Ug&lc.

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 1234567890&ÆŒ$¢£%!?()[]

UPPER AND LOWER CASE: THE INTERNATIONAL JOURNAL OF TYPOGRAPHICS

PUBLISHED BY INTERNATIONAL TYPEFACE CORPORATION, VOLUME SEVEN, NUMBER TWO, JUNE 1980

New Alphabets

But above all astonishing inventions, what loftiness of mind was that of the man who conceived of finding a way to communicate his most recondite thoughts to whatever other person, although separated from him by the longest intervals of space and time! To speak with those who are in the Indies, to speak with those as yet unborn, or to be born perhaps a thousand or even ten thousand years hence! And with what ease! All through the various groupings of twenty simple characters on paper. **GALILEO**





New alphabets can only be a logical evolution of letterforms already existing, designed for modern techniques of composition and as an expression of our own time. Tomorrow's computerized photocomposition developments will demand new design systems prepared to the last detail, and we shall devise working solutions only if we dissociate ourselves from the outdated forms of the past. The world today changes more swiftly than it did in former decades. In this world the printed word will be an influence of tremendous power. And since the printing industry, like the other mass media — radio and television — can influence millions of people daily, it must remain fully aware of its responsibility. **HERMANN ZAPF**

U&lc.

VOLUME SEVEN, NUMBER TWO, JUNE, 1980

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TYPE-FACES AND CLOTHES AND MAKING GOOD IDEAS WORK BETTER

Typefaces clothe words.

And words clothe ideas and information.

Clothes, the cliché says, make the person. Hardly. A person, an idea, a word has its own character and its own personality.

But clothes can attract or repel, enhance or detract, emphasize or neutralize, and make a person memorable or forgettable.

Typefaces can do for words, and through words for ideas and information, what clothes can do for people.

It isn't just the hat or tie or suit or dress you wear. It's the way you put it on and the way you coordinate it to your other clothes and its appropriateness to you and to the occasion that make the difference.

And so it is with type. A typeface library is a kind of wardrobe with garments for many occasions. You use your judgment and taste to choose and combine them to best dress your words and ideas.

Just as you can select the right tie but knot it too tightly or too loosely, or leave it crooked or uneven at the bottom, it is possible to choose the right typefaces and still use them poorly.

Today, with tens of thousands, and tomorrow with perhaps hundreds of thousands of people who have little or no knowledge of nor sensitivity to typefaces and typographic design being called upon to choose and use typefaces, it is imperative they be informed and sensitized so they can dress their words and ideas most effectively as well as most efficiently.

It is timely, therefore, that ITC has opened its ITC Center and is offering exhibits, seminars and library facilities to all who care. You are invited to attend the ITC Center's exhibits and seminars. Just watch the pages of U&lc for program details.

Come to the ITC Center. Visit with us there. If the ITC Center can inspire you to better clothe your words and messages, we'll consider our programs successful. The ITC Center is designed to help you use typefaces and typographic design to make good ideas work better.

THIS PAGE WAS SET IN ITC KORINNA KURSIV

The next 26 pages are dedicated to all those people in the graphic communications world who get very nervous when the talk gets technical.

terri·*fying* or terri·*fic:* A how it ends is up to you.

AS YOU GEAR YOURSELF for the heavy text of this issue of U&lc, you may have an overpowering urge to brake, clutch and shift into reverse—back...back ...back...to the good old days when a person could do a knockout job with a turkey quill, a sheet of vellum and a bottle of ink.

IT'S NOT OUR PURPOSE to drag anyone kicking and screaming into the '80's; your life is not at stake. But your livelihood is! Like it or not, the world of science and technology has become inseparable from the world of graphics, and we feel it is incumbent on us at ITC to keep you up-to-date on all the technological developments in printing and communications. The information can be terrifying...or it can be terrific. It's up to you.

CONSIDER THE BRIGHT SIDE: there is enormous potential for new design ideas based on the technological innovations. Remember what commercial technology did for all those clever fellows in the fine arts? Roy Lichtenstein made it big with Ben Day dots; Andy Warhol legitimized silkscreen and photo-screening as "fine art" techniques; Dan Flavin made a name for himself arranging fluorescent light bulbs; sculptors have become welders, and art is coming out of computers and photocopying machines.

SO MUCH FOR MOTIVATION. The fact of the matter is, you really have no choice. Anyone involved in graphics in the '80's will have to keep up with the rapidly changing technology of the '80's. But while Mr. Gutenberg, in his time, and the inventors of lasers and electronics of ours set a blistering pace, keep this in mind:

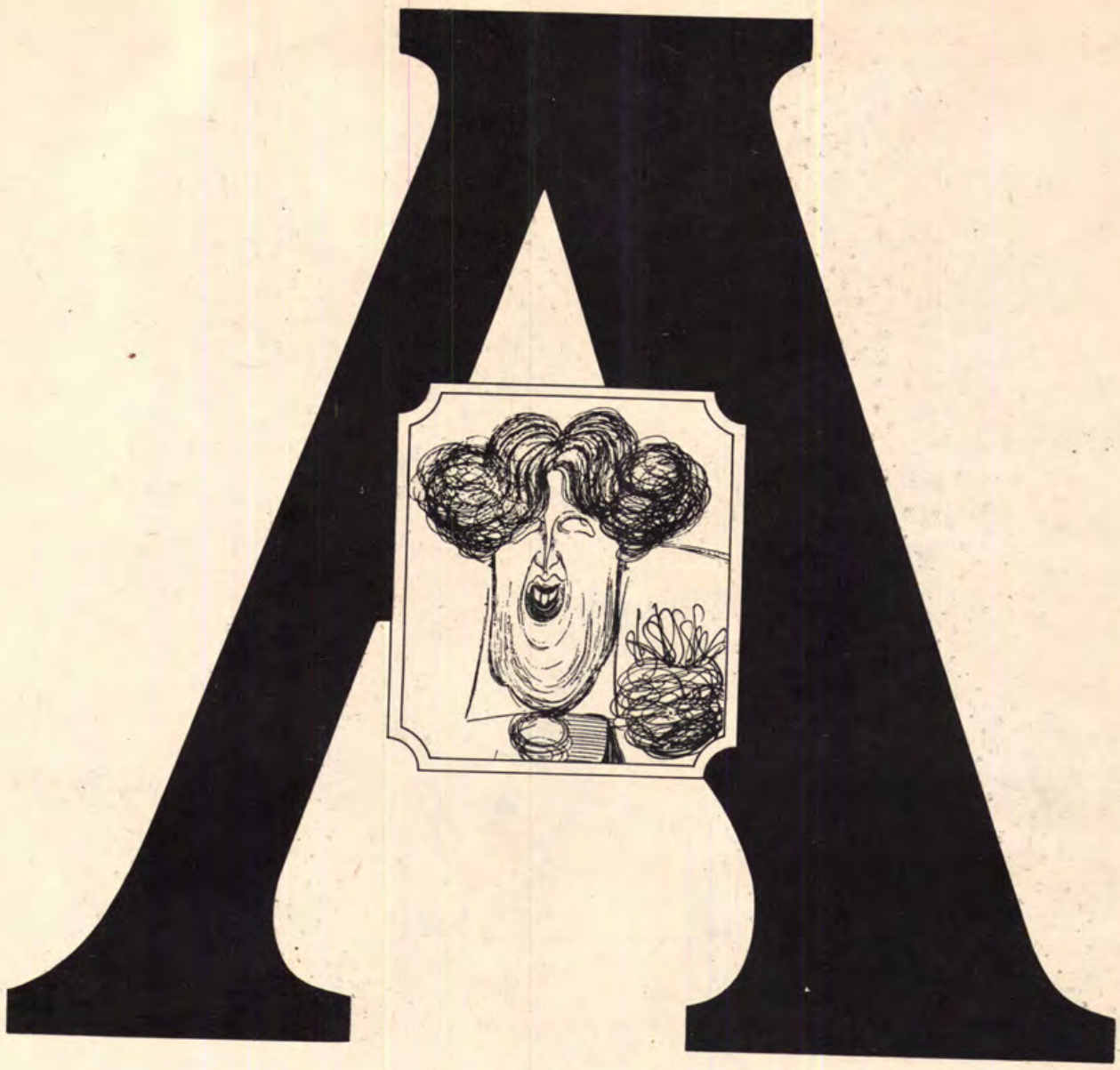
*The medium **does not** deliver the message.*
Designers do.

REGARDLESS OF THE DEVICES that are conjured up by the technicians, designers have the last word with the words. The job to entice, surprise, engage, entertain, inform, persuade — in short, communicate with readers—has been the burden of the artist from Day 1. Every age has had its specialists. When smoke signals were the medium, there were surely some Indians a little more nimble with their blankets...in the jungles, some drummers had a better beat...in the medieval cloisters, almost any brother could grind the pigment, but only a few penned the manuscripts.

THE PURPOSE OF THIS NEXT SECTION is to put the current communications scene in proper perspective. The technology of the '80's will be mind-boggling. But it is also mindless and powerless without the intelligence, talent, wit, imagination, esthetic sensibility, creativity and all those other sublime qualities that only human beings possess.

THIS PAGE WAS SET IN ITC FENICE

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ART

It is through Art, and through Art only, that we can realize our perfection; through Art and Art only that we can shield ourselves from the sordid perils of actual existence.

OSCAR FINGAL O'FLAHERTIE WILLS WILDE
1856-1900

THIS PAGE WAS SET IN ITC BENGUIAT

BEAUTY



I am certain of nothing but the holiness of the heart's affections and the truth of imagination—what the imagination seizes as beauty must be truth—whether it existed before or not.

JOHN KEATS
1795-1821

THIS PAGE WAS SET IN ITC TIFFANY



CREATIVITY

No great thing is created suddenly, any more than a bunch of grapes or a fig. If you tell me that you desire a fig, I answer you that there must be time. Let it first bloom, then bear fruit, then ripen.

EPICTETUS
CIRCA A.D. 60

THIS PAGE WAS SET IN ITC ERAS



DISCOVERY

It is often simply from want of the creative spirit that we do not go to the full extent of suffering. And the most terrible reality brings us, with our suffering, the joy of a great discovery, because it merely gives a new and clear form to what we have long been ruminating without suspecting it.

MARCEL PROUST
1871-1922

THIS PAGE WAS SET IN ITC ZAPF INTERNATIONAL



ESTHETICS

Nothing sublimely artistic has ever arisen out of mere art, any more than anything essentially reasonable has ever arisen out of the pure reason. There must always be a rich moral soil for any great esthetic growth.

GILBERT KEITH CHESTERTON
1874-1936

THIS PAGE WAS SET IN ITC QUORUM

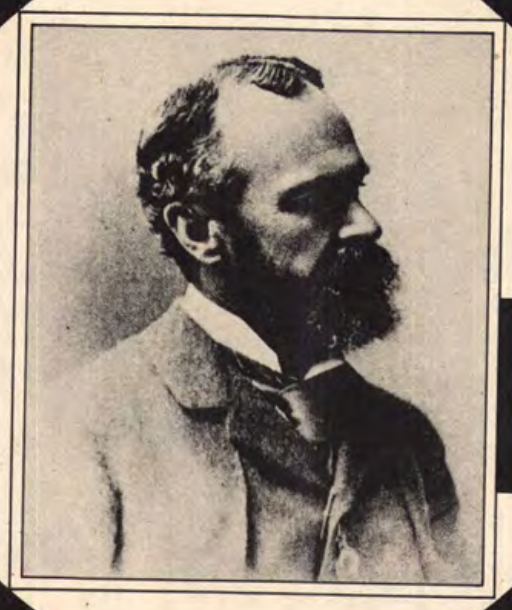


FORM

Arts and sciences are not cast in a mould, but are formed and perfected by degrees, by often handling and polishing, as bears leisurely lick their cubs into form.

MICHEL DE MONTAIGNE
1533-1592

THIS PAGE WAS SET IN ITC AMERICAN TYPEWRITER



GENIUS

Genius, in truth, means little more than
the faculty of perceiving in an unhabitual way.

WILLIAM JAMES
1842-1910

Great geniuses have the shortest biographies.

RALPH WALDO EMERSON
1803-1882

Genius is nothing but a great aptitude for patience.

GEORGES LOUIS LECLERC DE BUFFON
1707-1788

Mediocrity has no greater consolation
than in the thought that genius is not immortal.

JOHANN WOLFGANG VON GOETHE
1749-1832

Genius...which is the transcendent capacity
for taking trouble first of all.

THOMAS CARLYLE
1795-1881

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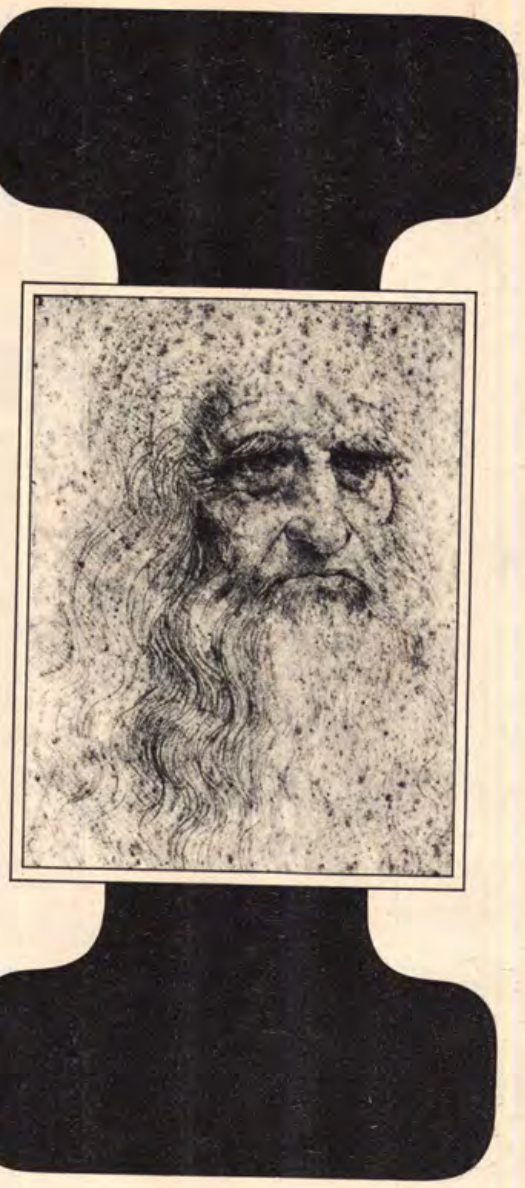


HUMOR

True humour springs
not more from the head than from the heart;
it is not contempt, its essence is love;
it issues not in laughter, but in still smiles,
which lie far deeper.

THOMAS CARLYLE
1795-1881

THIS PAGE WAS SET IN ITC BENGUIAT GOTHIC

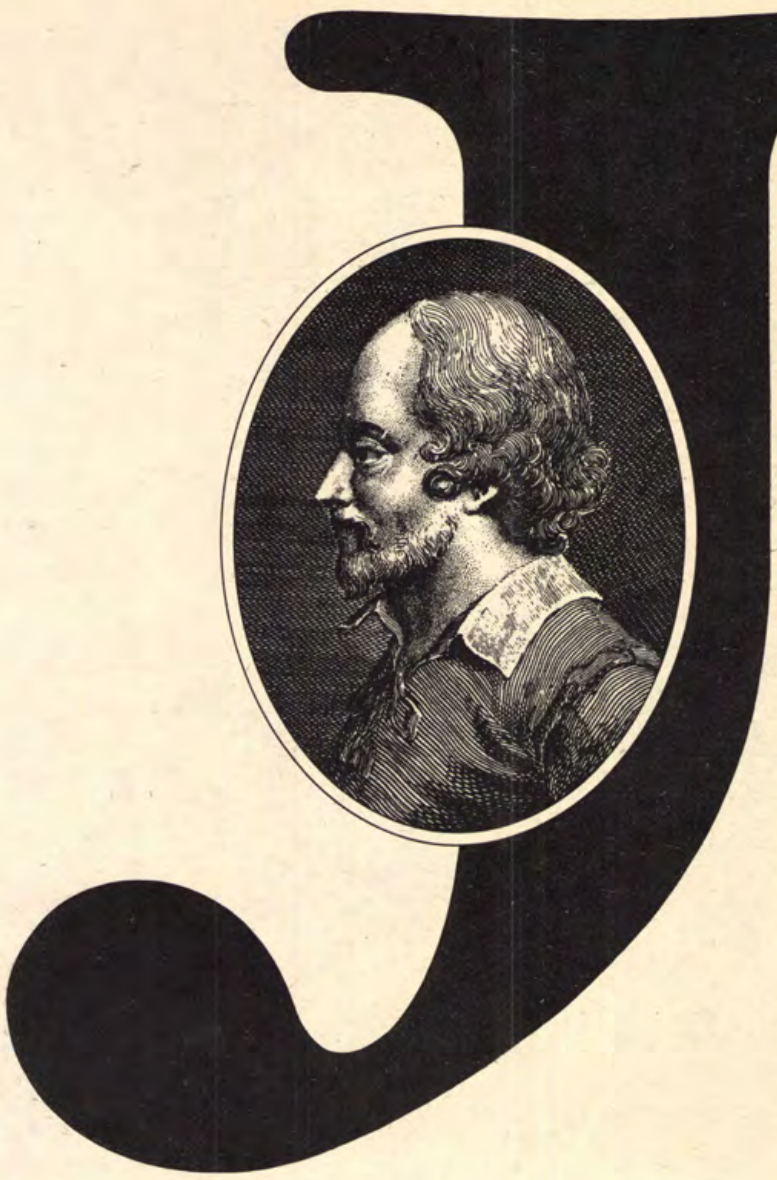


IMAGINATION

It is of no small benefit on finding oneself in bed in the dark to go over again in the imagination the main outlines of the forms previously studied, or of other noteworthy things conceived by ingenious speculation.

LEONARDO DA VINCI
1452-1519

THIS PAGE WAS SET IN ITALIA



JUDGMENT

Beauty
is bought by judgement
of the eye, Not utter'd
by base sale of chapmen's
tongues.

WILLIAM SHAKESPEARE
1564-1616

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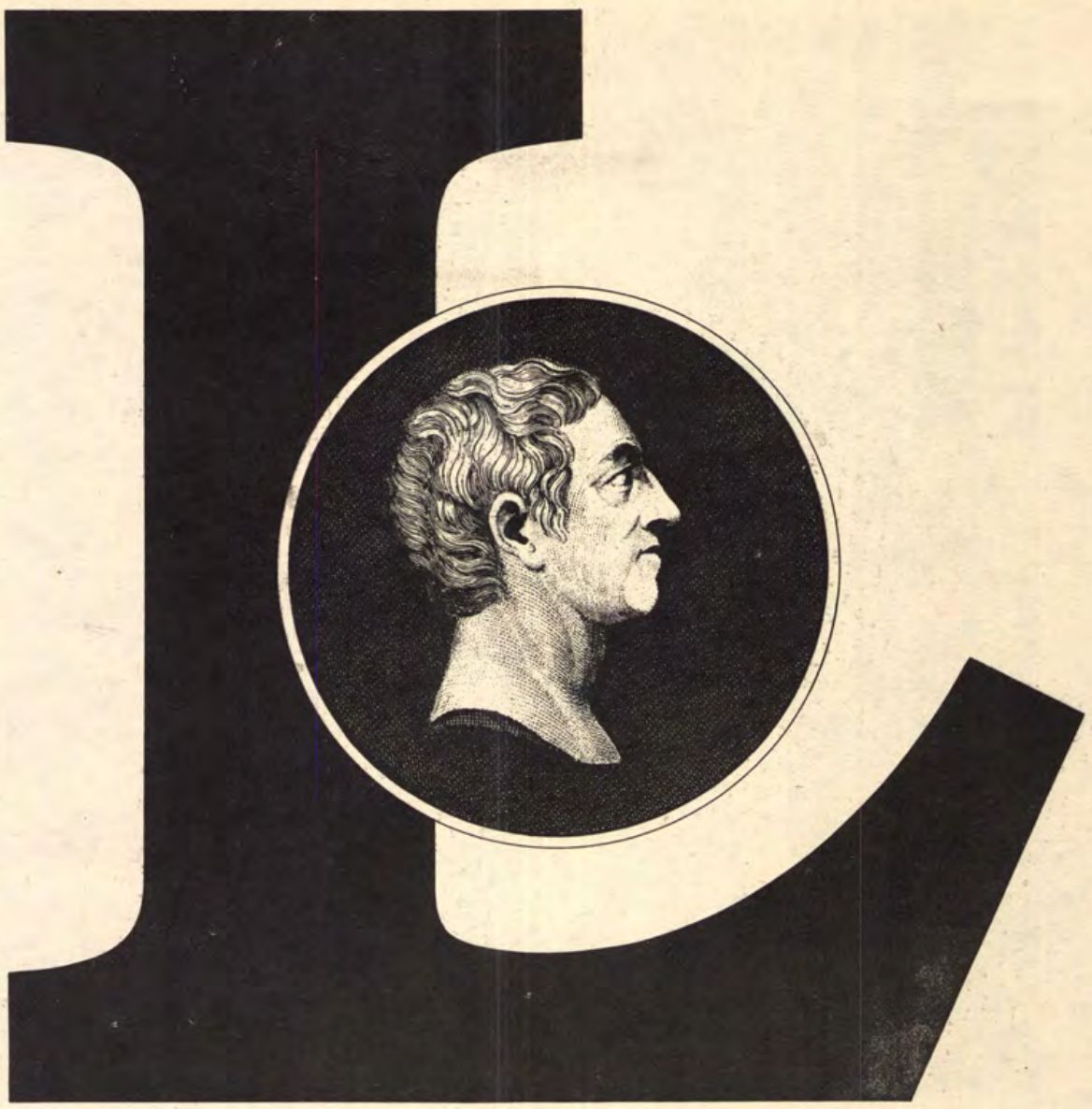


KNOWLEDGE

Where there is much desire to learn, there of necessity will be much arguing, much writing, many opinions; for opinion in good men is but knowledge in the making.

JOHN MILTON
1608-1674

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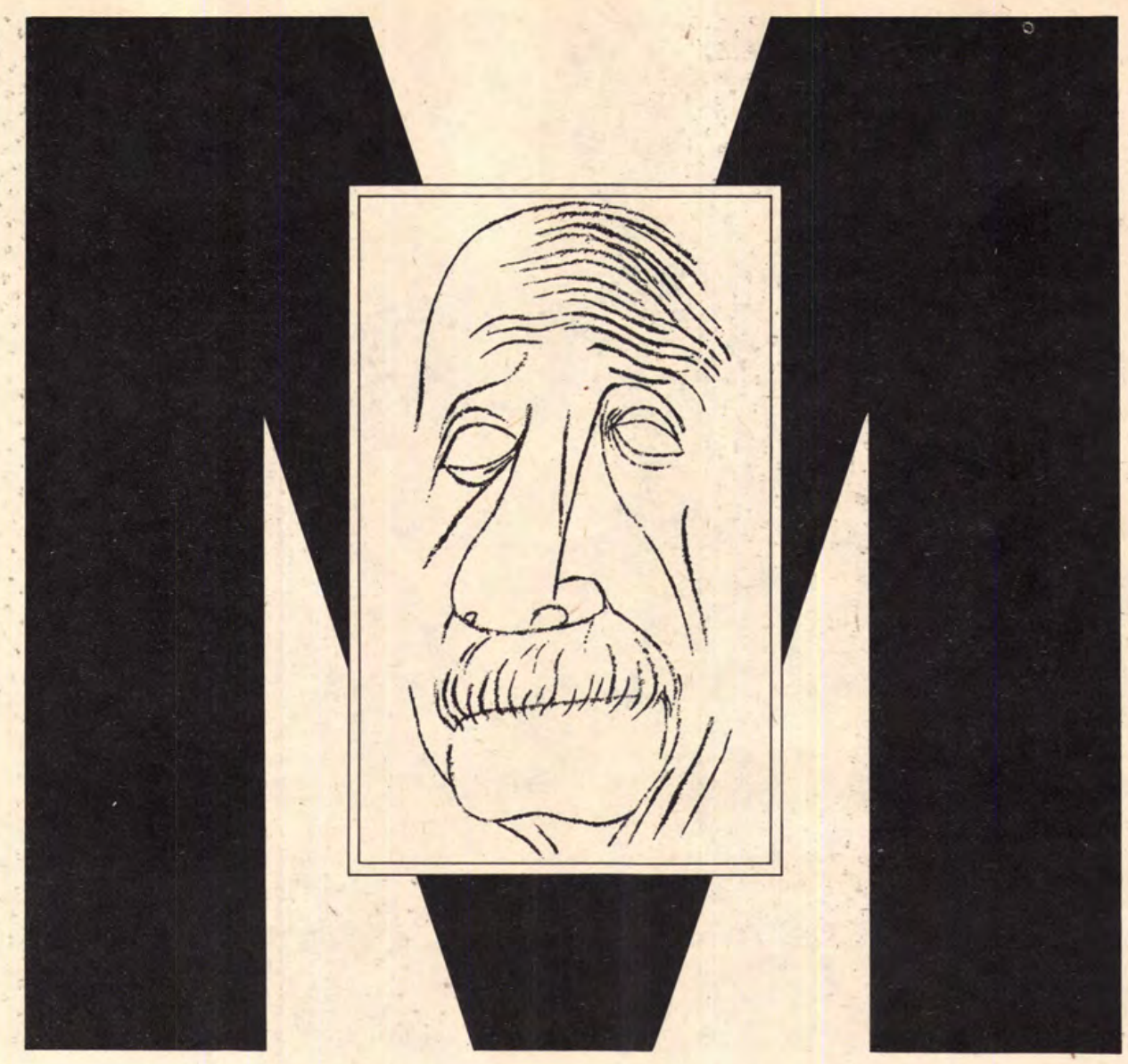


LUSTER

Knowledge may
give weight, but accomplishments give luster,
and many more people see than weigh.

PHILIP DORMER STANHOPE
EARL OF CHESTERFIELD
1694-1773

THIS PAGE WAS SET IN ITC BOOKMAN



MYSTERY

The most beautiful thing we can experience is the mysterious. It is the source of all true art and science.

ALBERT EINSTEIN
1879-1955

THIS PAGE WAS SET IN ITC AVANT GARDE GOTHIC

NOVELTY



America is a land of wonders, in which everything is in constant motion and every change seems an improvement. The idea of novelty is there indissolubly connected with the idea of amelioration. No natural boundary seems to be set to the efforts of man; and in his eyes what is not yet done is only what he has not yet attempted to do.

ALEXIS DE TOCQUEVILLE
1805-1859

THIS PAGE WAS SET IN ITC NOVARESE



OPPORTUNITY

Art is long,
life short; judgment difficult,
opportunity transient.

JOHANN WOLFGANG VON GOETHE
1749-1832

THIS PAGE WAS SET IN ITC SERIF GOTHIC



POWER

No man ever forgot the visitations of that power to his heart and brain, which created all things new; which was the dawn in him of music, poetry, and art.

RALPH WALDO EMERSON
1803-1882

THIS PAGE WAS SET IN FRIZ QUADRATA



QUALITY

The critical sense is so far from frequent that it is absolutely rare, and the possession of the cluster of qualities that minister to it is one of the highest distinctions.

HENRY JAMES
1843-1916

THIS PAGE WAS SET IN ITC ZAPF BOOK

REALITY



No idea is so antiquated that it was not once modern. No idea is so modern that it will not some day be antiquated....To seize the flying thought before it escapes us is our only touch with reality.

ELLEN GLASGOW
1874-1945

THIS PAGE WAS SET IN ITC NEWTEXT



SIMPLICITY

Simplicity
is the mean between
ostentation and rusticity.

ALEXANDER POPE
1688-1744

THIS PAGE WAS SET IN ITC KORINNA



TALENT

If a man has a talent and cannot use it, he has failed. If he has a talent and uses only half of it, he has partly failed. If he has a talent and learns somehow to use the whole of it, he has gloriously succeeded, and won a satisfaction and a triumph few men ever know.

THOMAS WOLFE
1900-1938

THIS PAGE WAS SET IN ITC FRANKLIN GOTHIC



UNIVERSALITY

All progress
is based upon a universal innate
desire on the part of every organism
to live beyond its income.

SAMUEL BUTLER
1835-1902

THIS PAGE WAS SET IN ITC FENICE



VITALITY

The vitality of thought is in adventure. Ideas won't keep. Something must be done about them. When the idea is new, its custodians have fervour, live for it, and, if need be, die for it.

ALFRED NORTH WHITEHEAD

1861-1947

THIS PAGE WAS SET IN ITC KABEL

W



WIT

The delectable form which intelligence takes in its moments of surplus power—the form of wit.

STUART PRATT SHERMAN
1881-1926

THIS PAGE WAS SET IN ITC CLEARFACE



XCELLENCE

Whatever is felicitously expressed risks being worse expressed: it is a wretched taste to be gratified with mediocrity when the excellent lies before us.

ISAAC D'ISRAELI
1766-1848

THIS PAGE WAS SET IN ITC CHELTENHAM



YEARNING

There are
three ingredients in the
good life: learning,
earning, and yearning.

CHRISTOPHER MORLEY
1890-1957

THIS PAGE WAS SET IN ITC BAUHAUS



ZEAL

I remember a passage in Goldsmith's "Vicar of Wakefield," which he was afterwards fool enough to expunge: "I do not love a man who is zealous for nothing".

SAMUEL JOHNSON
1709-1784

THIS PAGE WAS SET IN ITC ZAPF CHANCERY

What's New from ITC?

ITC Fenice Light, Regular, Bold and Ultra with corresponding italics are new typefaces from ITC. Only licensed ITC Subscribers are authorized to reproduce, manufacture, and offer for sale these and other ITC typefaces shown in this issue. This license mark is your guarantee of authenticity.

ITC LICENSED

These new typefaces will be available to the public on or after July 14, 1980, depending on each manufacturer's release schedule.

ITC



Aldo Novarese was born in 1920 at Pontestura Monferrato, Piedmont, Italy.

When he was still a boy, he entered the Scuola Artieri Stampatori in Turin, where he was trained in the techniques of wood engraving, etching and lithography. Following his natural bent, he pursued his studies at the Scuola Grafica G.B. Paravia of Turin, where he graduated and later taught graphic design for nine years. As a very young man, he joined the Art Studio of Nebiolo and after a few years was promoted to become its head.

Today, Aldo Novarese is the leading Italian type designer and among the most renowned in the world. He has created no less than 165 alphabets, some of which are widely known and used in Italy and abroad. These are, in chronological order: Augustea, Atenaeum, Landi, Cigno, Ritmo, Egizio, Garaldus, Slogan, Juliet, Fontanesi, Recta, Eurostile, Estro, Nova Augustea, Oscar, Magister, Metropol, Forma, Elite, Stop, ITC Novarese, and now ITC Fenice. In addition to letter design, Aldo Novarese also successfully practices graphic design and devotes part of his time to study and research concerning typography and advertising.

Biographical sketches and reproductions of his work have appeared in books and periodicals of world-wide circulation. His works have often been shown in personal or collective exhibitions. His own classifications of typefaces were presented at the French Ecole de Lure in 1957. He is the author of Alfa-Beta, a handbook on letter design, its history and development.

In his manifold activities, he has been awarded prizes and distinctions in the following competitions: I.C.I. Competition, 1949; Progresso Grafico Competition, 1949; Liege Competition, 1950; Rassegna Grafica Competition, 1955 (first prize); Milan Fair Gold Medal, 1956; Lina Grafica Competition, 1956 (first prize); A.I.A.P. Garter, 1963; Mario Gromo Gold Medal, 1965; VGC International Typeface Design Competition, New York, 1966; Compasso d'Oro Competition, 1970.

Although Aldo Novarese is known primarily as a typeface designer, he is also a painter endowed with an uncommon native talent and ingenuity.

FENICE

(FE-NEE-CHAY)

ITC Fenice is a neo-classic character in the tradition of Didot, Bodoni and Ibarra. These faces are distinguished by the thread-like serifs that were perfected by Bodoni. The ITC Fenice family retains the distinctive characteristics of the Bodonis and blends them with contemporary structural style.

The lowercase has a larger x-height. Certain Baroque embellishments of ITC Fenice's forefathers have been eliminated. For example, hooks in the lowercase "a," "c," "r," and "g" contrast with those in the uppercase "C" and "G" where they are most prominent. The serifs have also been shortened to guarantee tighter letterfit.

ITC Fenice was designed by Aldo Novarese. The Regular with Italic and the Bold Roman were originally issued by H. Berthold AG. ITC is offering these versions under license from H. Berthold AG and has rounded out the family by commissioning Novarese to draw a Light with Italic, a Bold Italic, and an Ultra with Italic.

This is the second typeface of Mr. Novarese's to be issued by ITC, the first being the ITC Novarese family introduced in December, 1979. Mr. Novarese has designed more than 165 typefaces. Some of the best known are Eurostile, Egizio, Slogan, Fontanesi, Magister, Juliet, and Nova Augustea.

LIGHT

ITC FENICE LIGHT

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,..!?•-–—”’—/#*)[†‡§«»]
ĄÇĐĘŁØÆŒẞąćçđęłøäæõœåfi
1234567890123456789012345678 90

ITC FENICE LIGHT ITALIC

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,..!?•-–—”’—/#)[†‡§«»]*
ĄÇĐĘŁØÆŒẞąćçđęłøäæõœåfi
1234567890123456789012345678 90

REGULAR

ITC FENICE REGULAR

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,..!?•-–—“”’/#*)[†‡§«»]
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1234567890123456789012345678 90

ITC FENICE REGULAR ITALIC

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,..!?•-–—“”’/#)[†‡§«»]*
ĄÇĐĘŁØÆŒßąćçđęłøäæõêfi
1234567890123456789012345678 90

BOLD

ITC FENICE BOLD

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,..!?•-“”’—/#*)[†‡§«»]
ĄÇĐĘŁØÆŒßąćçđęłøæœfi
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ITC FENICE BOLD ITALIC

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,..!?•-“”’—/#)[†‡§«»]*
ĄÇĐĘŁØÆŒßąćçđęłøæœfi
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ULTRA

ITC FENICE ULTRA

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,.!?•-“”’—/#*)[†‡§«»]
ĄÇĐĘŁØÆŒßąçđęłøæœfi
1234567890123456789012345678 90

ITC FENICE ULTRA ITALIC

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
&$$¢£%(:;,.!?•-“”’—/#)[†‡§«»]*
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WARNING

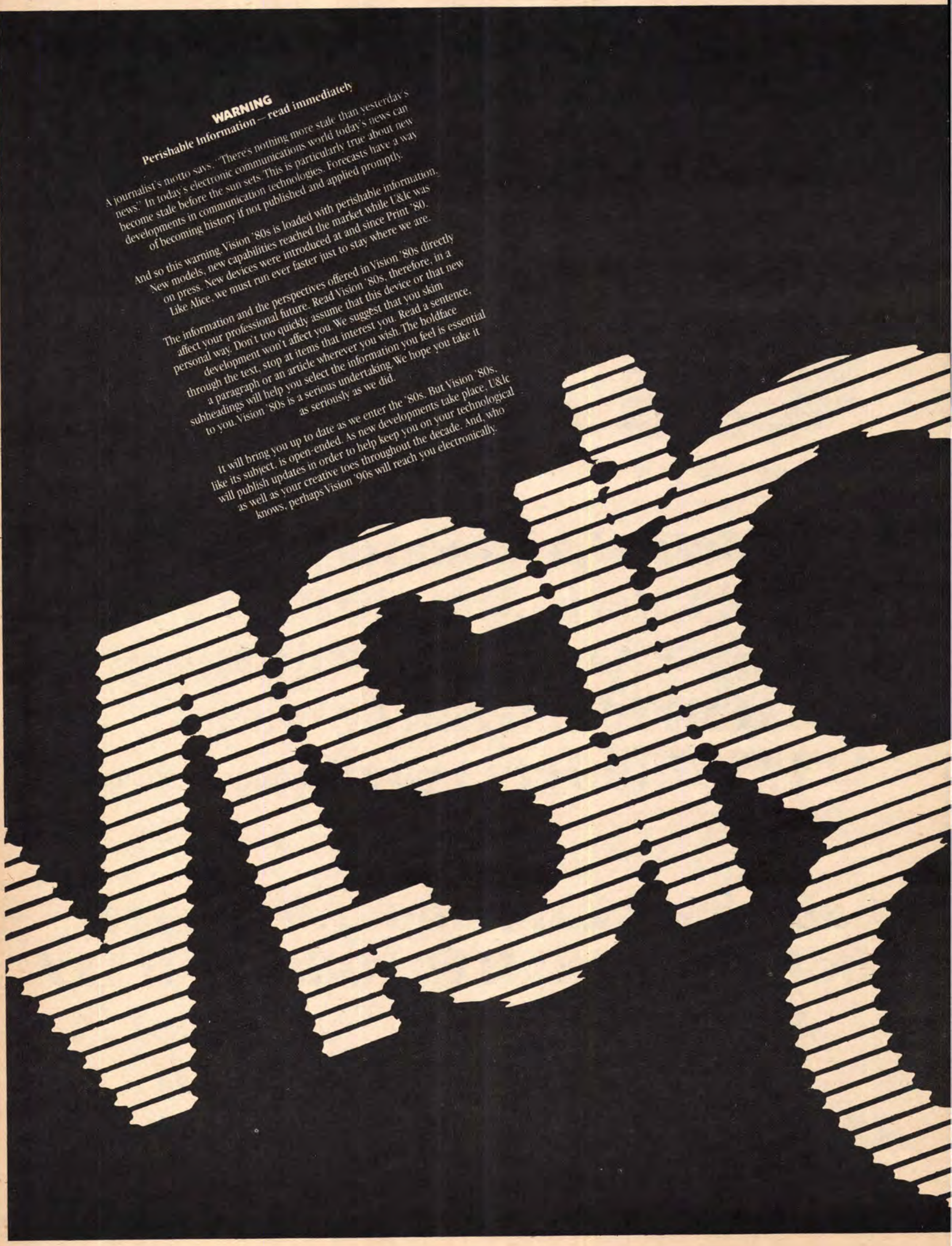
Perishable Information — read immediately

A journalist's motto says, "There's nothing more stale than yesterday's news." In today's electronic communications world today's news can become stale before the sun sets. This is particularly true about new developments in communication technologies. Forecasts have a way of becoming history if not published and applied promptly.

And so this warning. Vision '80s is loaded with perishable information. New models, new capabilities reached the market while U&lc was on press. New devices were introduced at and since Print '80. Like Alice, we must run ever faster just to stay where we are.

The information and the perspectives offered in Vision '80s directly affect your professional future. Read Vision '80s, therefore, in a personal way. Don't too quickly assume that this device or that new development won't affect you. We suggest that you skim through the text, stop at items that interest you. Read a sentence, a paragraph or an article wherever you wish. The boldface subheadings will help you select the information you feel is essential to you. Vision '80s is a serious undertaking. We hope you take it as seriously as we did.

It will bring you up to date as we enter the '80s. But Vision '80s, like its subject, is open-ended. As new developments take place, U&lc will publish updates in order to help keep you on your technological as well as your creative toes throughout the decade. And, who knows, perhaps Vision '90s will reach you electronically.







Author, editor: *Edward M. Gottschall, Director of Information and Marketing Services, International Typeface Corporation and Vice President, Design Processing International, Inc. In a graphic arts career that began in 1938 he has been managing editor of the Graphic Arts Production Yearbook, editor and co-publisher of Art Direction magazine, co-editor of the four Advertising Directions books, instructor and lecturer at New York University and Pratt Institute, Executive Director of the American Institute of Graphic Arts, and founder of the Annual Type Directors Club exhibition. He is currently the United States delegate to ATYPI (Association Typographique Internationale).*

Design: *Jurek Wajdowicz, designer, Lubalin, Burns & Co., Inc., and Associate Design Director of Design Processing International, Inc., was the designer of the entire Vision '80s feature. He graduated summa cum laude, Academy of Fine and Visual Arts, Lodz, Poland with a Master of Arts Degree in 1976 and started his professional career freelancing in Poland. He joined Lubalin, Burns & Co., after a trainee period with Pentagram Design in London. His work has been shown in numerous publications and exhibitions here and abroad.*

Assistant to the editor: *Juliet Travison, International Typeface Corporation, assisted in editorial research, collecting the illustrations, verifying data, keyboarded the entire text on a word processor and handled the first phase of the interfacing.*

Photomechanical art and production: *Ilene Mebl, artist, International Typeface Corp.*

Typefaces: *ITC Garamond Book Condensed and Italic, Bold Condensed and Italic, and Light Condensed Italic. ITC Kabel Ultra. ITC Avant Garde Gothic Book Condensed, ITC Avant Garde Gothic Medium Condensed.*

Keyboarding, interfacing, typesetting: *Vision '80s was completely keyboarded in the office on a word processor using hard-sectored floppy discs. On the WP, the text was transferred (in about 60 seconds per disc) to soft-sectored discs. These were then run on a typesetting editing terminal to produce discs that could drive a digital typesetter.*

ORIGINATING INFORMATION ____ 40

IMAGE ORIGINATION *(computer/electronic art/photography)* ____ 45

INPUT: DATA/TEXT ____ 52

INPUT: IMAGES/GRAPHICS ____ 57

FILING/RETRIEVAL STORAGE *(electronic and micrographic)* ____ 58

VDT EDITING ____ 63

PAGE/AREA COMPOSITION AND ELECTRONIC/STORED FORMATS ____ 70

INTERFACING ____ 80

TYPEWRITERS *(electronic, intelligent, communicating)* ____ 82

WORD PROCESSING MACHINES AND SYSTEMS ____ 84

a. Stand-alone *c. CRT systems* *e. Time-sharing*
b. Single-line display *d. Shared-logic* *f. Shared-resource*

TYPESETTING *(photographic, digital)* ____ 95

TYPEFACES ____ 112

REPRODUCTION/MULTIPLE COPIES ____ 118

a. Non impact *b. Intelligent copiers*

DISTRIBUTION/ELECTRONIC MAIL ____ 124

THE AUTOMATED OFFICE, THE OPEN OFFICE ____ 132

WHICH SHALL IT BE? CHOOSING EQUIPMENT AND SYSTEMS ____ 138

DOWN THE ROAD: EXECUTIVE VIEWS OF THE FUTURE ____ 141

VISION '80s UPDATE ____ 144

A PENULTIMATE NOTE: LOOKING BACKWARD FROM THE '80s ____ 145

EPILOGUE: LOOKING BACKWARD TO THE '80s ____ 146



A MINI-GLOSSARY OF TERMS USED IN VISION '80s

Cathode-Ray (CRT)
A viewing tube, as in a television set. Used in phototypesetting to display copy. CRT's are used in input/editing and composition terminals and in typesetting machines.

Central Processing Unit (CPU)
The main manipulatory section of a computer, which contains the arithmetic-logical unit, registers, etc.

Cursor
A movable spot of light that appears on the screen of visual display terminals and can be positioned horizontally and vertically by means of keyboard controls to instruct the computer at what point a correction, insertion, deletion or other change is to be made.

Data Base
Data items are stored in order to meet specified information processing and retrieval needs. A data base is an integrated file of such data, usually recorded electro-magnetically.

Digital Data
Data that is electromagnetically stored in the form of discrete digits. The data for the letter "A" would be a specific combination of on and off electrical digits.

Disc Drive
The system or device which electromagnetically reads information from or writes information on a magnetic disc.

Hard copy
The typewritten or paper copy of material keyboarded into a computer, word processor, or typesetter. Also a printed or typed record of their output.

Hardware
The actual equipment which makes up a system. As opposed to the programming or instruction sets for the system (software).

Interface
In computer technology it usually refers to some form of electronic device which enables one piece of gear to communicate with or control another. A device linking two otherwise incompatible devices such as an editing terminal of one manufacturer to a typesetter of another manufacturer.

Laser
An intense, coherent light source that can be optically manipulated. An acronym for "Light Amplification by Stimulated Emission of Radiation."

Scanner
An electronic device that recognizes the presence or absence of data on the surface of magnetic tapes or discs, printed sheets, photographs, color art or transparencies, for example.

Software
A program (or collection of programs) which controls the operation of the computer. A kind of shorthand or code that, when applied, enables an operator to achieve desired output from a computer-controlled device such as a word processor or typesetter.

VDT (Visual Display Terminal)
A device which usually includes a keyboard, cathode-ray tube for displaying text, and a memory or storage area. VDT's are used for a number of purposes in word processing/typesetting systems including entering of text, editing, managing a file system, page makeup and outputting.

And some initials used in Vision '80s

COM	Computer Output Microfilm	**EM**	Electronic Mail
CPS	Characters Per Second	**OCR**	Optical Character Recognition
CWP	Central Word Processing	**OEM**	Original Equipment Manufacturer
DP	Data Processing	**PS**	Proportional Spacing
ECOM	Electronic Computer-Oriented Mail	**WP**	Word Processing

INTRODUCTION

New tools, new methods, new jobs, new careers for artists and designers, writers and editors, typists and typesetters

Tremendous and far-reaching changes that are taking place right now will accelerate and intensify in the immediate future, with respect to the tools used by art directors, designers, and writers and what effects they can achieve while at the same time saving time and money.

These changes make full use of creative talent, offer a greater range of choices with visual aids, and make possible quicker decisions. They also often require final graphic decisions much earlier in the production process than was heretofore necessary.

They will affect job opportunities by creating new and expanded jobs in the market for consultant designers, by upgrading salaries, and by altering lines of authority and career paths.

These ongoing changes will make possible new visual effects and greatly improved communications effectiveness, especially in graphics and typography created and produced in offices.

Companies and individuals can thrive in this rapidly evolving environment of computer- and/or laser-aided automated offices, reproduction centers, editorial offices, and art and design studios.

To do so requires learning about new technologies. This prospect —though it bores, baffles, and turns off some creative people— excites and inspires many others.

A KALEIDOSCOPE RUN WILD

Alvin Toffler, in *Future Shock*, writes of the "shattering stress and disorientation that we induce in individuals by subjecting them to too much change in too short a time." The result is a "real sickness," a "disease of change" —a disease that can be prevented by learning what the new technologies are and how to use them advantageously. This is what Vision '80s aims to help *U&lc* readers to do.

Some people have an "irrational resistance to change"; others "hunger, even rage for change." Reality, to all, often seems like "a kaleidoscope run wild."

FOCUS: WHAT CAN THE NEW MACHINES DO?

Toffler's words certainly apply to the changes taking place with unprecedented speed in the way offices, graphic arts services, reproduction centers, editorial and advertising departments, and art and design studios operate today, as well as in what they can do and how they can do it.

For most of us, it is not necessary to know about all the different machines and various models on the market. Nor need we be overly concerned about how they work. Those of us who wish to survive and thrive in the years ahead do need to know, however, what the current technology can do, how we can use it to do new things or do our customary work better, faster, or at lower cost.

Through Vision '80s, a review of the new methodologies and their possible meaning to our readers, *U&lc* will offer at once a broad picture of the trends in information management and the automated office as well as a more detailed report covering new and future machines, materials, and methods affecting typographic communications.

FORCES OF CHANGE

U&lc believes —knows— that a tremendous range of new equipment affects the future role of the art director, for example, including matters that may be furthest from his/her immediate concern: things as seemingly remote from creativity and taste and graphic judgment as fiber optics, lasers, bubble memories, and non-impact printing.

THE TV/FAX CONNECTION

The technological changes that affect our jobs and careers are in turn brought about by forces in the marketplace. Economic forecasters see some slippage in the role of print communications in the years ahead because of the electronic media's ability to communicate more rapidly and with better cost-effectiveness.

As facsimile transmission improves and becomes linked to television, it will put hard (paper) copy into the living room and in the process will confront newspapers, magazines, and books head on. To combat this, the print media and their suppliers are adapting the technologies of the electronic media and concentrating on improving the cost-effectiveness of print.

This economic drive has created a climate of acceptance by print for the new tools and methods to be reviewed in Vision '80s.

Vision '80s will explain the many new technologies to *U&lc* readers at their level of concern and in terms they can relate to. The editors of *U&lc* hope that Vision '80s will help you overcome any fear of or resistance to change you may have—resistance, we believe, that is due to a fear of the unknown. We hope that Vision '80s, by making the unknown known, will whet your appetite for the exciting accomplishments that will be possible with the new tools at your command, so that you will become one of those who hunger for valuable change and who will adapt and thrive.

YOUR JOB WILL BE MADE EASIER, YOUR ABILITIES EXPANDED

Consider just a few things you can do right now:

- Create full-color art with a keyboard and a cathode-ray tube. That's right—no brush, no camera, no paper, no film. Your palette has 128 colors, and you can work faster and create more versions, to be stored or thrown away or produced at will.

- Make up a full editorial or advertising page without a T square, paper, razor blade, or rubber cement and revise it instantly while watching it being revised on a TV tube. Then you can push a button to send it to a typesetting machine that will turn out a fully made-up page on film, paper, or a press plate.

- Transmit an OK'd page, with type and screened halftones in position, from an editorial/art office in Washington to a printing plant in Los Angeles within minutes.

And, in a very few years:

- You will be working with fewer standard paper sizes, new formats, and preprogrammed formats.

- You will take pictures with electronic (filmless, paperless) cameras.

- The very design and furnishings of your office or studio will be changed to accommodate the new tools you will be using.

- You will be able to rapidly create, see, and choose from among more "roughs" than you ever thought possible.

NEW PRESSURES, NEW OPPORTUNITIES

Most art directors and designers will be working in an environment increasingly concerned with cost-effectiveness, interested in getting work done cheaper, quicker, and better. In such an atmosphere, delays will become increasingly costly as information flows more and more rapidly. Fast, even instant decisions will be required.

Automation makes equipment breakdowns, delayed decisions, and time-consuming revisions (as of copy or layout) prohibitively expensive. On the other hand, automation offers new devices that enable the writer or art director to make corrections instantly and inexpensively before the copy is typeset.

Thus the pressure to make graphic decisions quickly (with the aid of the new electronic devices), and to abide by them, will become ever more demanding. **Speed is becoming an element of talent.** Vision '80s will report on the forces bringing this to pass.

There will be, or should be, more consulting of art directors and designers at the beginning of a job, when the concept is being developed. The art director who knows what the new equipment can and cannot do will be in a better position to give advice while a job is in the planning stage. As we all know, those who help plan and design work are usually better paid than those who execute what others have planned.

More than ever before, people will be changing jobs. Their loyalties to a company or a boss will be weakened and transient, but their loyalties to personal work standards and to their professional societies are likely to be stronger.

In an affluent, fast-moving society there is less risk of failure for a person with skills and talent, and knowledge of this favorable situation will cause more people to change jobs, to form their own service organizations, or to serve as freelance consultants. This condition coincides with an increasing demand for such services.

IS YOUR JOB IN DANGER?

The new tools will not replace taste or judgment. They will help you do what you want to do faster, and better too. Although specialized technicians will replace many traditional craftsmen, the creative editor and designer who can work with the new tools and their keyboards, graphic tablets, electronic pens, TV tubes, and computer programs will be in greater demand than ever. But remember—if you can't or don't want to learn all about the significant changes that are taking place, there are others who will and who will gain a decided advantage over those with a "do nothing to learn" attitude and maybe even take your job away. Stop learning—and you open the door for your replacement.

THE SCOPE OF VISION '80s

To help you understand all the new tools at your command —for that is what the new machines and methods are—and to help you understand how they relate to each other and how they affect you, Vision '80s will review what's new in typo/graphic communications sequentially, from the word or image originator to distribution of information to the ultimate reader. The discussion will cover subjects traditionally dear to the heart of art directors and graphic designers, such as typesetting methods, typefaces and page/area makeup, as well as many operations that until now were not the concern of graphic creative people. With all operations in the communications chain now electro-digitally linked, creative directors and staffers need at least a general understanding of them and how they relate to each other.



"tiger in the tank" is a means of communicating maximum imagery in minimal time.

ORIGINATING INFORMATION

A need
A message
Information sources
Word/image originators
and a driving force for change:
Cost-effectiveness

The irresistible force bringing the new tools and technologies to the office, the production center, and the commercial graphic arts community is the drive for improved cost-effectiveness. Business survival, not simply profit margins, often depends on producing more for less and cutting unit costs, whether of manufacturing an automobile or typing a letter.
Cost-effectiveness in information management involves new standards of:

Speed

Compaction

Communications effectiveness

Talent productivity

Graphic quality

Cost reduction (for labor, equipment, materials, overhead, maintenance, etc.)

SPEED

As Vision '80s will report, from input through distribution, and including decision making as well as creative and production operations, new technologies are stepping up the quantity of output per person per day, or per dollar invested. Word processors type faster and faster. Some steps, such as rekeyboarding manuscripts for typesetting, are now skipped entirely. Throughout Vision '80s, we shall note the speeding up of every stage of the communications process.

COMPACTION

One way of cutting costs and increasing productivity is to compact information and operations. New transmission lines using superfine and superstrong fibers will enable a cable to carry 40,000 times the number of lines that can be carried by a copper wire cable of the same diameter. A new generation of equipment now in advanced testing stages electronically compacts all these steps in one machine: that is, keyboards input of copy (type or illustrations), makes up elements into pages, and bypasses platemaking as it produces multiple copies in b/w or color.

One of the most fruitful areas for compaction is in the typesetting of material formerly produced on typewriters. Some 40 percent of the space is saved, thus cutting paper, filing, distribution, and storage costs. Such compaction of information and operations also cuts costs by reducing production time and personnel at the machine operator level.

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Compaction. *The typewritten copy has been set in the nearest comparable type size. Eleven lines of typewritten text have been compacted to six lines of the same length and double-spacing has been eliminated while improving appearance and readability.*

Compaction is made use of by the graphic artist, too, when employing symbols to condense and relay information. The artist thus tries to use every instant of exposure to its utmost. The

COMMUNICATION EFFECTIVENESS, TALENT PRODUCTIVITY, GRAPHIC QUALITY

Cost-effectiveness requires not only spending fewer dollars per unit produced but also getting better results per dollar spent. In communications this could mean that a message must reach more people; or get to them more quickly; or be understood more quickly; or, in the case of a sales message, be seen and acted on by more people.

The implication of this to the creative communicator—whether a planner, writer, or graphics specialist—is that there will be a greater demand for people who can improve message effectiveness. The market for creative talent will expand. **Such talent will be in short supply, and many writers and designers will be able to freelance or run service operations and thrive while serving many clients instead of working for one company for a fixed salary.**

But management will be very demanding of such talent in two ways: (1) increasingly, there will be attempts to measure communications effectiveness; (2) talent productivity will be stressed. The pressure for the writer and designer to produce more copy and more designs per day will be abetted by the new tools described in Vision '80s. Substantial rewards will go to the graphic designer who couples knowledge of these tools with good judgment concerning effective message presentation and with an ability to think and work rapidly.

Will graphic quality suffer as a result of the new tools and the need to work more rapidly? It need not and should not. Of course, much depends on how one defines graphic quality. While output quality of the new machines varies greatly from one machine to another, the best of the new equipment promises to maintain and even improve quality standards of image sharpness, color fidelity, and tone control. Some of the new word processors and typesetters offer better letterfitting and better readability per given size than ever before. Gains in productivity and cost-effectiveness need not compromise graphic quality.

COST REDUCTIONS

Much of the new equipment to be brought into offices and reproduction centers in the '80s will cut personnel costs by reducing the labor force. This will be especially true in areas where machine operators, however skilled, are not required to exercise taste and judgment. And, ironically, those whose creative functions call primarily upon their taste and judgment will have to learn to operate machines. These machines, which will be comparatively easy to operate, will not simply increase their productivity but will actually enhance their ability to produce the best possible solutions to their communications problems. The new machines thus will expand, not restrict, their users' creative potential.

In addition to cutting labor costs, the new office and reproduction center systems will reduce the overall costs for some materials (notably paper) and of filing and eventually distributing information. Many of the new solid-state machines have few moving parts, and this will result in less nonproductive time (out of service

ILLUSTRATION BY JACQUI MORGAN

for repairs) and less, faster, and easier maintenance when repairs are required. Much new equipment will incorporate diagnostic routines for spotting defects and facilitating do-it-yourself repairs.

Equipment costs, initially high as new equipment enters the market, keep dropping as a wider market level is reached and as lower-cost computers and processors replace, at an astonishing rate, the more costly ones.

If more productive equipment means that one machine and one person can do the work formerly done by several, this also means that less space is required for machines and personnel, with consequent savings in rent and many related overhead items.

CONSEQUENCES FOR CREATIVE TALENT

What do all these developments mean to an art director, for example? Why should a staff designer or writer be concerned with overall office, reproduction center, or even studio cost-effectiveness? Because the management drive to cut costs and step up productivity is not confined to machines, materials, and expendable personnel. Managerial, support, and creative talent retained will have to become more productive. There will be new tools and equipment to make greatly increased productivity possible. Those who learn to use them to full advantage will thrive; those who don't, risk becoming expendable.

THE GRID—A TIMESAVER

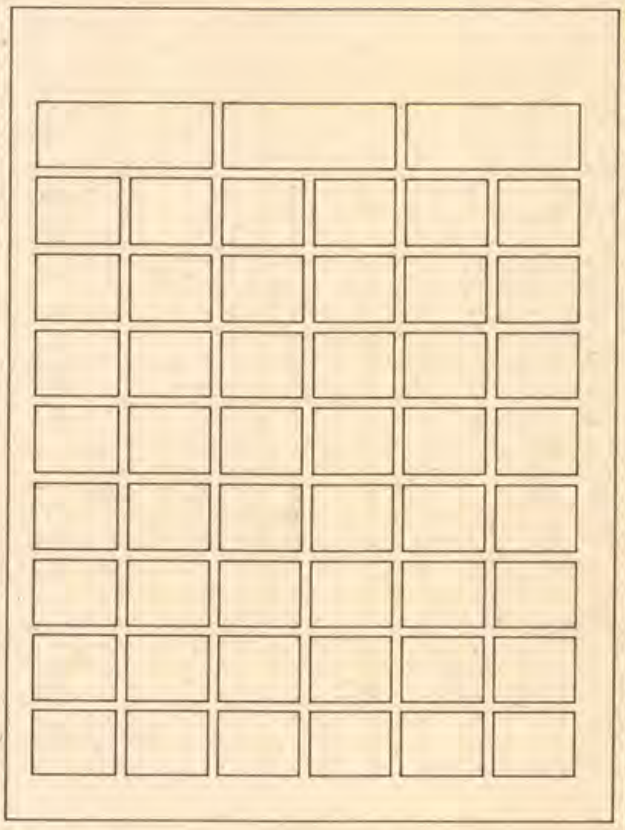
Most art directors and graphic designers who employ a grid system appreciate the sense of unity it gives to a format or a publication. They like the order it brings to the diverse elements of a design and the way, in publication design especially, that it can visually separate advertising and editorial pages. But more designers are coming to appreciate the modular grid as a time and money saver and for the graphic discipline and guidance it offers inexperienced personnel who must handle layouts.

Regarding the role of the grid as another tool in striving for cost-effectiveness, John Peter, in the book *Magazine Publishing Management* (published by *Folio: The Magazine for Magazine Management*), writes as follows: "Massimo Vignelli, who designed the magazines *Industrial Design* and *Dot Zero* to a modular grid, sees straightforward advantages in time and money. 'There is a saving in production. First, because of the standardization of elements involved. Second, in paste-up because the people doing it have less opportunity to make a mistake. You can also design much more quickly. The art director doesn't have to make an invention on every page. He can still do inventions if he wants, but within a system.'"

James Lienhart, who made grid modules for the magazines *Savings & Loan News* and *Sphere*, believes "many art directors put all of their creative energy into developing new arrangements each time rather than using a system that would allow for very simple planning, which would leave them more creative time for the development of really strong ideas. I realize coming up with ideas, developing concepts, and considering things from a more serious point of view can be kind of frustrating. It's easier to size something up another three picas."

James Kendall, managing senior editor at *Savings & Loan News*, also emphasizes the time saving. "Our adoption of the grid system has made production much simpler. We spend far less time fussing with the layouts and far more time working with the copy."

A six unit grid. *Designed for Vision '80s, it provides for two, three or six column makeup of 29, 19, or 9 pica column widths. The grid units are based on an 11 point line depth.*



DÉJÀ VU

If all this seems new and exciting, challenging, or even frightening, in truth much of it is not new at all. The specific technologies are new; but the insistence on cost- and communications-effectiveness is not new. Nor is the fact that we must work more rapidly, yet more surely, than ever before. All this is very old policy, indeed. More than 2,000 years ago, the Greeks switched from right-to-left to left-to-right writing in order to write faster. The need for speed has been an underlying force behind most of the changes recorded in the history of letterforms, typography, and reproduction. Change itself is not new.

What is new, and frightening, is the **rate** of change. So much is happening so fast. One generation today witnesses new machines and materials that are introduced and become obsolete; wave after wave, within a lifetime. Many a shop has tried to keep pace by investing in new equipment, only to find it obsolete even before it is paid off.

It is this greatly accelerated rate of change that pressures management to pressure its entire chain of command and support people to become more cost- and communications-effective.

The '80s will be the period when this drive reaches a climax, as new technologies will contribute more than ever to make this twin goal attainable. The key to such success in the '80s is not in technology but in people. The machines and tools will be there. People must become aware of and familiar with them, must be trained to make the most of them. This is true even of such non-machine-oriented people as writers, artists, and designers.

WHAT NEW TOOLS CONCERN THE GRAPHIC DESIGNER?

The consequences of today's new tools are permeative; they affect not only those who use them but every prior and subsequent link in the communications chain. The new tools that are changing the way art directors and designers work include even those used by word originators. Word originators—that's the current buzz phrase for people who create the copy or text, such as authors, editors, copywriters, reporters, executives, and administrators.

Not only their tools but the sources, nature, and timing of the information they handle are changing, and so are the very purposes of the messages they create and transmit. To understand what is happening and how these changes will affect us in the '80s, let's start at the very beginning of the communications chain and move along it link by link.

THE MESSAGE

The message, not its medium or manner of presentation, is the message—Marshall McLuhan notwithstanding. Louis Sullivan's tenet that form follows function was never more true nor more in need of being observed than today. The purpose of the message, in Sullivan's terms, is **function**. The ensuing words, images, and graphic formats are **form**: the means to the end of making the message seen, noted, read, understood, believed and, when necessary, acted upon.

In the '80s the message itself will be undergoing changes that have already begun. These changes concern message volume, size, timing, subject matter, presentation, audience, and life-span.

The number of messages, already overwhelming, will grow. As message volume expands, there will be increasing pressure to make messages shorter, to use graphics to replace words wherever possible, to transmit and store messages in condensed form. Because decisions by management, staff, vendors, and consumers will be more numerous and made more quickly, the information influencing decisions must move more rapidly and often be targeted to arrive at the most propitious time.

Can print media compete with electronic media in this respect? Will the role of print increasingly shift from being a conveyor of news to one of documentation? Of detailed backup? Will the TV fascimile connection eventually take even that role away from print?

What new presentation devices will be needed to make a message reach and affect increasingly bombarded targets? As products have shorter life-spans, the campaign time to establish and sell them shrinks, thus presenting further challenges to communicators. The pressure of message competition and of short product life is not new but is intensifying, so that today's words, graphic images, and media may not be up to tomorrow's needs.

YOUNG TALENT

Older people tend to emphasize the value of experience and the wisdom that comes from "having been through it before." Experienced and talented graphic designers are no exception. But the great requirement in the '80s will be for those who can see the future, who have a sense of the contemporary, who are not tradition-bound. The opportunities for young talent should be abundant — talent young in heart and open-minded, not necessarily young in age.

INFORMATION SOURCES

The conventional information sources include authors, advertisers, artists and photographers, paper files, libraries, and archives. In the '80s we shall rely on the same sources, but they will be increasingly augmented by machine-readable files, microfiche files, and large central data banks or storage facilities containing data, words, and images that can be instantly accessed by appropriate personnel in the data or office system or the reproduction center. Such stored information will be electronically edited, communicated, and distributed for print reproduction or electronic transmission.

THE IMPACT ON THE GRAPHIC DESIGNER

Writers and designers will need to know how to tap such information sources and how to handle their output. As with the change in the nature of the message, the new sources and the new ways in which raw information will be stored and accessed affect the entire communications chain. Information that can be so readily accessed and edited will demand equally rapid graphic presentation.

To cope with these intensified pressures, the art director or graphic designer will be aided by interactive electronic layout terminals, on which the elements of a job can be composed and seen full-size on a TV screen. Type and pictures can be moved around and resized at will. These devices will be described more fully later in Vision '80s, but it should be noted here that they will enable the user to quickly create, see, modify, and choose from a whole batch of electronic (rather than paper) roughs.

Obviously poor solutions, instead of being crumpled and thrown on the floor or in the wastebasket, can be erased merely by pressing a key. Others worth a later look, instead of being torn off the pad and pushpinned to the wall, can be stored in the data memory bank or put on paper by pressing the appropriate key. Ultimately, the final choice can be recalled to the screen, refined, and transmitted to a typesetter, where type and art can be produced in full page format instead of in preliminary galley form. All this without waiting overnight for new revises. All this with more alternatives created, evaluated, and weeded out in an hour than used to be handled in a whole day.

The designer's mind will not be crowded or pressed by the stepped-up demand for speed. Quite the contrary. The designer's mind was always fast. The supporting services have been — are — the bottleneck. In the '80s these services will keep pace with both the designer's mind and management's need for fast decisions. The well-prepared designer, aided by the new tools, will fit into the communications system of the '80s with ease. Those designers who will not adjust to or who reject these future tools will become "fine artist-designers" who will work alone and for their own satisfaction. Those who do adjust to the new tools will become the new professional graphic designers of the future.

A communicating input/editing terminal. *It can input, file, edit, and then output copy (via a modem, left) to a remote site.*



WORD AND IMAGE ORIGINATORS



Once upon a time people were the primary source of information. Traveling storytellers and entertainers brought news from one part of the world to another. Later, handwritten and hand-copied manuscripts literally spread the word to a select audience who could read. This was person-to-person communication.

The second phase in the development of information sources and information distribution was machine-aided. People and printing presses, then people and broadcasting networks, combined to originate and distribute information. We are now in the era of people + machine communication.

But we are on the verge of a new era in which new kinds of machines already playing a major role not only in transmitting but also in storing and themselves becoming the sources of information will be increasingly dominant. Thus we are at the dawn of the age when machines talk to people (verbally and visually) and people converse with machines and machines talk to each other. One result of all this is an increase in the productivity of word originators. In fact, in some operations, word originators even enter command codes for font selection, type size, line measure, page format, etc.

Here are just a few examples of the intriguing new hardware available at the front end of the communications chain.

INTERACTIVE DICTATION

SONY's Network, one of a new breed of computerized central dictation systems, holds 24 cassettes and 18 hours of continuous dictation. A number of different word originators can use it by calling in via telephone or by using one of the system's telephone-style dictating stations. Most importantly, the system talks to the word originator. When an originator talks into the Network, it asks for the user's I.D. code, gives brief instructions on how to use it, and (verbally) gives a three-minute, one-minute, and "Wait for cassette change" warning.

Further, this system prints out information slips for each cassette. On a slip of paper, the Network tells the department supervisor the length of the dictation, who dictated, and the dictation mode. It also changes cassettes automatically until all 24 cassettes are used up and has prompts and warnings to operators that make it easy to use.

This kind of large-capacity, easy-to-use equipment is expected to encourage more executives, writers, and other word originators to use such machines. Even today, most input to word processing centers is in longhand. As the new machine dictation equipment becomes more widely used, it not only will expedite communications but will save from 30 to 90 minutes per day for executives using it.

The executive, for example, can even address it from off the premises through Touch-Tone™ or a regular dial system. Thus, from home or a branch office, an executive can transmit messages and give dictation. The system, when properly instructed, separates tapes to be delivered as messages from those to be transcribed

ILLUSTRATION BY JUREK WAJDOWICZ



Taking dictation and typing simultaneously. *Typist is transcribing dictation from the SONY Network, using SONY transcribing equipment. Modem (upper left) facilitates use by many word originators at remote sites.*

and will also separately eject those requiring priority handling. When using a centralized dictating system the executive need not physically hand the cassette or recording medium to the secretary. The messages are sent by wire.

The word processing operator can keyboard while playing back the dictation, thus performing two operations (taking dictation and typing) at once. While this by itself is not news, the fact that more and more word originators and keyboard operators will work this way is.

VARIABLE SPEECH CONTROL (VSC)

Trying to type while listening to recorded dictation requires skilled, fast typists. But a new system, VSC (Variable Speech Control), permits the playback speed to be varied, so that transcribing becomes easier and more typists can cope with it. Up to now, slowing down a recording yielded a low-pitched growl and speeding it up produced a high-pitched staccato squeal. Beyond narrow parameters, the results were unintelligible; the tolerable range was ±20 percent of normal speed.

Now VSC, developed by the Variable Speech Control Co. in San Francisco, permits playback speeds ranging from half normal to three times normal without distortion due to change of pitch. Not only can secretaries adjust VSC to their typing speed, but they can get high-speed playback for review purposes. Recorded meetings and interviews, for example, can be reviewed in one-third the normal time.

Since the human brain can comprehend 250 to 350 verbal words per minute, the high speed of VSC is within the human comprehension range.

RAPID ACCESS CASSETTES

Another device to speed the dictation/transcription process is epitomized by Norelco's Tracer Track™ system. On the cassette is a visual/electronic indexing key. Result: at the touch of a button you can search the cassette and stop automatically at the end of a syllable or at a special instruction position.

Of course, other systems—among them, Dictaphone, Sony, Lanier—make portable, pocket and desktop equipment as well as remote automatic central systems. With some systems, the originator can phone the word processing center directly, and the cassette there literally takes the dictation. Form letters need only be identified, and then only the customized information need be dictated.



In 1978 the average cost of face-to-face letter dictation was $4.77. The same machine-dictated and machine-transcribed letter could be produced for $3.74. This 21.5 percent saving could be significant for high-volume operations. In 1979 a personally dictated letter cost $5.59, a 17 percent increase in one year; the machine-dictated letter rose in cost only 12 percent, to $4.19, increasing the cost spread to 25 percent. And, of course, you can machine-dictate six times as fast as you can write. For these reasons, among others, there will be more use of dictation machines in the '80s.

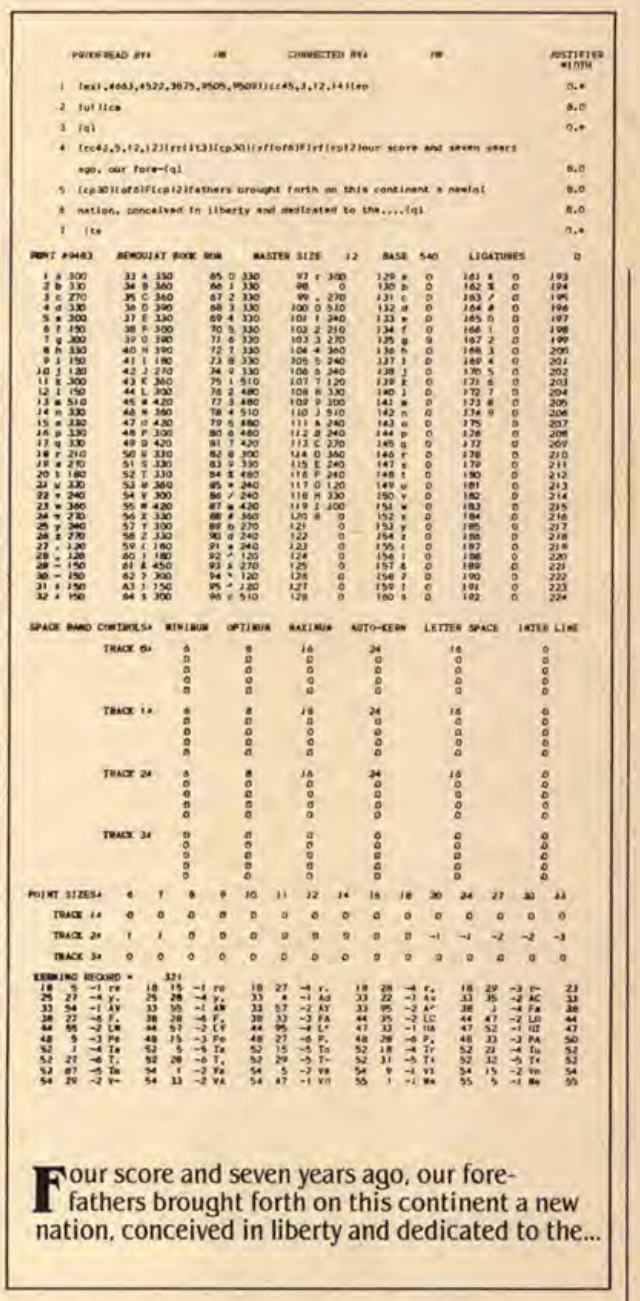
DATA BASES

With more and more companies storing masses of raw data in central data banks, the data base system itself becomes a source of information, a kind of digital/electronic library or file. All sorts of personnel in a company may have full or selective access to the data base: accountants, inventory controllers, marketing and promotion executives, writers, production schedulers, forecasters, payroll and budget administrators, shipping and personnel departments, job dispatchers and analysts, to name just a few.

Central, compact, easy-to-access storage is a tremendous time- and money-saver. Today, however, most data bases hold data in a form not suited for automatic output to a typesetter. When a report is to be published, for example, the information retrieved from the central storage facility often requires customized software to make it intelligible to a phototypesetter.

As we move into the '80s, magnetic tape or disc use of data bases, together with reformatting such data into final typesetting and composition form, is considered the fastest growth area for commercial typesetting services. The need for customized software may decrease in the '80s if manufacturers of typesetting equipment offer a total business and typesetting system. A few are already moving in this direction. One example is Itek's CPS-320, an editing terminal for a typesetter that is an interactive business system. It is described more fully in the section of Vision '80s dealing with typesetting.

Ideally, all the instructions concerning makeup, column widths, typographic parameters, position of decimals, etc. should be included in the data base. This would make its output, which



Four score and seven years ago, our fore-fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the...

Converting raw data for typesetting. *Data banks store numbers and words but generally ignore punctuation, capitalization, and most grammatical and typographic information. Software programs, such as the sections of the Penta system shown here, make it easy for the operator to draw the data out and set it as desired. At bottom is typeset copy. At top is printout of copy as it appeared on the CRT display with codes to add typographic instructions. In the middle are some of the Penta tables drawn upon by the operator to control font selection, size, kerning, ligatures, letterspacing, leasing, and paragraph styling.*

becomes the input for a typesetting machine, ready and easy to run. But most customers can't, or won't, input data that way, because it takes too long and slows down the overall data storage process. Another argument is that much stored data will not be retrieved for typesetting purposes anyway.

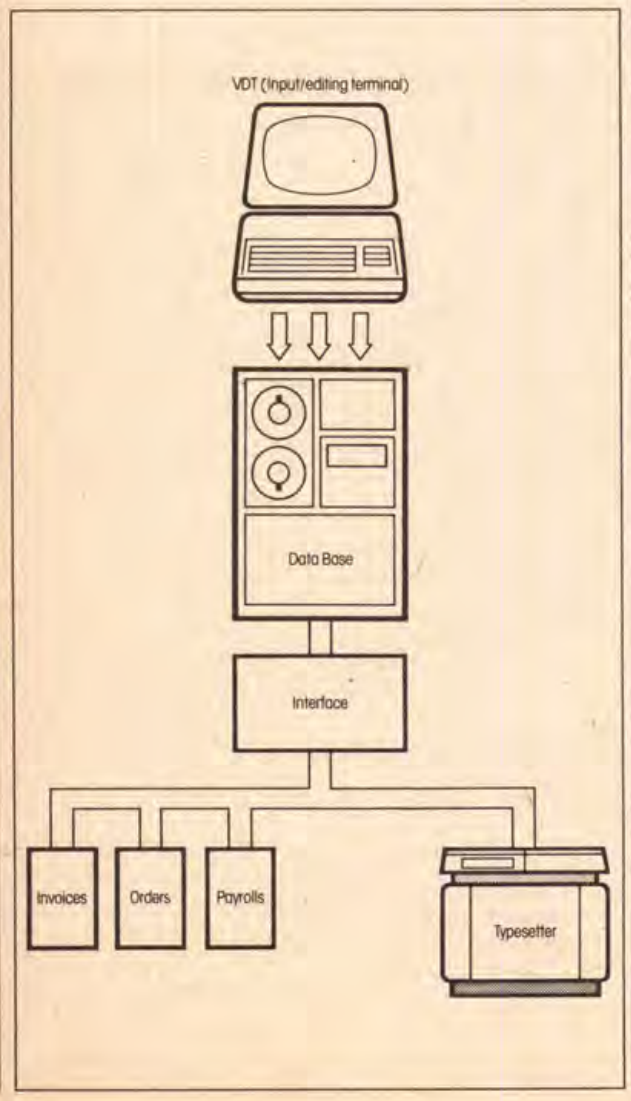
Thus the burden is placed on the department retrieving the data that will be typeset. Service bureaus in big cities and an increasing number of typesetting services can convert data base output into typesetter input; however, this is still a custom process. At present, there is no universal translation system to convert any data base output to any typesetter input. The languages, the codes, vary from data base to data base and from typesetter to typesetter. Despite this impedance, greatly increased use of data base information for print communications is quite certain for the '80s.

As an example of how the conversion is being done today, let us consider price lists. Essentially these are repeat jobs using updated data and a predetermined or repeat format. The stored data can be output on tape and used to produce up-to-date price lists. A computer program is written to convert the raw data into a typesetting format, and the resultant tape can then be fed to the typesetter.

This is keyboardless typesetting. It not only **captures** keystrokes so as to avoid rekeyboarding but **eliminates** them at this stage, with resultant savings of time and money.

DATA-BASE/TYPESETTING INTERFACES AND COST-EFFECTIVENESS

The ability of the typesetting system to use the data stored in a company's electromagnetic files offers great opportunities for reducing operating costs. The computers in many typesetters, for example, have the capacity to process all kinds of business data, such as inventory control, payrolls, orders and invoices, and production schedules. And a computer can often run more than one program at a time. This multiprogramming capability, combined with software programs to enable the computer to handle a variety of business as well as typesetting problems, can increase the unit's output and decrease its idle time considerably. With multiprogramming, business and typesetting functions can be handled simultaneously. From this we can see that not only can the typesetting system use the data base as a source of copy but a common computer can also manage both systems.



DP/WP/TYPE INTERFACES

In the '80s we will have more devices and computer programs to facilitate the conversion of data base information for subsequent phototypesetting.

One such device now available is the Quadex Media Input Module, which converts tabular material for use on word processors or typesetters. The prestored keystrokes are reformatted without rekeyboarding.

Another device is the Data Communications Interface, offered by Itek. The Itek RS-232C interface permits the user to adjust speed and code so that it can translate from any of a number of data base codes to any of a number of word processing and typesetting codes.

Major steps have been announced by other manufacturers to bring data processing, word processing, and typesetting into one system. Wang's approach is summarized in the section of Vision '80s that covers word processors.

AM International's Jacquard systems are multifunctional, with applications for both word and data processing. In '79 the company merged the marketing of its word processors, small business computers, and photocomposition equipment into one division.

One software approach to facilitate setting type from information stored in the data system is that developed by ADAPT, Inc. For DEC 10 and 20 users, ADMS-11 (Automated Document Management Systems) facilitates output on a range of equipment including line or character printers, word processors, and typesetters.

Still another approach to combined word and data processing programs is taken by Cado Systems Corporation. Cado's computer is compatible with AT&T's CRTs and printers and with IBM systems. The Cado computer can handle data and word processing input simultaneously and can be the heart of an intelligent terminal, a stand-alone computer, a text editor, or a message handler.

AN INFORMATION GLUT

In the '80s there will be a real information glut. Some 72,000,000,000 new pieces of information arriving yearly all need to be sorted, edited, stored, retrieved, and/or disseminated. Obviously, services and devices to expedite the conversion of stored information for word processing and typesetting will proliferate.

ILLITERACY COMPOUNDS COMMUNICATION PROBLEMS

Effective communication is hampered not only by the huge and growing volume of information but also by the high illiteracy rate, especially in the United States. Combined with the information explosion, this puts further pressure on all concerned with communication, including word and image originators, to make their messages effective. Rising costs intensify this pressure and help build a demand for writers, designers, and production and information management specialists who can truly cut communication costs and/or increase results for every dollar spent.

The whole problem of recognizing data and word processing as parts of a single communication system was faced by a Policy and Planning Committee of the word processing industry, which recommended more and better interfacing of the two systems so that information from both could be handled together and fed to subsequent functions (e.g., telecommunications, photocomposition, facsimile transmission) as a unit.

MUSIC BY THE NUMBERS

Music, too, can be recorded digitally. In fact, when perfected, true digital recordings will offer pristine sound against a noiseless background. Every pitch and volume level is given a binary number that can be read by computer circuits. Sound is not recorded, but bits representing sound are recorded. Playback reverses the process. SONY, among others, is developing this process. Their disc and its pulsemarks (no-grooves) are read by a laser beam instead of a needle. The home market for this system, while not in the immediate future, may develop during the '80s.

DIGITAL PICTURE FILES

Pictures as well as words, data, and formats can be stored digitally. Like the data base and other stored documents, the picture file can be called up by the typesetting/reproduction system. The "Bettman Archive" of the '80s may well be electromagnetic. Instead of pulling out a file drawer, removing a folder, and thumbing through the many tearsheets, proofs, and photographs on a given subject, you will be able to call them up on a CRT by keyboard command. When you find those you want, another simple keyboard command will produce a paper copy of them or send them on line to a typesetter, while at the same time returning unwanted pictures to their electronic file.





IMAGE ORIGINATION

Like word originators, image creators must communicate even more rapidly, even more intensely and precisely to the inundated message receiver.

Like the other tools and machines reviewed in Vision '80s, digital photography and electronic palettes help the creative person do more, faster and better. How they speed up and increase creative output and decisions is obvious. How they can improve quality may need some spelling out.

Consider something as simple as drawing a straight line or rule. Alphatype's CRS typesetter and Berthold's APU-3608 typesetter, for example, can produce lines in a wide range of lengths and thicknesses. The rules are not a series of joined dashes but are created as a continuous line, so that their thickness is uniform from end to end. Few if any human hands can do as well.

TOOLS AS STIMULI AND IDEA SOURCES

Consider a full-color illustration. Not only does an electronic system offer a large palette but, as do electronic pagination systems discussed elsewhere in Vision '80s, it enables the artist to modify the picture instantly and to try many more variations than time would permit with conventional techniques. Furthermore, because many modifications can be obtained by literally toying with the controls, versions that might never have occurred to the same artist working with brush and board can be created. In this sense, the new electronic devices even offer ideas to the artist.

Nothing involved in electronic art restricts creativity or negatively affects the artist's skill, taste, or judgment. Electronic art does affect artistic freedom of choice by expanding it greatly. The chance pictures that may be created with the new equipment can also stimulate the artist to seek solutions that otherwise might not have been considered.

Thus, in addition to speeding production, an electronic device, when used with imagination, can be a creative stimulus and a source of ideas.

NO PIE IN THE SKY

All this may sound like pie in the sky to some, but in truth, it isn't even news. Television producers have been using such techniques for years. After all, electronic art is a natural for an electronic medium. And now that print media are using electronic tools for their manufacturing stages, the compatibility of electronic art and digital photography will lead to their increased use in print publishing, advertising, promotions, packaging, and other formerly nonelectronic media.

SCANNERS, COMPUTERS, AND CREATIVITY

Scanners and computers offer artists and photographers new tools for creating pictures, logotypes, graphs, charts, and designs. Electronically created art is past the laboratory stage; it is already on the market. Designers and artists, with mixed feelings, are becoming increasingly aware of it. At a Graphic Arts in Industry trade show in San Francisco in '78, Seymour Chwast of Push Pin Studios judged the new technologies to be something less than the wonderful creative tools some think they are. "Laser beams cannot help designers to think, to draw, to find the best way to communicate ideas to other human beings." He sees electronics and computers as dehumanizing "communications, education, entertainment and dissemination of culture" and leading to designers developing "conglomerate minds" that produce look-alike solutions. Chwast foresees a day when only two designers can do everything: "One to do the Swiss stuff, and one to do the Bookman Cursive jobs."

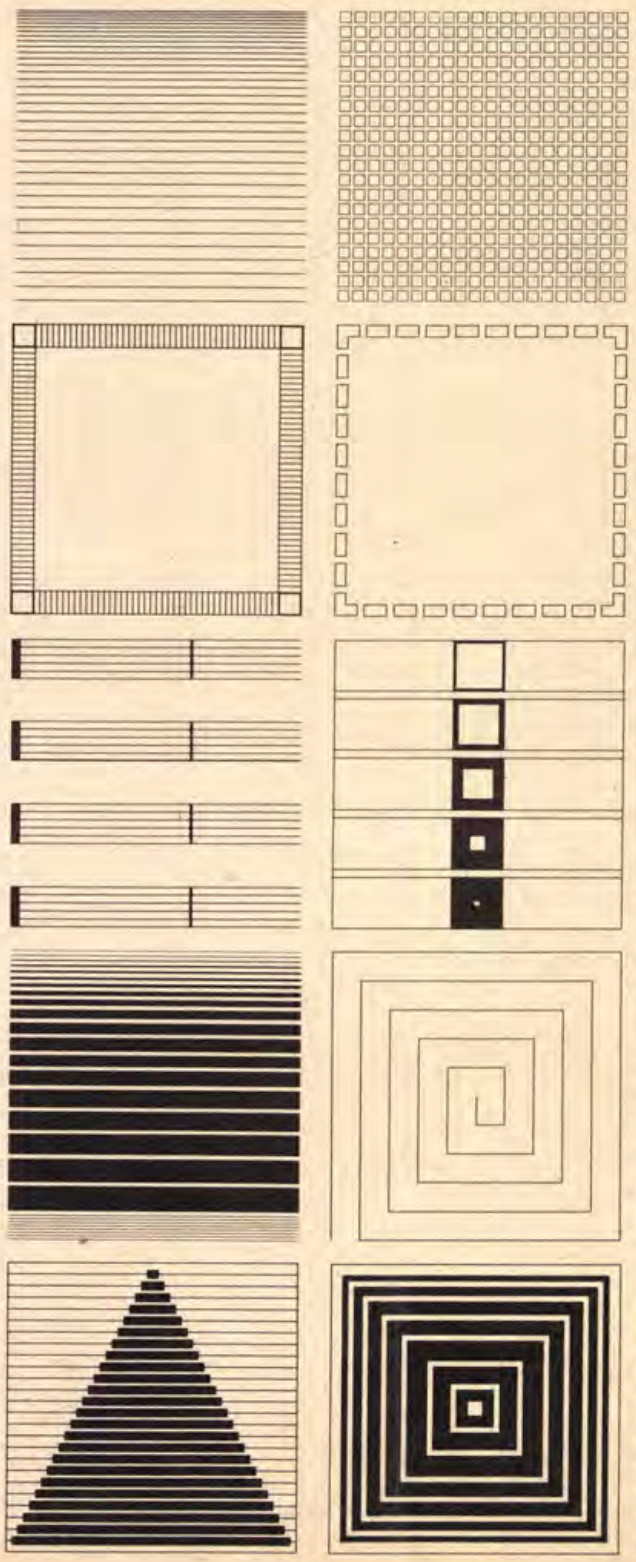
U&lc disagrees with Chwast when he blames electronics and computers for inferior and look-alike designs. The new technologies are only tools; computers do not create concepts. They can expand, and need not limit, the creative options for executing concepts. What they do in this respect depends on the ability and attitude of the designer or artist using them. Writing in an issue of *Graphiti*, a publication of the San Francisco Graphics Guild, Maria Jensen comments: "We, as graphic people, are going to have to learn a new language. We may find that creativity and personal expression as we know it today will become as cost-prohibitive to produce as book illumination did five centuries ago."

Ms. Jensen listed three areas of computer penetration in the graphic arts: (1) word processing and typography; (2) automatic paste-up and page layout; and (3) the artist's studio. It is this third area we shall examine now.

ELECTRONIC AND DIGITAL PHOTOGRAPHY

We are approaching the day when electronic cameras will replace photographic cameras. The United States government, through NASA (National Aeronautics and Space Administration), has been pioneering in this area for several years. We are not talking about options for cameras with automatic range finders that adjust shutter openings and speeds. We are talking about the Erts or Landsat techniques that took pictures in space and sent them back to earth. Instead of film, these employ electronic image sensors. Such a camera is now being developed at the RCA Laboratories in Lancaster, Pennsylvania.

Electronic cameras record visual information digitally in image points, just as television pictures consist of so many scan lines per inch or a lithographed halftone may use a 133-line screen to achieve 17,689 dots per square inch. But the Landsat image contains ten times the image points, horizontally and vertically, as does commercial television; thus its resolution is 100 times as fine. Finer resolution can be achieved and electronic cameras can be adapted to color photography when the demand requires. These fine image points in the recorded picture are known as **pels**, or **pixels** ("picture elements"). A video signal is a string of pixels that define the intensity, position, and color of each point in the picture.



Electronic rules. *Few, if any, human hands could draw these rules, borders, boxes, grids, staffs, steps, or whatever, as precisely or as easily as they were set by Berthold's fps 2000. For more information on ruled form typesetting see the Typesetting section of Vision '80s.*

ELECTRONIC NEWS PHOTOGRAPHY

Before spreading to other graphic arts levels, electronic photography will probably first affect news gathering (electronic and print). It offers superior quality, bypasses processing, and is readily transmittable and easily stored; moreover, pictures can be recalled, viewed, and edited on CRTs and electronically moved to a digital typesetter or other device for platemaking and/or printing. This development is compatible with others discussed in Vision '80s, particularly the development of such nonimpact laser/digital reproduction units as the Wang Image Printer, the Xerox 9700, and the IBM 3800, among others.

If all this sounds exotic, it isn't. It is merely an extension of things we are already doing, such as electronic color scanning and color separating, scanning for facsimile transmission, and electronic screening and color correcting of art and photography. Present techniques take optical copy and modify it electronically. The next step will be electronic copy in which a video signal is the actual input to the production process.

Of course, editing, retouching, color correcting, sizing, and cropping will all be done electronically. Much of this is done that way today. In some situations, proofs as we know them, on paper or film, will be bypassed. The picture in the computer memory can be proofed by calling it to the CRT screen. Hard-copy (paper) proofs can also be produced, if they are essential to securing customer approval.

Electronic photography is not a faraway fantasy. Electronic camera techniques are being developed by companies such as Fairchild, General Electric, RCA, and Texas Instruments, and research on digital photography is being conducted in a number of places, including MIT. Some of this research is directed to the television networks, and at TV quality levels we have electronic photography now. To bring the quality to the level demanded by the publishing industry, to develop smaller and lighter cameras, and to match this progress with more advanced electronic processing in prepress operations are tasks expected to occupy the better part of the next decade. Color electronic photography is anticipated for TV for the mid-'80s, and for the newspaper industry (with a resolution of 1,000 x 1,000 pixels, or four times that of TV), by the late '80s.

ELECTRONIC COLOR PRINTS

Can you imagine making high-quality color prints from electronic signals using lasers? The LaserColor Printer does that already, for in 20 seconds it converts a 35mm slide into electronic signals that expose negative film as the first step in producing an enlarged print. Signals can be manipulated to control colors, and the fine laser beam facilitates pinpoint corrections. The process can compensate for imperfect lighting, optics, and photographic materials. There is also a color previewer, so the user can anticipate finished results before making the final commitment. (PEC LaserColor Laboratories is in West Palm Beach, Florida; a video previewer is located at Image Bank in New York City.)

COMPUTERIZED CHARTS AND GRAPHS

Computerized charts and graphs and illustrations can be made with Genigraphics, a system developed by General Electric. Since the computerized drawing board and storage-retrieval system costs about $350,000, Genigraphics is essentially a service offered by GE. It can produce a wide range of basically geometric designs in color, store a large library of symbols and type fonts, and edit material rapidly. It can ready material for a slide, for example, seven to ten times faster than the same work can be done on an art board.

NASA'S ROLE

The current interest and excitement in digital typesetting is old hat to some slide producers making 35mm business slides.

The space program produced many advances in technologies not directed at the hardware of space flight. One need that NASA developed was instantaneous graphic representation of collected data. To fill this need, General Electric was contracted to develop hardware and programming to produce color video-display charts, graphs, and word displays. After the moon dust settled, GE was left with a system but no potential end-user. The massive cost of the hardware made a package of this size unattractive to produce video-oriented color graphics.

A system was tacked onto the end of the existing package that produced, by a 4,000-line vertical and horizontal scanning technique developed years earlier by CBS Labs, a 35mm color slide of the video picture. As in current typesetting applications, the original data are produced in a number of ways. What you finally see is stored in the memory, or memory medium, of the computer. It can get there by a variety of methods:

1. A line negative is made of original art. The negative is scanned by a device that is in effect the reverse of the device which produces the picture. The point at which the scanner "sees" a change from black to white sends a set of XY coordinates to the computer, which it "remembers" for later use.

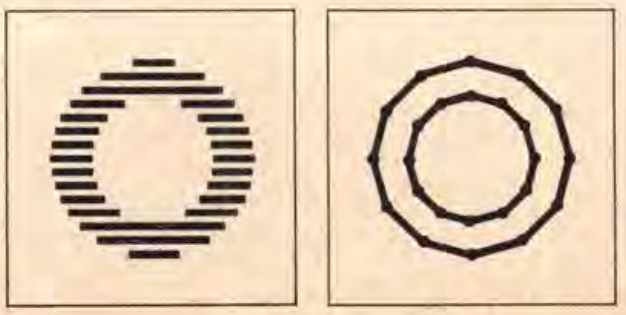
2. A tracing is made of the art. This tracing is laid on a matrix board, and its edges are followed using a light pencil. As the light passes each XY coordinate, its location is recorded by the computer.

3. An XY grid is overlaid on the art, and the coordinates are manually entered through the input keyboard of the computer. (This system is very tedious and is seldom used today.)

Current technology is such that reproduction of the data is accomplished in one of two possible ways:

*1. **Raster Scan** — similar to today's television sets. Curved edges are actually approximated by a series of steps.*

*2. **Random Scan** — two points (scanned earlier) are connected with a straight line.*





This second method, currently used by Genigraphics, has better resolution, but the type has chopped curves and cannot stand much enlargement.

A third system, adapted from a method for designing ship's hulls, is currently under investigation; in this the artist selects two points and defines the arc + or — between them. The line so plotted will be relatively smooth, with little break between segments of the arc. This system requires a massive memory.

Basing their concept on GE's, a small number of companies have developed their own software systems. All use the CBS scanner output or home-built versions thereof. All experience large investment problems, leading to the idea of having "centers" where the actual work is produced and locating sales outlets in various other geographical areas.

GENIGRAPHICS

Shown above is a Genigraphics console, which is operated by an artist. The artist's taste and judgment command, via the keyboard, the computer's intelligence. The results appear on the screen. Stored in the computer's memory, awaiting the artist's commands, are most of the elements that make up a slide — colors, typefaces, symbols, layouts. The console is a computer-controlled electronic drawing board. Characters and images called up on the screen can be positioned and repositioned, sized and modified. Typefaces can be expanded, condensed, sized to suit the layout, drop-shadowed, and shown in a full range of colors. The present typeface library consists of Helvetica Medium, Helvetica Regular, Craw Clarendon Book, and a Condensed Gothic. There are plans to expand the existing library.

Colors can be chosen from a full spectrum and sized, shaped, and positioned at will. Color formulas are stored in the computer's memory for later matching. Symbols and logos in the library of over 1,000 items can be flopped, set in colors, duplicated, sized, and positioned by keyboard control.

When the complete slide is the way the artist wants it, it can be either automatically photographed or stored to await approval. The slide is filed electronically, stored on a disc. There are no pages, boards, or cels to file.

Presently, there are 12 service centers in GE's Genigraphics network: Syracuse, New York City, Houston, San Francisco, Los Angeles, Atlanta, Chicago, Boston, Stamford (CT), Denver, Dallas, and New Jersey. Every slide in the Genigraphics system is stored on a floppy disc and identified by an artwork file number. In a few seconds a slide can be recalled to the screen for editing or for duplicating. Customers receive black-and-white hard-copy (paper) proofs before the slide is made. It is also possible to lease a terminal and establish two-way telecommunications with the service center computer. With this system it is possible to create, compose, store, retrieve, and photograph up to 10 slides per hour. The console artist can use basic formats stored in the machine's



Genigraphics console. *The artist creates full-color art at this console using an electronic drawing tablet and stylus. Results are seen on the CRT.*

memory or can create new ones. The customer supplies copy and rough layout as one would to any art service—written or typed manuscript, tissues, and story boards, with color instructions.

XEROX'S DYNABOOK

Imagine an affordable personal device, the size of a notebook, that can handle all your information-related needs: solve math problems, translate languages, store data and permit its instant manipulation and release, edit text, and, at your command, create drawings or paintings, animate pictures, or compose and generate music.

Impossible? No. The Learning Research Group at the Xerox Palo Alto Research Center, which dreamed this impossible dream, is well on the way to making it come true. Its ultimate device is called a Dynabook, and the system enabling humans to communicate with it is called "Smalltalk" language. Presently Xerox has what it calls an interim Dynabook.

The interim Dynabook looks like a small box into which disc memories can be inserted. Each disc holds about 1,500 page-equivalents of manipulable storage. The CRT can be in high-resolution black-and-white or color. Other input devices include a typewriter keyboard, a chord keyboard, a "mouse" to input positioning instructions, and organlike keyboards. The CRT is used for visual output, and a hi-fi system outputs sound after a digital-to-analog converter processes the signals. For different uses and effects, different disc packs are loaded in.
Dynabook can, for example, read a book nonsequentially. Suppose you want to find in *War and Peace* all references to General Kuznetsov. You could program Dynabook to access all such references and display them on the screen.

The system also has different type fonts for material to be printed out. A character font consists of a matrix of black-and-white dots, and the user can create an original font if so desired. To create and display a high-quality painting, about 500,000 dots would be used for an 8½ x 11 inch area. This is approximately equal to a 70- or75-line halftone screen.

Curves are drawn on the display screen with an electronic pen. Pens can draw in color, and the thickness of their strokes can be controlled.

Although it is in principle simple enough for a child to use, Xerox envisions a system so sophisticated in what it can do that it will be used for many purposes by musicians, architects, writers, doctors, lawyers, accountants, executives, housewives, and students of all ages.

Alan Kay, head of the Xerox Learning Research Group, notes that the increase in the capacity of such devices and the decrease in their cost will likely bring them to the market in the '80s. "The micro-electronic revolution of the '70s will bring about the personal computer of the '80s," he writes.

3-D COMPUTER GRAPHICS

A number of companies are developing hardware and software to create graphics. Particularly interesting is an interactive (operator can see and alter the art as it is being created) 3-D computer graphics system that can be used simultaneously by 16 artists. Its 16 terminals, or electronic artist's boards, are connected to a single computer through a graphics processing device. A graphics tablet and an electronic panel enable the artist to select pictures or designs stored in the system's memory or to draw them in electronically. Controls permit the artist to position, size, and modify them, as well as to rotate them and apply perspective to give a 3-D effect.

Architects are using computer-aided terminals not only to draw plans but to generate other elevations and to superimpose sketches or site photographs, "turn" a drawing to another view, even to simulate shadows at different times of the day.

Multi-Picture Systems, developed by Evans and Sutherland Computer Corporation, is being used at McDonnell-Douglas for aircraft design. Martin-Marietta has a system that may be used by the military as a command control and communications system for reviewing tactics and strategy. A simpler system developed by Selaner Corporation for Digital Equipment Corporation's DECwriter LA-35 uses circuit cards to generate, from its storage, pictures of airplanes with rotated views, circuit diagrams, a map of the United States, and various line art. The DECwriter can also move bidirectionally to help the artist position the art properly.

THE DOLPHIN COMPUTER AND ELECTRONIC DESIGN SYSTEM

A unique example of electronics used to create video art is Dolphin's Computer and Electronic Design System.

If you watch television, you cannot avoid noticing the many unique electronic designs of typography and live-action imagery. The system has recently been expanded to include print graphics in such areas as corporate logos (General Motors MIC auto insurance group) and is being considered for a redesign of cartouche graphics for currency and postage stamps. The speed of going through visual options and the variety of options has become a delight to many graphic designers.

Dolphin has helped pioneer this new field of visuals through space age technology since 1971. How it works and what it offers the artist and designer were described in the *Journal of the American Institute of Graphic Arts* in '73 by Ilina Stranberg. She reported on designer Sam Antupit's explorations of what The Dolphin System could do with the letter A. Excerpts from her report are included in the following discussion:

"Understanding the creative potential of electronic art will stretch your mind beyond the confines of Souvenir or Helvetica or of any typeface you've ever known as you watch the process re-create one letter until it becomes a thing in flight, in color, even in sound. Its strokes translate to electrical impulses and then back into almost anything. It's type alive, in color, in motion, in infinitely elastic form. It's literally an electronic idea machine. It multiplies options for the designer's taste and judgment, and its output is useful in all graphic media."

Allan Stanley, president and founder of Dolphin Productions, reflecting on newly invented creative tools, says:
"Graphic artists today are faced with an incredible array of new electronic devices which can make their work more exciting. One of these new tools is Dolphin's Computer and Electronic Design System."

The Dolphin System was created specifically for graphic art and animation—only! Therefore, there aren't any punch cards, tedious programming devices, or need to know technical jargon to be able to work with the creative production teams. It is a direct-control analog system that creates an image in motion on a screen and can be directed, positioned, colored, and composed instantly through the computer.

The Dolphin System aids creative producers in areas of print, logos, photos, art, and electronic visualizations. The system is the most advanced technology available, but the working process is simple and stimulating.

This is the basic production sequence:

•Material to be "animated"
Black and white graphics as cells—directly from a "live action" or motion picture source—are used.

These, through a special video scanner or directly as video (as from tape or film), are entered into the Dolphin computer.

High image quality is maintained by the use of extremely high resolution (1000-line screens) or digital/computer control of motion sources.

•The "Effects" and Designs
The network of circuits is turned on by turning knobs and joining patch panel outlets. Each control of motion (horizontally, vertically, and in depth) acts upon the source material.

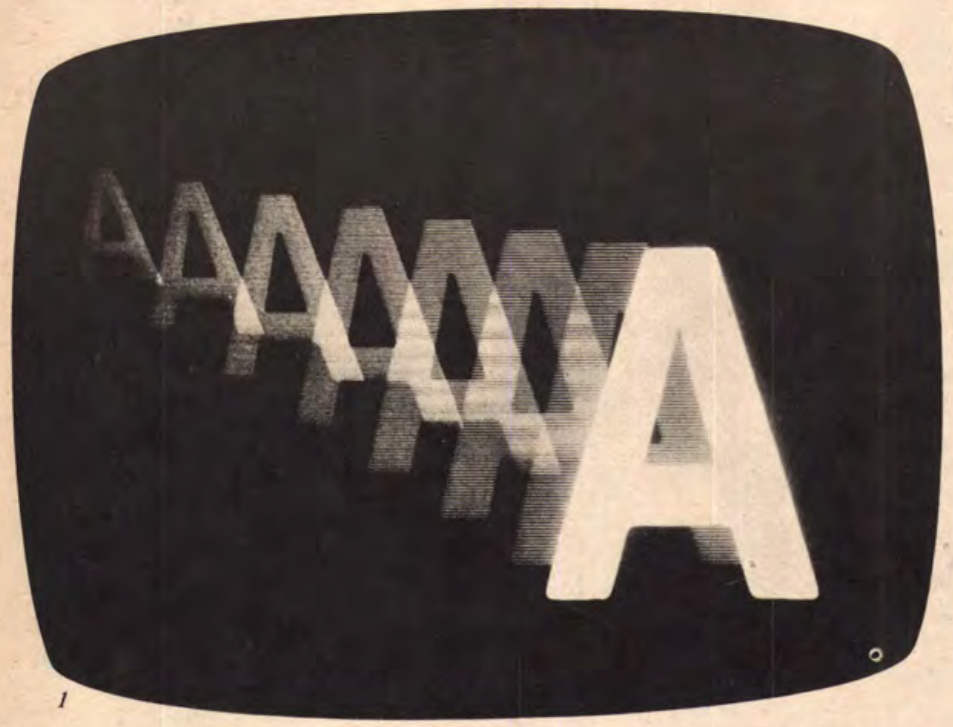
Screen composition of elements in position and to size is easily and quickly set up, usually from a **single cell**!

The animation is given a **beginning** and **final** position and size. Then the creative magic begins.

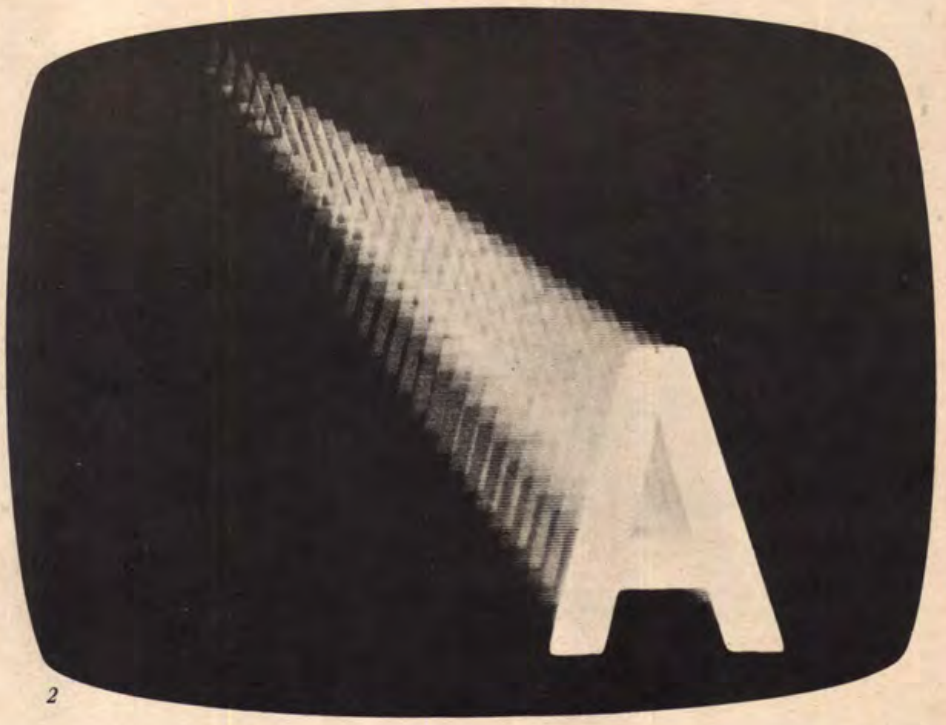


The A was reduced to a dot, and Figures 1 and 2 show zooms from that dot. The time rate of the zoom controlled the amount of images which appeared.

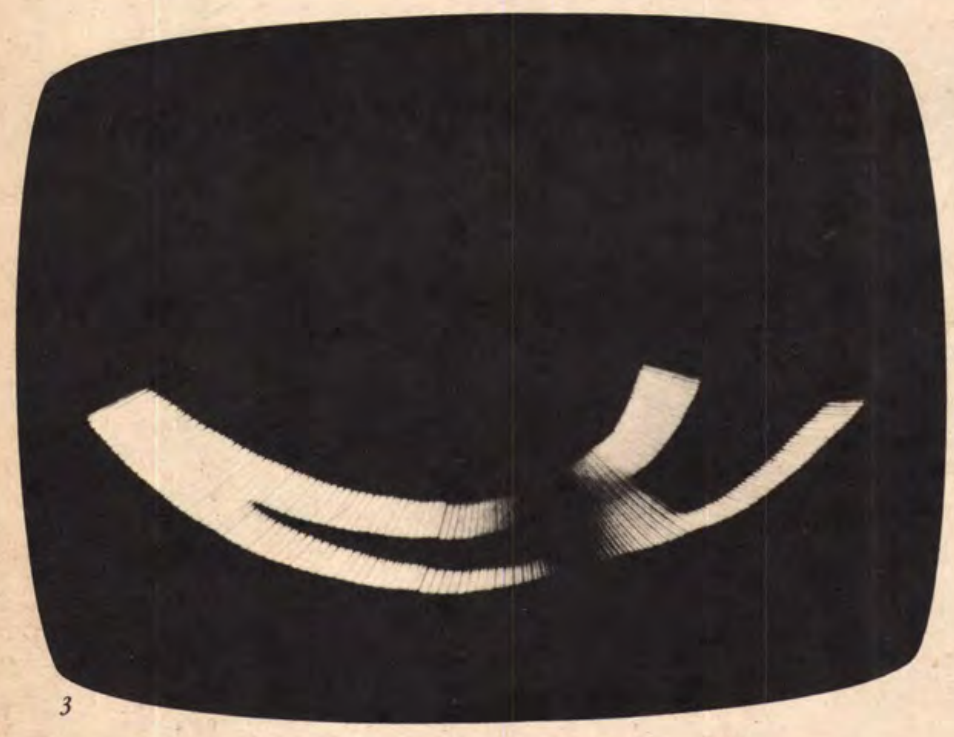
Figures 3-5, two oscillators locked ninety degrees out-of-phase were applied to the horizontal and vertical channels. More stretching (Figure 6) was achieved by applying a higher frequency on the rotational oscillators.



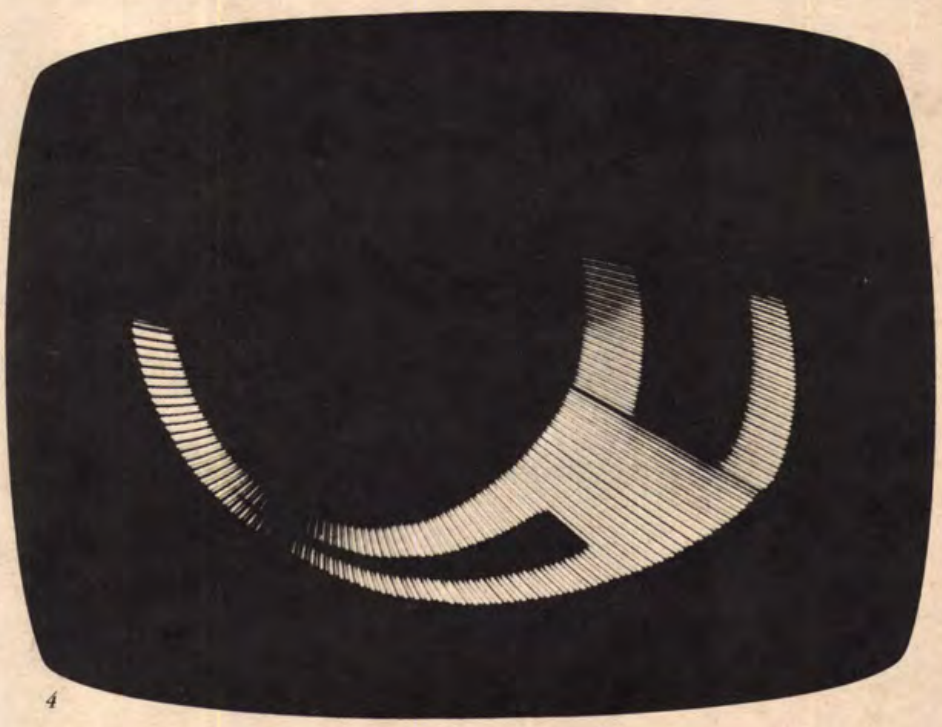
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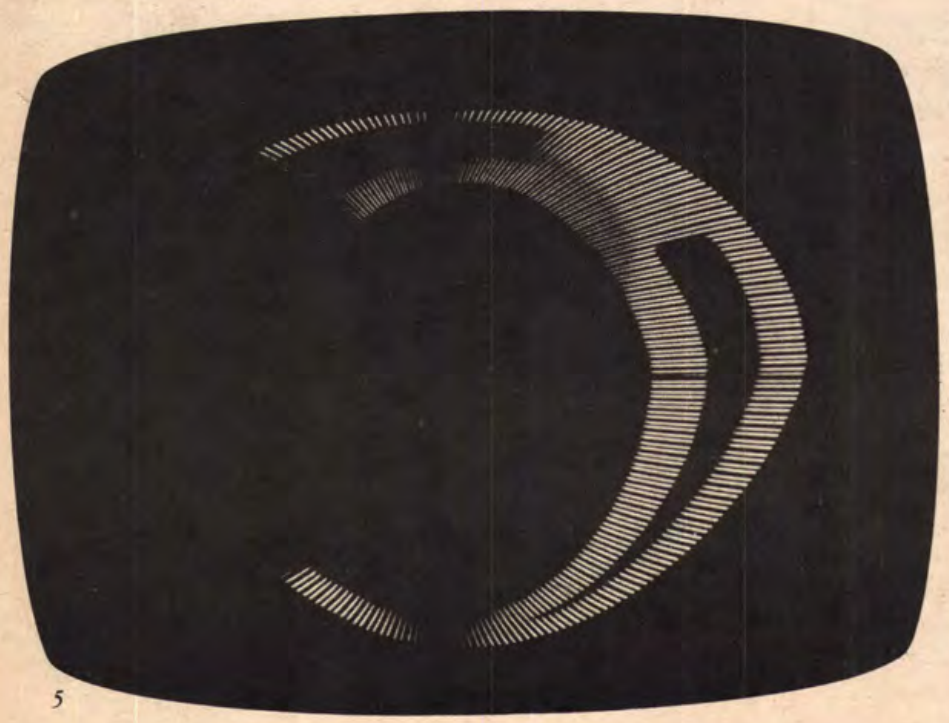
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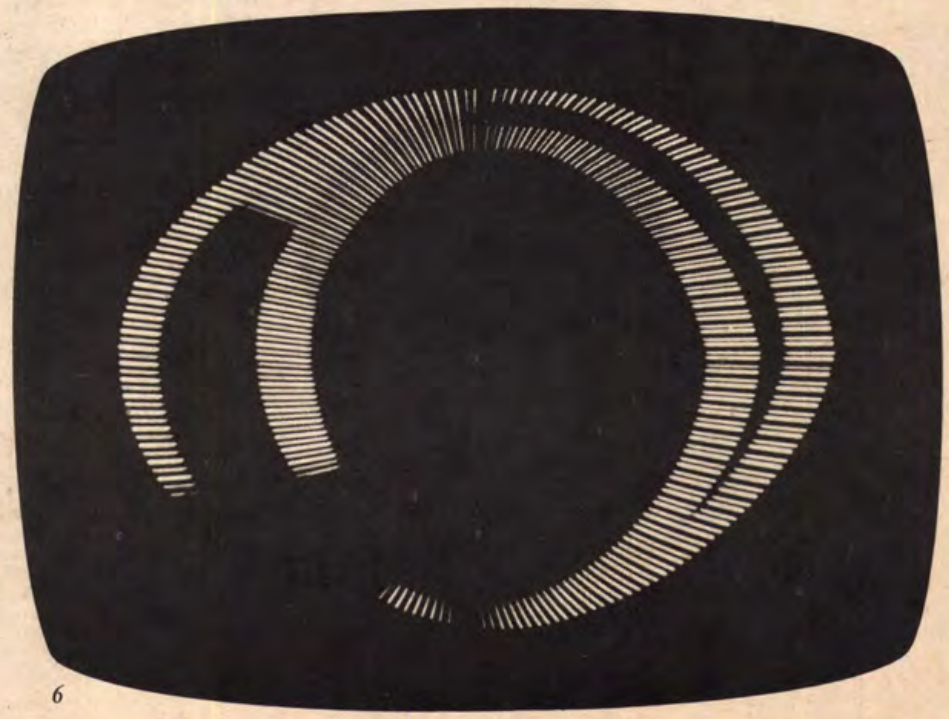
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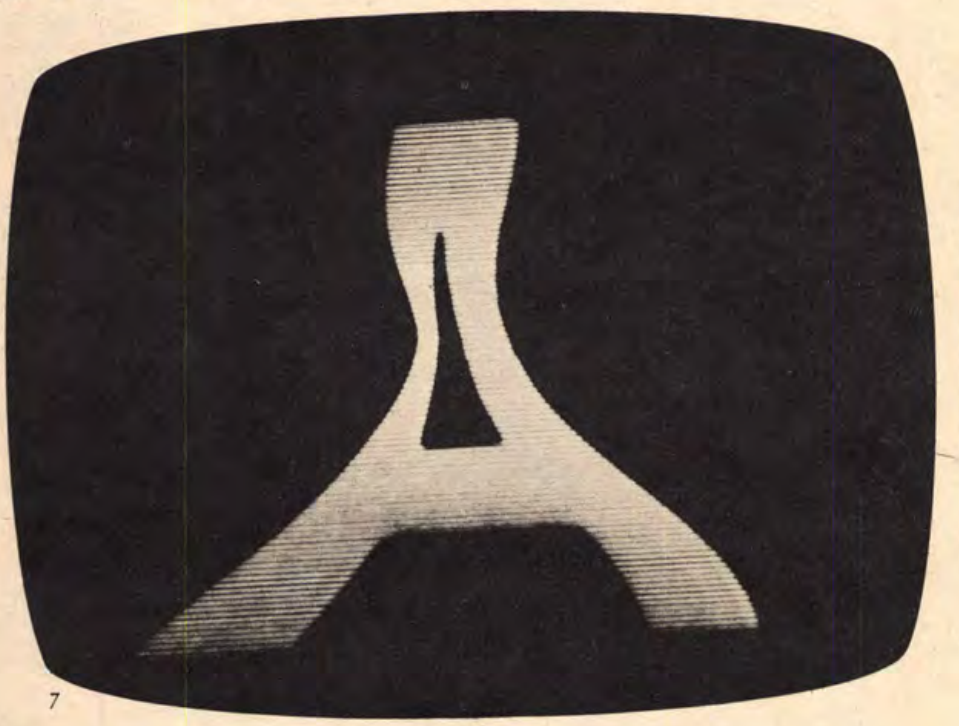
5



6

In Figures 7 and 8, the oscillator was phase-locked and applied to the depth channel. Varying the frequency and amplitude of the voltage produced the differences in shape.

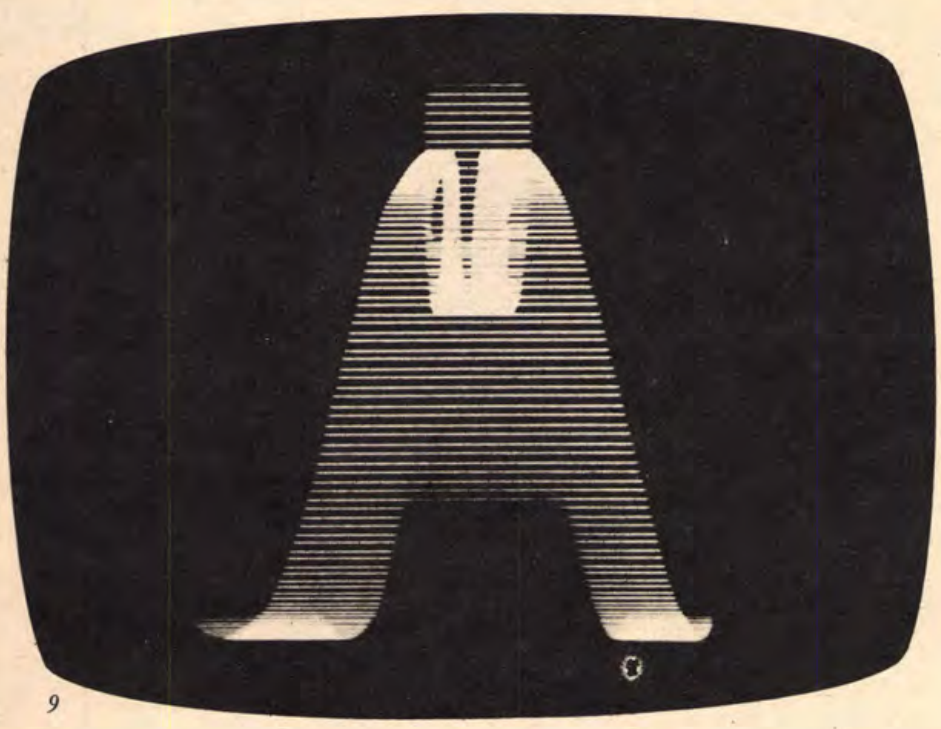
Figures 9-11. After oscillation was applied to the vertical channel, the frequency was modulated — the higher the frequency, the more bands in the image. In Figure 12, two oscillators were applied, one working vertically and one horizontally.



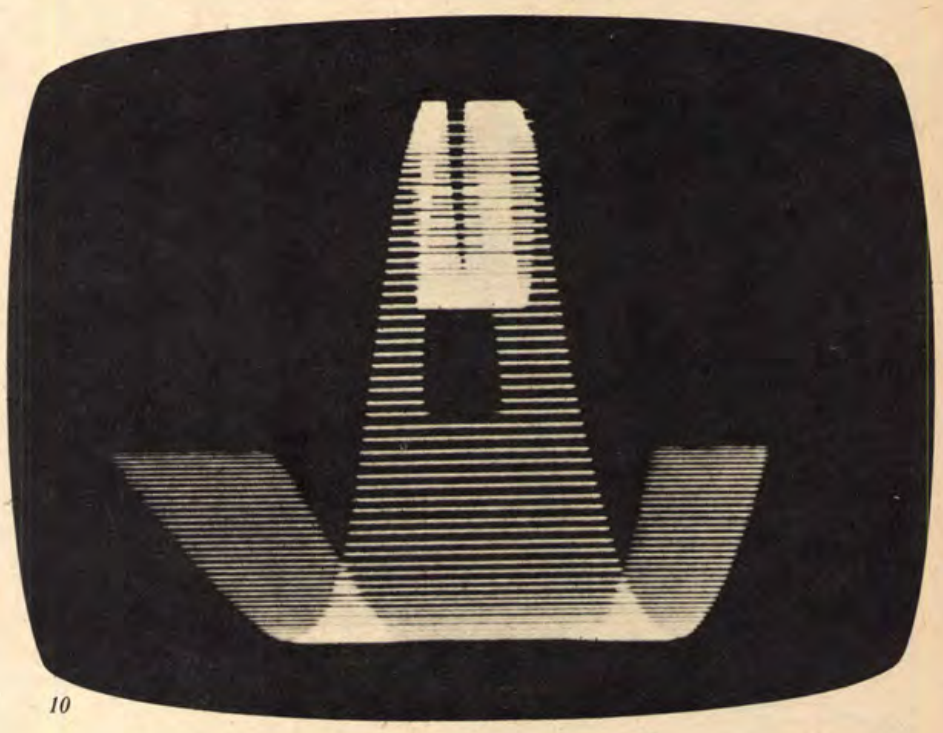
7



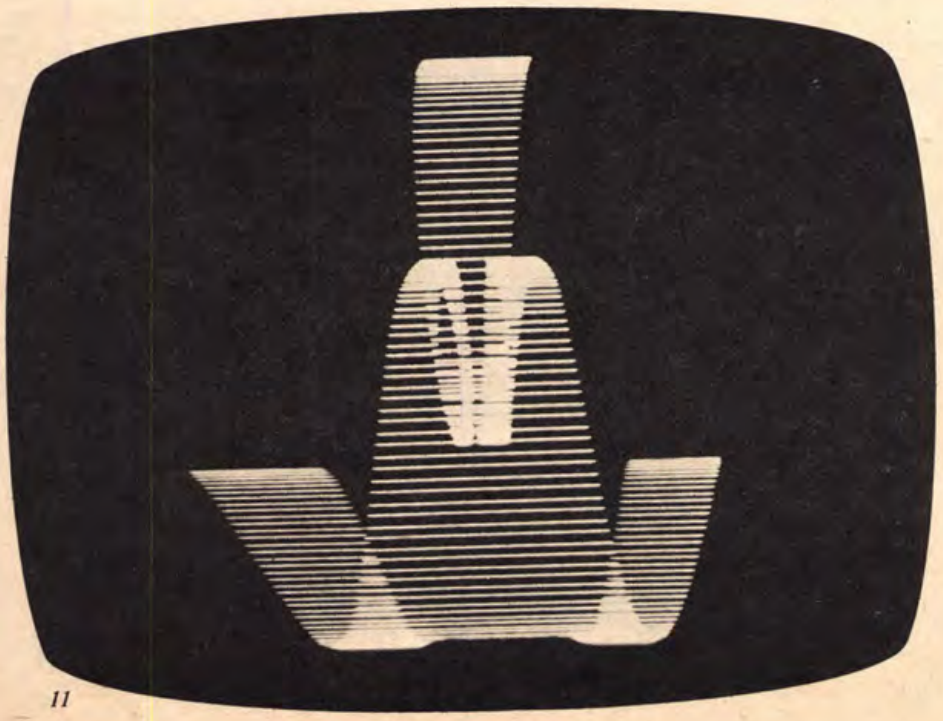
8



9



10



11



12



Color slide maker. *Color slide copy/graphics is input on this Xerox 350 Color Slide System, then transmitted to the nearest Xerox Reproduction Center where the slides are produced.*

Zooms and transformations into symmetrical or free-form shapes, as well as twists around the illusion of an axis, **to the other side,** can be created from the single cell or source.

•Color and Texture
The images go through an electronic colorizer. The colors can be flat, shaded, textured or mixed, and can glow as if they are neon light tubes.

A popular technique is overlaying animations many times in various colors. Overlays create scenes so rich in color values that they are impossible with any other medium. Best of all, because of direct recording on videotape, they are quick and are controlled by the designer.

•The Relationship of Designer/Art Director and the Creative Production Process
Each scene and element of a show or commercial is seen exactly as it will appear in the final product. Each is immediately recorded on videotape, instantly before a new scene is begun.

Changes are usually possible, even after producing a scene with relative ease. It's like the reassurance that the eraser at the end of your pencil allows.

Design Freedom
Gone are the clutter and complexity of frame count charts, multitudes of drawings, and the army of people usually needed to perform the many stages needed in frame by frame animation techniques.

Present is the exciting capability of looking at various forms of motion, shapes, colors, and **timings!**

Expression and communication becomes clearly defined, created and captured.

"Electronic controls can be adjusted to produce an infinite variety of effects. Should the designer decide to expand a letter, for instance, he turns a dial on the console which controls the motion of the letter on the cathode ray tube. When the letter has reached the desired degree of expansion, he merely stops turning the dial. Simultaneously, the letter in its new form becomes fixed on the screen. In similar fashion, figures can be made to shrink, to bend spatially, to twist, to squeeze, to zoom or explode.

Round corners can be made sharp, or vice versa; linear patterns can be created around them. All these effects may be seen in full color on the video screen.

"The area of the cathode ray tube onto which the images are projected, called the raster, can be divided into five sections, each of which is separately controlled. In this way several pieces of artwork may be combined on the cathode ray tube and the images mixed simultaneously on the screen.

"The Dolphin System gives the designer a comprehensive picture at all times. He can see every phase of his work in the color scheme of the final product. At any stage of the project he can make instant adjustments in tone...or change the colors completely. He can develop, refine or redefine each element of his design while keeping it in context with the whole.

"With these wholly new designing experiences, he can break away from preconceptions of what is structure in art...perhaps create new forms. Still, some graphics people...if not unaware of the existence of such an extraordinary new tool...are disinterested in its application. Its creative possibilities are now beginning to be explored.

"Why aren't more designers experimenting with the computer? Some maintain it's a matter of philosophy. There has been widespread anxiety on the part of the general public in relation to the computer, usually expressed as a fear that it will take over the creative functions of man. A working pattern of creative moments followed by long production periods is accepted as the norm by the design professions. With few exceptions, the Dolphin Graphics System can duplicate many effects available by conventional optical/chemical means and offers a totally new world of possibilities beyond. The designer needs new tools such as this to maintain the high standards of his work while coping with the demands of speed at the expense of quality which are often placed upon him. Rather than maintaining emotional and aesthetic prejudices against new technologies, he should be concerning himself with its techniques, familiarizing himself with its possibilities, and evaluating the aesthetic qualities involved. Above all, he should be exploring.

"Graphic design could become an anachronism if it doesn't maintain itself with the rest of technology. Just as computers have revolutionized typesetting and musical composition, they seem destined to similarly affect graphic design. Now, while computer technique is still developing, designers must take more initiative in the shaping of this new tool and medium. If they don't, they might well have to put up with it as it is shaped by others who do not share their expertise in the classic forms of design."

Designer Sam Antupit had no working experience with computer graphics until the hour he spent with the Helvetica Medium capital A, at Dolphin Productions in New York City. The photographs of the letter as it appeared on the cathode ray tube during that hour were made by the Dolphin Productions people who operated the computer under Sam's direction.

But the real story is that all this was done by Sam easily and with nontechnical requests in simple language that each of us uses in any design problem, during his first experience with the Dolphin Computer System.

CREATIVITY PLUS COST-EFFECTIVENESS

In design, color, and motion, the Dolphin System is proof that faster and less costly creation/production can be coupled with increased graphic innovation and communications effectiveness.

Conventional animation could have cost ten times as much and taken much longer to produce. A Disney-type film would require 1,440 individual frames or drawings for every minute of motion picture film. "Snow White" would be prohibitively costly to produce today.

Dolphin's special computer, in contrast, uses a single negative with black-and-white artwork to produce sequential movement. With only a few pieces of artwork needed, productions that formerly took years to complete are now finished in days and weeks.

COMPUTER-AIDED ILLUSTRATION AND DESIGN

There are a number of approaches to computer-aided illustration and design. The one described here is an IBM system, which was described in detail in the *IBM Journal* (Vol.17, No.3). The experimental system is at the IBM Research Laboratory in San Jose, California.

The system allows a designer to choose freely among 128 different colors, various form modes, and collage capabilities. To use it creatively, the designer need not be a programmer nor understand the technical aspects of the system. However, a few words about how the system works may help you understand how the designer uses it and what it can do.

How it works
The system consists of a display generator connected to a color video monitor and employs a computer and related control hardware and programming. The user can control the position and size of a displayed line or pattern. The character generator can produce a code of alphanumeric characters or nonalphanumeric picture elements. Picture elements can be created, stored, recalled, and edited as well as output in color. The complex storage system offers 16 possible intensity levels for each primary color or 16^3 (4,096) hue/intensity choices. However, only 128 can appear in any one picture, and the user must decide in advance of imaging what colors will be wanted. In short, choose the palette before dipping the brush.

The display generator is connected to a mini-computer, and the system can be directed with a keyboard and a joystick cursor control. To position the characters as desired, the cursor, or light spot, can be moved about on the CRT by manipulating the joystick. The designer can see the design grow and can see changes as they are made. The system's developers are aware that the resultant designs may later be reproduced by lithography and that reproductivity criteria must be met.

To produce colors
Color selection is made visually. All 128 colors available for a picture are displayed at the bottom of the video monitor. By moving a joystick, a crosshair or other cursor device is centered on the chosen color. That color can then be brought to the drawing area of the screen, where it can be positioned, sized, and shaped by manipulating the keyboard controls or joystick.

The designer using this system can randomly play with it until



the results are pleasing. But designer concepts can be mentally explored prior to using the system, whereupon actual colors and forms can be tried and altered until just the right one is created. Since changes are seen instantly, the whole process is very rapid.

Color and form can be altered independently. Colors are consistent and do not require mixing or matching. There is no layout work, no cutting of paper or paste-ups, no prints, no dummy layouts; yet immediate audience reaction is possible by viewing the CRT even as changes are suggested and tried.

Form control
The individual shapes within the design can be created on this experimental graphic display system. The designer chooses a form made by using a function switch. Form modes include lines, solid squares or rectangles, line circles, solid circles and text, plus the ability to rotate within a mode or to use a mode continuously.

The desired form is then created by using the joystick to size and position the form on the viewing screen for immediate judgment.

The designer visually determines sizes and positions of the shapes in the various form modes by fixing the beginning and end of a line, the radius of a circle, or the diagonal of a square or rectangle. Free-form shapes can be created with the rotate mode, and a series of continuous shapes can be created with the continuous-use mode.

Collage
Image mixing enables the designer to create collages. A video camera brings an image onto the display screen. The designer, by superimposing color and form on the original image, may then use the 128-color palette along with form modes to create video collages. Three-dimensional effects can also be created this way, and texture can be introduced as a design element by bringing a textured image onto the display screen and then applying color and imposing form modes on it.

Further, a photograph can be taken of the video image, and this can be retouched, silhouetted, overlapped, or enhanced by conventional techniques.

Choosing the best design
Since any design or design variation can be stored, the designer can store those that should be reviewed and erase those that would normally go into the wastebasket. Those that are saved can be viewed sequentially. If side-by-side viewing is essential, photographs of the screened pictures can be taken. Interrupted designs can be stored while in progress, then recalled and completed later. A "portfolio" can be stored in the system, too.

Obviously, this system is still in the research and development stage. Its cost-effectiveness and just how it would be offered and used are still to be determined. But it exists and works and is a harbinger of things to come. A fascinating aspect of developments such as this is their compatibility with each other and with existing graphic arts processes through the common denominator of reducing everything to digital information.

In the '80s we are likely to see devices such as these on the market. Not only will the cost of the hardware be lowered, but improved software will also become more versatile and easier to use.

DRAW OR TRACE ELECTRONICALLY

An artist can draw originals or trace drawings rapidly on a ColorGraphics system offered by Chromatics, Inc., of Atlanta. Using a light pen and a digitizer, this method shows the drawing in progress in color on a 13-inch CRT. Corrections can be made without redrawing, and areas can be filled in with different shades and patterns. When interfaced with a Xerox 6500 ColorGraphics printer, it can produce paper prints on plain color copier paper or on an 8½ x 11-inch color transparency. A character-create option permits creation of special graphic characters on the screen without programming. Characters may also be stored on a floppy disc for later use.

DIGITAL BLACK HOLES

Walt Disney Productions hasn't been sleeping through this technological revolution. For its movie "The Black Hole," instead of 1,440 hand-created frames being drawn for each 60 seconds of animation, a 75-second sequence of digital computer graphics was created. The technique, similar to that used in "Star Wars" and "Star Trek," uses a specific computer language to write a program that eventually creates a series of single images. The images can be displayed on a CRT, from which they are photographed by a motion picture camera shooting single-frame black-and-white exposures. An optical printer is used to color the resulting film. This is straight digital animation in which the computer generates lines or images. Other forms of computer graphics include the Dolphin technique, described above, and computer interpolation in which the animator makes key drawings with a light pen and the computer is used to create variations of them.

TASTE

Much has been made of the fact that the new technologies do not usurp the artist's role in making choices and applying personal taste and aesthetic sense and knowledge. This is a partial truth. Art historian Arnold Hauser notes that the turnover in art styles is accelerated by the rapid development of new technologies, and this affects not only fashion—in art or clothing or in anything else—"but also the shifting emphases in the criteria of aesthetic taste... the continuing and increasingly rapid replacement of old articles in everyday use by new ones... readjusts the speed at which philosophical and artistic reevaluations occur. . ."

The duration of new art styles seems briefer and briefer. Impressionism was new and important in the early days of the industrial era, the late 19th and the early 20th century. Abstract Expressionism thrived for about 20 years (1940-1960), while the Pop and Op that followed had general life-spans of five years or less.

More recently we have had Kinetic Art with its fluid form. Its very reason for being is transience. And the search for new talent, new trends, is now an annual, perhaps an ongoing sport. The result is what Alvin Toffler (*Future Shock*) calls "the accelerated turnover in the avant-garde." Just as a new machine may become obsolete within a few years, while still being paid for, the life cycles of schools of art and criteria of taste are becoming briefer and briefer. These two phenomena, seemingly unrelated, are in fact closely connected—just two of the many results of the increased pace at which we work and play and think and feel.

Few artists today think of creating enduring masterworks; most work for the short term. One reason is given by artist/social scientist John McHale, who observes: "Accelerated changes in the human condition require an array of symbolic images of man which will match up to the requirements of constant change, fleeting impression and high rate of obsolescence." What is needed, he advises, is "a replaceable, expendable series of ikons."

Of course, all this affects the viewer, the consumer. The rate at which each of us is exposed to, must accept, understand, cope with, and then discard new ideas, new facts, and new images is stepped up, too. Somehow the communication, with words or images or both, must still penetrate our changing and confused mental/neural condition if the message being transmitted is to be received as intended. These challenges to the writer and the artist go beyond coping with new tools and must be comprehended if true communications effectiveness is to be achieved in the '80s.

FROM CREATION TO PRODUCTION

At each stage of the communications process the output of one stage becomes the input of the next. The first step in the production process is generally known as "input" because it is here that the words and images originated by writers and artists enter the production stage.

Perhaps the greatest change affecting word and image originators is that input to the reproduction system—even composing areas and pages—will increasingly be done at the front end of the communications process, by copywriters, reporters, editors, and authors, as well as graphic designers and art directors. Although most input is still done by specialists (such as typographers and typesetters), this function will be performed increasingly by the creative person. The following data, concerning input equipment and methods, should be read with this in mind.

The entire communications process can be considered in terms of three broad operations: origination, production, and distribution. So far in Vision '80s, we have been concerned with word and image originators, their tools and procedures. Our next concern is with production and the ways in which words, data, and images are input to the production operation.

INPUT: DATA/TEXT



The impact of the new technologies in the immediate future will be particularly heavy on creative people—writers, editors, artists, and designers.

This is not only because many of them will have to discard old tools and old methods of working for new ones, but also because the new tools will do more than write or illustrate or design. The profile of the new creative person is an amalgam of creative and production talents. Few production-oriented people can sprout creative abilities. When the market requires one person for this dual role, it will have to rely first of all on creative people who can, if they will, cope with this dual function.

In some circumstances the new tool employed by an art director, for example, will be a machine controlled by a keyboard or by a combination of an electronic pencil and a graphic tablet. These may be input, editing, or page-makeup devices, or two or all three of these functions may be accomplished with one machine.

In some situations the creative person will run that machine; in others, the creative person will direct the machine operator. In all cases the creative person must know what such devices can and cannot do, in order to bring to these stages of the communications process the graphic and verbal judgment and taste that the machines lack.

To understand just what is happening, let us consider the steps in the creative/production chain as we have known them, as they are in today's period of flux, and as they are likely to be in the immediate future. For each step we have listed the primary tool or tools employed.

MULTIPURPOSE EQUIPMENT DEMANDS MULTISKILLED PEOPLE

The fantastic new technologies, while saving time and money, open new creative possibilities and will call on fewer people—sometimes one person—to make judgments in a wide area. One person may have to decide when the copy reads well, the illustration looks right, the elements of a page are correctly sized and positioned, the reproduction quality is satisfactory, the schedule and budget are met, and distribution is correct and on time.

We have long been accustomed to specialists, and we have long appreciated the role of the generalist. Now we may need a new breed of person—the multispecialist, to team up with the multifunction machines.

Let us consider where we are now in this ultraspeed evolutionary process—beginning with the status of input technologies.

INPUT—WHAT IS IT?

Essentially, an input device enters information (an author's manuscript or advertising copy, for example) into a machine for processing. The input machine converts data, words, pictures, or format instructions into machine-readable codes. These codes can be used to drive the typesetting machine.

Because some input devices can transmit typesetting commands as well as text to the typesetter, graphic designers as well as writers and machine operators need to know what they can and cannot do.

KINDS OF INPUT DEVICES

Input devices include:

Keyboards

Optical character readers

Graphic tablets

Electronic scanners, computers

Other kinds of input include voice converters and a whole network of devices that can, individually or in combination with each other, input to the typesetting/reproduction process, such as: electronic typesetters, word processors, page-makeup terminals, color scanners and color previewers, computer output microfiche, facsimile transceivers, wire services, picture digitizers, data bases, and communication links. Although most of these have other primary functions, they can also be used to produce input for the typesetting/reproduction process.

	YESTERDAY	TODAY	TOMORROW
Writing a story, ad copy, a report, etc.	Pen, pencil, typewriter, dictation equipment	Conventional tools plus word processors and keyboard devices that key the copy for typesetter	Voice input of text, data, and instructions will be more widely used. The same terminal used to originate a story will be used to edit it, create illustrations, make up pages or areas, set type, expose the pages, bypass platemaking, produce multiple copies (collated) in color and using both sides of the sheet. It will be able to communicate to remote sites and distribute itself electronically when so desired.
Illustration—art/photography	Brushes, pens, pencils, paints, inks, cameras, paper, board, etc.	As before	
Design/layout	Drawing table, T square, layout pad, pencils	Conventional tools plus electronic interactive input and makeup devices, as well as programmed formats	While not everyone will need such an all-in-one machine, all sorts of combinations of multipurpose devices will be possible and available.
Typesetting	Foundry type, metal machine and phototypesetting	Photographic, digital-CRT, and digital-laser typesetting via typesetting services and in-office installations	In sum, all steps will be digital/electronic, and the systems will be affordable across a wide budget range.
Platemaking	Done by photoengravers or printers	More platemaking done in-house	
Reproducing (printing, binding, etc.)	Commercial printers, binderies, etc.	More printing done in-house	
Distribution	U.S. Postal Service, private delivery services, expediters	Increasing rise of electronic mail and competing transmission services and networks	

ILLUSTRATION BY ANDRZEJ DUDZINSKI



QWERTY plus. *To execute typesetting commands or instructions the basic QWERTY keyboard is often augmented by special keys and pads of keys and sometimes the keys themselves have characters (for a supershift position) on their front as well as their top surfaces. This is a Ricoh keyboard.*

KEYBOARDS



The most common input device is the keyboard. Until a few years ago, keyboarding was a redundant operation, the most labor-intensive and expensive component of the typesetting operation. A story would be typed by a writer, edited, retyped by a typist (perhaps several times), then sent to a typographic service, where it would be keyboarded again by a Linotype or Monotype operator, then proofread and revised until finally approved.

Today, the need for speed and economy and for reducing the opportunities to introduce error has resulted in a production operation in which copy is keyboarded just once. The keystrokes are recorded or captured on perforated tape or on a magnetic medium such as a card, cassette, or disc. These media, which are the output of the input devices, become in turn the input for the output devices or typesetters. Such recording of keystrokes also reduces the introduction of new errors and redundant proofreading. On soft-copy and counting keyboards, errors can be corrected directly within the text without rekeyboarding the rest of the job.

Keyboards can be part of a complete input/output device, as is the case with typewriters, word processors, or direct-entry typesetters. They can also be separate devices; as such, they can output paper tape or a magnetic medium or be wired to an editing terminal or a typesetter. In the latter instance, they are referred to as "on-line" keyboards.

The wire connecting the keyboard to the typesetter or editing terminal can be a telephone line or a satellite system. The keyboard which thus communicates to a terminal or typesetter at a remote location is referred to as a "communicating" keyboard.

"Off-line" keyboards have no direct physical link to an editing terminal or typesetter, but their output, usually perforated tape or a magnetic medium (cassette, tape, disc), is removed from the keyboard when a job is completed and inserted into the input receptacle of the editing terminal or typesetter, which it then activates. In some situations the commands (typesetting and/or makeup instructions) are entered at the keyboard; in other situations, only the text is entered, and the commands are put in at an editing terminal.

BLIND KEYBOARDS

Keyboards can be "blind"; that is, no visual copy is produced for the operator to read. The blind keyboard perforates tape, and proofreading is done at a later stage. Blind keyboards are faster to operate because there is no waiting for carriage returns and no interruption of operator rhythm while reading the typed copy to check for errors.

SOFT-COPY KEYBOARDS

Soft-copy keyboards, such as Mergenthaler's NJ300, display the last 32 to 64 characters keyed on a moving illuminated display. Like blind keyboards, they eliminate carriage return, but they offer the operator a chance to catch and correct errors before finally committing a line. Although the full line is visible on the display area of the machine, no part of it is recorded internally until the line is complete and approved by the operator. If the operator is distracted by the display, it can be turned off. This would speed input, but more errors would then need to be caught and corrected at a later stage.

HARD-COPY KEYBOARDS

Like typewriters, hard-copy keyboards produce a paper copy of the information going to the output tape or magnetic medium, which can then be distributed, edited, or filed.

COUNTING AND NONCOUNTING KEYBOARDS

"Counting," or justifying, keyboards can be adjusted for whatever typeface or size is to be set, so that the correct width value for each character is counted and all are added up for each line. This tells the operator when the line is about to be filled. Usually a "hot zone" is flagged so the operator can decide whether to start a new line, add another word, or divide a word. "Noncounting" input devices (also called nonjustifying or "idiot" keyboards) defer line-ending decisions to the editing or typesetting operations. The result is faster, easier input. Since keyboarding has been perhaps the most expensive step in the typesetting process, eliminating it by capturing the keystrokes of the word originator or speeding it up by reducing the operator's functions, decisions, and distractions can be a meaningful cost consideration.

TEXT AND COMMANDS

Today's typesetters require two kinds of information: (1) the actual text or characters to be set; and (2) the commands or instructions concerning how the copy will be set. Commands include typeface, point size, line length, interline spacing, whether copy is to be flush or ragged left and/or right or centered, kerning, instructions for tabular matter, kind of letter and word spacing to be used, indents, and hyphenation. Obviously, graphic decisions are committed when the keyboard operator enters these commands, and the designer or person responsible for the graphic appearance of the job must have some control at this stage and must know the capabilities of the equipment being used.

The keyboard or other input device must enable the typesetter unit to distinguish commands from copy. Different devices have different procedures for accomplishing this.

Keyboard layouts differ, but many have as their core the typewriter "QWERTY" layout. Additional keys or pads of keys above, below, or to the sides of the central keys enable the operator to execute commands not possible on an ordinary typewriter.

One must remember that a given key, when struck, issues an electronic command which may or may not cause the character struck to be printed. The use of shift and supershift can triple the number of characters that can be created with the QWERTY keyboard. Each key would have three meanings. The key for "e," for example, could produce:

Unshift	7
Shift	&
Supershift	⊗

One key can represent even more characters when a special key—known as a **precedence key** because it is struck immediately before the character key is struck—is activated. Combining the use of a precedence key with the three shift positions could enable one key to represent six, nine, or more characters, thus greatly extending the output capability of a QWERTY keyboard.

Another method for achieving the same purpose is to use two-letter mnemonics and a precedence key. A **mnemonic** is a character, or combination of characters, that is easily associated with the meaning it represents. A few typical mnemonics are:

MNEMONIC	MEANING
EJ	End of job
TI	Title
TY	Typeface
BF	Boldface

Ideally, mnemonics should be limited to two characters, and a universal standard system should be adopted before we develop mnemonic babel. Widely used and advocated is a system that uses the first two letters of a single word being represented or the first letter of each of the first two words when representing a phrase of two or more words.

The markup person and the keyboard operator must, of course, know the system used by his or her keyboard and may need a diagram, template, or other device to know which character each key represents at each shift level and when precedence keys or mnemonics are employed. Some keyboards not only have two or more symbols on the top surfaces of the key but also show characters on their front surface.

THE DESIGNER'S CONTROL POINT

If the person who creates the graphic format job is not the keyboard operator, that person (art director, designer, or whatever the title) must have some control to be assured that the input/editing/makeup/typesetting stages will reproduce the format correctly.

In electronic typesetting, the key control point is when the copy is marked up. This can be done prior to the input stage or can be deferred to the editing or the makeup stage. If the copy is not marked up with its typographic specifications prior to initial keyboarding, the input operation can be accomplished more rapidly. But at whatever stage markup is required and executed, the graphic designer or other person responsible for the format must know the language of the machine or system and what the system can and cannot do—or else must work closely with a markup specialist and/or operator who has such knowledge.

Once upon a time the art director or designer wrote the typographic specifications on the copy—in the margins, as a rule. The machine operator followed those instructions but did not keyboard them in. Adjustments on the machine established line length, leading, letterspacing, typeface or size, and other typographic parameters. Today the machine does these things automatically on receipt of keystroke coded instructions. Each machine has its own code and its own limits for such things as line length, type styles and sizes on line at one time, ability to reverse lead, and all the other things a designer might want it to do.



The MVP. *This input/editing terminal uses format keys to call up stored formats. System uses three commas before a mnemonic command and one comma to end it. To tell the typesetter to set a title in style No. 2, operator would key: ,,,T12, followed by text of title.*

Thus the markup instructions, in coded form, as well as the text are keyboarded as input. In large installations a markup specialist may figure out command codes, so that the operators can use their full time for keyboarding. Full-time markup specialists should be more expert at writing the codes, too. If this specialist is not also the designer or art director, then some liaison is essential. Once the designer and markup specialist learn to work together, a clear layout with conventional markup may suffice. In other operations, each machine operator must create the markup code as well as keyboard it. The designer's control may become more diffuse in such operations than when a centralized markup system is followed.

When the keystrokes of typewritten copy are captured by optical character readers (OCR) or when the keystrokes of the word originator using a word processor are captured on perforated tape or on a magnetic medium, the command coding for the designer's instructions may be entered at one of several steps in the process:

1. **By the word originator** (author, reporter, typist, etc.)

2. **At an editing terminal** by an editor or a machine operator.

3. **At an electronic pagination terminal** by a designer/operator or an operator without design training.

At whatever stage the markup is done, the designer must either do it or have some control over it. The trend is for graphic decisions to be made toward the front end of the process—by the word originator when possible. Repeated formats can be coded, stored, and recalled for use when needed by means of a short code number. But whatever system is used, the designer or art director either must know how to mark up for it or must know at what point and how control can be effected.

Electronic markup cuts input and proofreading costs and reduces schedules. For these reasons it will proliferate and become one of the new tools and methods of operating available to more and more creative graphics people in the immediate future.

Of course, the creative person does not have to know every keyboard or input device; nor is it necessary to know how they work. One need only know, for the machines being worked with, what they can do and, in some cases, how to command them to do it. But one must also be alert to the dynamic era in which we are working. Machines we barely get used to can become obsolete and be replaced within just a few years. So volatile are the technologies available that the very keyboard or editing terminal in one's office or studio may have to be modified only months after it has been installed. Manufacturers of new hardware add improvements and new disc programs (for facilitating multicolumn makeup or tabular composition, for example) to machines already installed, and one must be alert to such equipment upgrading and know how to use it.

Among the many things to consider when deciding which keyboard to install are the range and number of formats and commands it can store and execute, as well as the ease and speed with which an operator can use it.

All typesetting machine manufacturers offer input units (keyboards) to go with their output units (typesetters). A number of companies that do not manufacture typesetters do manufacture keyboards for use with various typesetters of other manufacturers. These often have features not found on other keyboards. Some features of present keyboards and others likely to be available in the near future are:

- **Formatting**: Many keyboards permit the operator to create and store formats that will be used frequently. Instructions concerning font, line measure, film advance, point size, and indentions are just some of the parameters that can be programmed and put into the keyboard's memory, to be activated when needed. Such instructions are initially time-consuming to execute and require numerous keystrokes; by putting them into the keyboard's memory, they need be keyboarded only once. One can be recalled either by striking the single format key to which it has been assigned or by striking a preestablished two- or three-letter trigger code. This not only saves time as the format is reused but also eliminates a source of making errors.

- **Dual-Function Word Processing/Typesetting**: Keyboards are being designed to function both in the office and in the typesetting plant or department. Quadex, for example, within the next five years expects units that will be able to generate either simple letters or complex copy for cost-effective typesetting.

- **Telecommunications Links**: Keyboards and input-editing terminals will be linked via phone lines, cables, or satellites so that keyboarding in one location can be transmitted for output at a remote site such as a branch office, a company reproduction center, or a service operation. Input from many sources can be revised and consolidated at the reproduction center.

- **Editing and Makeup Capabilities**: The distinction between keyboards that only, or primarily, create input and those which are also able to store, recall, edit, and even make up copy into formats is disappearing. More and more multifunctional units are appearing. A review of what these can do appears in a later section of Vision '80s.

- **Estimating, Billing, Accounting, Inventory Control**: Some keyboards and editing terminals not only have multiple functions in terms of graphic communications operations but can also cope with many recurring business/office problems. After all, the heart of these machines is a mini-computer or a microprocessor. These small powerful devices, although called "intelligent," are limited to whatever intelligence is built or programmed into them. Key Corporation's Multiset III is an example of a keyboard/editing terminal that can also handle automatic page makeup and a kerning program. With optional software packages, it can estimate costs and income and handle classified ad formatting and such accounting jobs as general ledger maintenance, payrolls, and accounts payable and receivable in a manner custom-tailored to the user's needs. Other programs enable it to communicate via telephone to receive input or to transmit output, to handle user-created formats and programs, and to maintain inventory records.

- **Automatic Proofreading**: Some keyboards or terminals (such as the Multiset III described above) also proofread as they record, before they output for typesetting. Such devices have incorporated in memory a spelling dictionary, which functions in much the same way as a hyphenation code. The machine searches its memory to verify spellings before committing words to the recording medium. In some units the dictionary is large and can be customer-updated. Although the advantages of such a program are obvious, one would want to weigh its cost against its savings and also measure the extent to which it might slow the input process against the time saved by eliminating a separate proofreading operation.

- **IBM's Audio Typing Unit can "speak."** Attached to some IBM typewriters, it enables a blind keyboarder to proofread by hearing what was typed.

- **Automatic Foreign-Language Translation**: Here, too, the future is today. Programs and devices exist that can automatically translate from one language into another. You can, for example, input in English and output in German. Since these programs are relatively recent, they should be checked for reliability and comprehensiveness. Also, the same copy may take more or less space in one language than in another.

The Weidner Multi-Lingual Word Processing System is one of nine systems now or about to be operational. It is almost instantaneous, uses a mini-computer, and claims to be easy to operate. During a demonstration in late '78, an English version appeared on the screen only seconds after the Spanish version had been typed in. In a few years the machine will handle nine other languages: Arabic, Dutch, French, German, Hebrew, Italian, Japanese, Portugese, and Russian. It can be programmed for technical terms (legal, scientific, medical, or engineering terminology, for example).

The output is a printed, camera-ready translation. Although it does not replace a human translator who knows idioms and must exercise judgment and choose options, it does relieve the translator of much tedious work and permits concentration on the editing and judgmental areas.

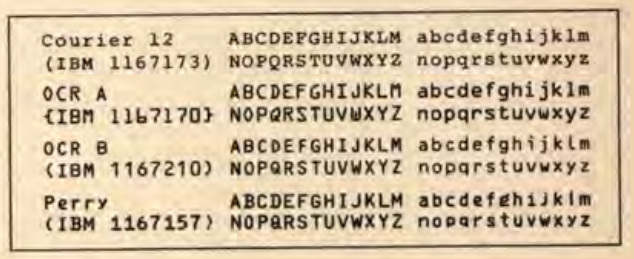


Here too, cost-effectiveness is crucial. The system claims to cut translation costs in half and to quadruple output. Present prices for a Spanish-to-English unit range from $125,000 to $150,000. It is conceivable that in a few years, as production steps up and costs of the core memory come down, such units will be within reach of many small businesses and translation services as well as government agencies and large companies.

Already on the market, of course, are hand-held calculators that display words in a chosen foreign language and even employ electronic speech synthesis to pronounce them. One such unit sells for about $250, with the plug-in modules for the various other languages selling for $50 each. These translators store 1,000 words; all 1,000 can be displayed, but only 500 spoken. Other calculators without the speech feature have larger vocabularies and cost less.

OPTICAL CHARACTER RECOGNITION (OCR)

What is OCR? OCR devices can read written, typewritten, or typeset material and convert the scanned or read material into electronic signals. These signals can then be entered into (input)



Special OCR fonts. *Most OCRs read only certain typewriter fonts such as Courier 12, OCRA, OCRB, or the Perry fonts shown here.*



KDEM verification terminal. *For each character, KDEM computes a confidence index. A low index calls on operator intervention and displays a magnified picture of the original character.*

word processing or typesetting equipment. This is a method of capturing the keystrokes of a word originator or of previously prepared or printed material. It can also—when used to scan handwritten documents or books, for example—eliminate even initial keyboarding for the job at hand.

JUST WHAT CAN OCR READ?

Some current OCR devices can read almost anything. When OCR devices first entered the market, they could read (i.e., distinguish the characters of) only specially designed characters. Standard OCR fonts such as OCR-A and OCR-B were developed. These are obtainable for many typewriters and are readable by all OCR units. In addition to the internationally used standard OCR-A and OCR-B fonts, two other fonts are widely used: the Perry font and IBM Courier 12. An analysis of these four fonts and their relative advantages appears in the *Seybold Report* (Vol.6, No.12, pp. 8-9).

OCR devices can also read bar codes. These devices read the bars printed below the letters, numbers, or other symbols in order to convert them into electronic signals. This has the advantage of using more human-readable characters for the hard copy at the typing stage; however, the result is that the small human-readable letters may be no more readable than the larger OCR-A characters, for example.

IS THE OCR RESTRICTED TO READING SPECIAL FONTS?

No. Early readers were so limited, but today's readers have expanded their abilities in two directions:

1. Some can now read virtually anything—from handwriting to any typeface.

2. Some have combined the functions of character readers and editing terminals.

IS THERE A TRULY UNIVERSAL OCR?

For all practical purposes, yes. The omni-font Kurzweil Data Entry Machine (KDEM) can convert printed or typewritten material, regardless of typeface or type size, into electronic input signals for most editing/word processing/typesetting systems. Existing books, manuals, or price lists, for example, can be reset without rekeyboarding. At the editing and/or makeup terminals, the content can be corrected and a new format can be established.

This comparatively new device literally backed into the graphic arts. It is an offspring of the Kurzweil Reading Machine (KRM), developed by Raymond Kurzweil. The KDEM is designed to scan printed or typewritten matter and read it aloud to the blind. It integrates a scanner, computer, and voice synthesizer and even contains the verbal equivalent of a dictionary, allowing it to cope with look-alike and sound-alike words. As of mid-'78, some 48 Kurzweil Reading Machines were located in public schools, rehabilitation centers, libraries, and hospitals—within only two years of its commercial debut in '76.

In fact, a desktop KRM one-third the size of the original (designed to sell for $50,000) was introduced in '78 for $19,400. KRMs not only can read aloud but, equipped with a hardware/software option, can translate printed material into Braille. The Library of Congress ordered the first print-to-Braille system.

Although KRM is presently oriented to English, it obviously can be adapted to other languages when the market demands. Initially costing in excess of $100,000, such machines may soon be on the market at one-third or one-quarter their original price.

The Kurzweil Reading Machine is capable of reading any book, newspaper, or magazine, for example; in graphic arts terms, this means it can read any font. The existing technology was a solution in search of a problem. First it was applied to the reading problem of the blind; then its potential as a universal OCR became apparent, and KDEM was introduced. KDEM can handle substandard print, including fragmented, broken, or joined characters as well as all alphanumerics (letters and numbers) and a large assortment of special characters. It can output electronically in code (ASCii) and onto a disc, or industry-compatible tape, or to a teletype-compatible interface. It can thus provide input to word processing or typesetting systems and, by scanning original printed or typed source information, reenter such information without keyboarding. The reading speed of the latest KDEM model is 3.7 inches per second, and new software permits it to read foreign languages and their accented characters.

By 1980 these machines were priced in the $80,000 range. Mass production and the application of less-costly memory devices are expected to bring their price down to the reach of a wider market.

The newest Kurzweil device is the Kurzweil Talking Terminal. It converts computer-transmitted standard English text into high-quality, easily comprehended synthetic speech. Readily attached to any computer terminal, it has an unlimited vocabulary and costs $3,650. It thus makes it possible for the blind to use computers. Instead of seeing the CRT, they hear the information. This opens up new careers for the blind. The same talking terminal can be used by those unable to speak. Voice-impaired persons can use its keyboard to type messages that will be output verbally. The Kurzweil Talking Terminal is the only device available that can generate unlimited vocabularies without linguistic programming by the user.

ANOTHER VERSATILE OCR

Special stylized OCR faces are becoming obsolete. The OCR/Word (Dest Data Corporation) reads almost any common typewriter face, such as Prestige, Elite, and Courier. One machine can be equipped with four switch-selectable typeface recognition programs.

THE MULTIFUNCTION OCR

Some OCRs, in addition to recognizing characters and converting them to electronic input for typesetting, can perform the following functions: deletions (of characters, words, phrases, sentences); insertions of a limited amount of copy; translation of codes for characters and groups of characters from its own coding system to that used by the editing terminal or typesetter receiving the material; handling codes for phototypesetting markup and accepting user-defined format instructions.

Typical units with such heterogeneous capabilities include the ECRM-5000 series (including the 5300 and 5300L Autoreaders), MGD Metroreaders, Compugraphic's UniScan, and some CompuScan models. Such machines not only read copy but ready it for hyphenation and justification typesetting.

WHAT HAPPENS WHEN EDITING TERMINALS ARE USED?

When the OCR feeds an editing terminal en route to the typesetter, its editing and code translation functions become redundant. Less complex and less costly OCRs can be used, allowing the computer in the editing terminal to handle insertions, deletions, corrections, and code translations. Such OCRs are essentially computer input devices; typical of these are the ECRM-4400 and the Context 201.



The KDEM. *The Kurzweil Data Entry Machine converts existing typed or printed material to computer form. It scans and recognizes ordinary print in any type font or combination of fonts in a wide range of sizes with a high degree of accuracy. Newer models have come down in price, increased speed, and added such software features as automatic font identification and detection of paragraphs, recognition of superscripts and dashes, and the ability to store converted text or communicate it to another computer system.*



The Camex 1351. *Tablet (right, center) is activated by touching an electronic pen to the appropriate rectangle. Changes appear immediately on the CRT.*

Although they can also output a full set of six-level or TTS codes onto paper tape, the Compugraphic UniScan and Hendrix OCR-2 are in this category, too.

OCR IN PUBLISHING

A few authors (John Hersey is one) and many reporters and editors use video input/editing terminals and thus record their keystrokes directly on cards, tape, cassettes, or discs. But most authors, editors, and reporters still use longhand or conventional typewriters. To avoid multiple keyboarding of such copy, OCR is employed. Edited versions of authors' manuscripts may be retyped on typewriters with OCR-readable fonts, then OCR-scanned to produce the electronic input to the typesetting or word processing system.

AN OCR CAN BYPASS THE WORD PROCESSOR KEYBOARD

Some OCRs—the Context 1210, for example—can read previously typed OCR-B material at the rate of five pages per minute and convert it into electronic form usable on a word processor. This frees the word processor from redundant keyboarding, thereby saving hours of machine and operator time and avoiding possible transcription errors. The error rate of such a machine is claimed to be only one error per 30,000 characters. In scanning previously typed copy, the Context 1210 can preserve or ignore the original format. Using an interface or translation device to match the code of the receiving machine, it can operate off-line or on-line to most word processors. Using the word processor to input or rekeyboard previously typed copy is not economical; it reduces the word processor to the speed and status of an ordinary typewriter, limited by the operator's speed—but this "typewriter" may cost $12,000-20,000.

Using the OCR for input where possible and using the word processor for editing and output can maximize the productivity of the operation. It makes little sense, for example, to tie up a $15,000 keyboard in doing roughs which can be done on a $700 typewriter equipped with an OCR font and which are then scanned and input to the word processor via a disc or cassette. Actually, from 50 to 80 percent of the word processor's time is tied up in text input. CompuScan, manufacturers of Alphaword OCR machines, points out that adding word processors is a costly way to break the resultant workload backup. Teaming up an OCR unit, CompuScan claims, can triple the productive capacity of any word processing system. This is particularly true in large offices, where one OCR unit can accept the output of 30 or more typists.

HOW CAN YOU EDIT OCR-SCANNED COPY?

The rough draft copy, whether an author's manuscript or an office document or letter, can be revised and edited by the word originator. The revised draft, originally prepared on an ordinary office typewriter equipped with an OCR font, is edited with a light red or blue felt-tip pen. The marked draft is scanned by the OCR, which is insensitive to the red or blue marks. Corrections can be typed above felt-pen marks, and words, characters, and lines can be deleted on some OCRs by typing in delete codes.

OCR CAN BE USED FOR MEDIA CONVERSION

OCR units can be used to read the printed output of text or data stored on magnetic cards, for example, and duplicate the information on a selected new medium, such as a magnetic disc. Conversions done internally save time and money and also help to preserve confidentiality.

WHAT ABOUT FOREIGN LANGUAGES?

Some OCRs, such as the Hendrix Typereader, have a foreign-language option which enables the machine to read most modern European languages.

WHAT IS THE FUTURE OF OCR?

Some people believe that, as more and more word originators make use of CRT input/editing terminals (VDTs), the need for OCRs as input devices will decrease. However, continued usefulness is envisioned for OCR not only in operations not penetrated by VDTs but for in-plant publishing where "cottage labor" (work-at-home typists) is cost-effective.

SCANNABLE COPY ELIMINATES SHOP KEYBOARDING

Copy prepared on a typewriter equipped with a scannable font can be sent to an OCR-equipped shop, where it will be scanned, instead of keyboarded, and input to the typesetter. This procedure saves time and money and reduces the error potential. The same is true for an in-house environment. A low-cost input device such as an IBM Selectric II typewriter, equipped with a machine-readable version of a Courier 12 font, could be scanned by an EditWriter 1750/UniScan, which can feed the typewritten copy through to an EditWriter 1750 terminal for hyphenation/justification and editing. The resulting disc can then be input to an EditWriter typesetter.

GRAPHIC TABLETS

The graphic tablet is an alternative or supplement to a keyboard. As it is used on a Camex 1351 or an AdVantage makeup terminal, a wide range of functions are listed in rectangles on the tablet's surface. These enable the operator to execute a wide variety of commands, such as changing word spacing, or letterspacing, or interline spacing; drawing boxes; indenting; adding or deleting characters, words, or lines; changing typeface, size, or line width; and inputting of letters, numbers, punctuation marks, symbols, and pi characters.

The operator, instead of striking keys as on a keyboard, holds an electric pen or stylus that he/she simply touches to the rectangles on the tablet labeled with the desired functions. The tablet is wired underneath, and the contact of the pen completes a circuit that allows the desired function to be executed. The resultant change—increased leading, for example—is immediately observable on the CRT.

The graphic tablet can be used to input text or commands. For operators who are not trained typists, such as art directors, the graphic tablet is an easy-to-use input device. It is not designed for initial input of text, since compared to a keyboard it is slow for such a purpose. But it is a versatile device for inputting commands. Some such devices also enable the artist/operator to draw in art or picture outlines. How they work on some important electronic pagination devices will be reviewed in a later chapter of Vision '80s.

VOICE INPUT



Perhaps the ultimate input device is the human voice. Just say it, and a machine will make it happen. If voice input of text and instructions is not yet commercially feasible, it has left the realm of pure speculation and is now in a research and development stage. After all, we now have a Kurzweil reader that can scan printed matter and read it aloud. Reversing that process is not impossible. Machines have been developed to translate voice input into digital form to be output on a printing device; but the error rate is still unacceptable. There are those who feel such devices will be technologically and economically feasible by the late '80s.

Companies working on voice input problems include Texas Instruments, Bell Telephone Laboratories and Interstate Electronics. TI's Speak-and-Spell teaching aid duplicates human speech electronically. Bell Labs has a device that responds to entire sentences and makes less than one error per 200 spoken words. Interstate Electronics has developed a voice recognition system that represents a size and cost breakthrough. Its voice recognition module condenses all logic and input-output interfacing needed to convert spoken words into computer codes onto a single circuit board. Such developments are speeding the day when voice input will be economically as well as technologically feasible.

Although voice input machines are as yet imperfect, they already have some sophisticated abilities. For example, they can be "trained" to accept input from one person only, perhaps for security reasons, and can "learn" that person's inflections and accents. Some people expect that voice data-entry devices with a vocabulary of over 1,000 words will be on the market in the early '80s and that voice input will eventually replace labor-intensive keyboard devices.

INPUT: IMAGES/GRAPHICS



Conventional illustrations, logos, art, and photographs can be electronically scanned, enlarged or reduced, cropped, positioned, retouched, screened, stripped into formats or pages, stored in and selected from a digital file, and transmitted to an output device. All this is being done today. No film, paper, razor blade, rubber cement, T square, drawing board, or photographic camera need be involved in the input and processing stages.

SCANNING

The chief method of entering a picture into the reproduction system is by scanning. The scanning device is usually a vidicon tube, a TV-type camera, or what is known as a flying spot scanner. There are flatbed and drum scanners. A variety of light sources are used, including different kinds of lasers. But, essentially, the input process is as follows:

1. Photographing: Electronic camera captures images.

2. CRT image: Image is focused on the face of a CRT.

3. Scanning: An electron-beam raster scans the tube face.

4. Analog signals: The scanning operator converts tone values into variable-intensity signals that are stored in anolog form. This means that the data is recorded continuously, instead of in fixed increments or steps as in digital storage. The analog form combined with the fine resolution stores a continuous-tone picture.

5. Digital signals: The analog-form stored signals are output to videotape and sent to a converter to become digital. Now every bit of information represents either a black or a white area. Gray tones are represented by a sequence of bits that comprise a **byte.** Just as the varying size of dots, relative to the space between the dots, establishes tone values in the halftone process, so the nature of the bit string (or byte) determines the gray value. 256 different gray values can be represented.

6. Tone-line conversion: A scanner can convert tone copy to line copy. It can be adjusted so that all tones above a given level are represented as black and all others as white.

7. Tone control: Signal-intensity levels can also be modulated to change the gray scale being recorded. This offers control of tone values. It is called electronic tone correction or retouching.

8. Resolution: The number of scanning lines per inch is a measure of the system's resolution, or ability to store and output fine detail and subtle tone variations. A machine with a 1/1,000 scanning pattern will record 1,000 × 1,000 (or one million) observations per square inch. These minute spots or observation areas are known as **pels**, or **pixels** (= picture elements). For fine-quality typography, a 1/1,200 to 1/1,300 scanning pattern is considered adequate to capture the nuances of thick and thin strokes, hairlines, subtle curves, and delicate serifs. One must remember, however, that output resolution may be finer or coarser than input resolution if the picture or type is reduced or enlarged. For fine resolution when scanning, a fine scanning beam or spot and a large number of scanning lines per inch are required.

9. Screening: For most reproduction processes (lithography, gravure, letterpress), a halftone screen is required to transform tone values into dots that vary in size and/or depth (in gravure) to reproduce gray tones. Collotype or photogelatin printing and electrostatic processes are an exception to this, but the former is not suited to long runs and the latter has yet to achieve graphic arts quality.

CONVENTIONAL HALFTONES

In the conventional printing processes, as we know, a crossline screen in the platemaking camera, between the lens and the sensitized film, breaks up the continuous-tone image into a series of dots. The screen is situated at a predetermined distance from the film. The light rays diffuse in this space after passing through the screen's "windows" and before striking the film. Intense rays from light areas of the original copy diffuse more than do less-intense rays reflecting from darker copy areas. The result is that varying dot sizes are recorded on the film, although all picture areas have the same number of dots per square inch.

In the resultant **negative**, the large dots with little space between them represent light copy areas. In the ultimate printed piece that is reversed, so that large dots with small spaces between dots represent dark tones. Contact screens prescreen film work differently but achieve the same end result.

ELECTRONIC SCREENING

When electronically inputting or scanning continuous-tone art that will be produced by one of the halftone printing processes, the screen, too, must be produced electronically unless the copy has been prescreened. Prescreening is generally avoided since it compromises copy to be enlarged or reduced (the screen value is thus changed), and the screen (dot) and scanning (pixel) patterns may conflict and create visually disturbing patterns or moirés.

To preclude changing the screen fineness, screening is done after the copy has been sized. This is explained more fully in the section of Vision '80s dealing with reproduction processes.

LASERS FOR SCANNING



Laser beams as the light source for scanning art, type, and photography for inputting into the electronic communications process offer: (1) cost-effectiveness because of their low cost, high reliability, and long operating life; and (2) fine-detail scanning because of the beam's high resolution.

TYPESETTING OF PICTURES

An example of a typesetting system that can input, store, edit, process, and output pictures as well as words is the VideoComp system produced by Information International, Inc. Since VideoComp can also output the type and pictures in position, it is also an electronic page-makeup machine. The VideoComp 570, which has a base price of almost $200,000, is obviously meant for large installations. How it edits, positions, and outputs pictures will be reviewed in the sections of Vision '80s concerned with editing, pagination, and typesetting.

Input is done by an illustration scanner, currently Model 3600, which scans logos, line art, and continuous-tone art and photographs. While a logotype is essentially the same as a single type character and can be stored and processed as such, line art, usually larger and not used repeatedly, must be scanned. The Model 3600 scans line art at a resolution of 1,000 lines to the inch.

Tone copy requiring a halftone screen for ultimate reproduction is scanned so that each spot corresponding to a halftone dot in the reproduction size is scanned as an individual character. The size of these "characters" depends on the halftone screen being created (1/50 inch square for a 50-line screen; or less than 1/100 inch for a 110-line screen, for example.) The actual output size and shape of each halftone dot, which help establish tone values and details in the picture, are not determined in the scanning process. Relative values are established there, but the small and large dots that determine tone values are established in the VideoComp output program.

A software program is used to improve image sharpness by scanning ahead to see if the next dot is too close in tone image (size) to the dot being scanned to produce the desired sharpness. Corrections are made automatically by the software program. Good-quality halftones are produced this way in 110-screen for *U.S. News and World Report* magazine.

COSTS AND HALFTONE DIGITIZATION

Halftone digitization is still a high-cost operation because a very large storage memory is required for it. As memory costs come down, such devices will become available to a wider market.

INPUT—A WRAP-UP

What do all these new devices and systems and their imminent offspring do for those who create graphic formats?

The graphic designer needs some way to control production of the format throughout the production process. As the stages of originating information or images and of makeup become electronically interlinked, the designer's control point moves to one or more of these front stages of the process. While this may relieve the designer of following the job through subsequent production stages, it locks in decisions early in the process and preempts later changes.

The designer can exercise control in one or more of several ways:

1. Do the markup and/or input personally. (Not many will follow this route.)

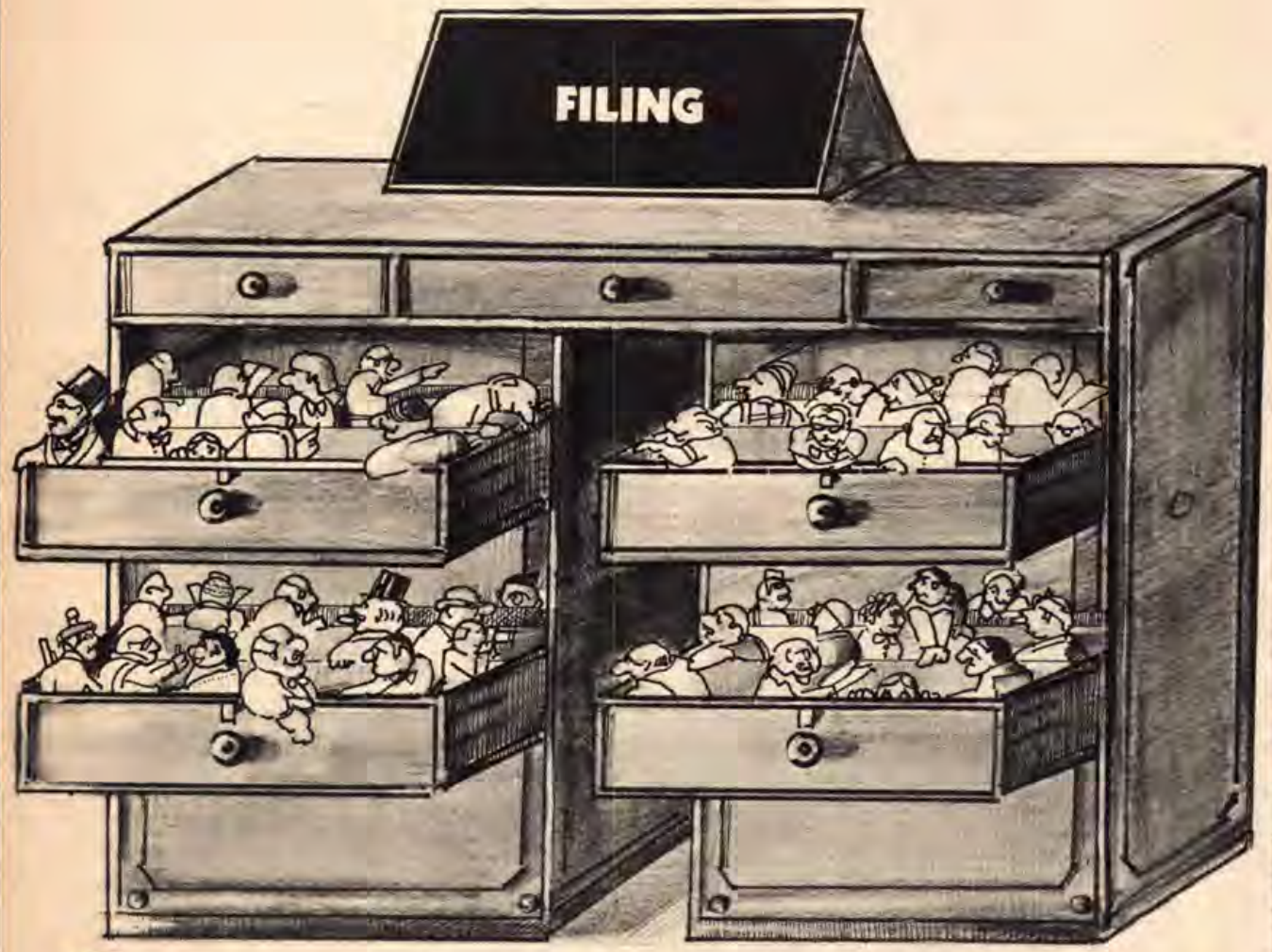
2. Maintain close liaison with the markup and input personnel.

3. Develop and use stored formats for repeated or recurring formats.

4. Personally operate, or supervise the work done on, electronic editing and/or pagination devices.

5. Design with an awareness of what equipment will process the job and with a knowledge of the graphic parameters within which that equipment operates.

ILLUSTRATIONS BY JUREK WAJDOWICZ



Traditionally, secretaries or file clerks have maintained office files. With electronic filing, some word and image originators or editors will use the file system directly.

Why? Because the same keyboard-plus-VDT terminals used by writers for creating text or by artists for creating images can both input copy or images into the system and file them for future editing or outputting. Input and filing thus become virtually a single operation done by one person using one terminal in a system. This is also true of those using editing and makeup terminals.

WILL THIS MAKE A FILE CLERK OF THE EDITOR, AUTHOR, ARTIST, DESIGNER?

Not really. Some file clerks may be eliminated and the creative person may often control the electronic files, but the tedium associated with paper filing systems will be gone. Electronic filing is easy to learn and is accomplished virtually instantly. It more than repays the creative person's effort by offering immediate and easy access, security, and the ability to file material so that the proper editor or art director can review it on his or her terminal, as in large systems using a central computer to direct traffic from one terminal to another, and OK or revise it before sending it to the output station. Newspapers and large publications do this now. In offices, the word processing operator or typographist (operator of a direct-entry typesetter) may set up the electronic files, which they and others in the system can use on their terminals when linked through a central processing unit (CPU).

In the '80s, more and more creative people—art directors and designers, writers, and editors—will personally use or directly supervise electronic input/editing/makeup terminals that make use of electronic files. The following data, while not reviewing all kinds of filing systems (such as paper, punched tape or cards, microfilm and microfiche, and various magnetic media) nor attempting a machine-vs.-machine analysis, cover the basics of electromagnetic filing and focus on magnetic discs, bubbles, and computer output microfilm (COM) devices as the media most likely to flourish in the '80s.

Manuscripts, correspondence, data, records of all kinds, artwork, and photographs are among the materials most offices and reproduction centers or graphic services must store safely and find quickly when needed. With the new technology, even screened halftones can be filed electronically.

File cabinets and drawers full of folders, documents, and artwork have been giving way in many places to various kinds of photographic microstorage, such as microfilm. The purpose is to cut storage/filing/accessing costs by conserving time, space, materials, and equipment as well as to improve security, channel or restrict access to selected personnel, and facilitate updating.

Nowadays filing—like every other stage in the communications process, from creating artwork to final document distribution in multiple copies to remote locations—is becoming electronic. Information and images that can be created and input into an electronic processing system can be stored in digital form on magnetic media such as discs, drums, cards, cassettes, or tape.

The advantages of this procedure are the same as cited above for microfilm, but with two differences:

1. When it is properly set up and operated, cost-effectiveness is even more dramatically improved. Retrieval is instant, and there is no need to refile documents called up for use.

2. The stored information or images are in digital form and are thus compatible with (sometimes via interface devices) and readily transferred to editing terminals, typesetters, and multiple-copy output devices. If necessary, paper copies can be produced for meetings, for OKs, or for anyone who feels more comfortable working that way or does not have access to a viewing screen.

THE MANILA FOLDER SYSTEM

Although manila folders, filing cabinets, and artists' or draftsmen's storage cabinets are not about to become obsolete, more and more filing is being done on microfilm and with magnetic media. In a large operation the disadvantages of manual filing are magnified, and they can seriously reduce the cost-effectiveness of the office or studio operation. Some of these shortcomings are:

- Such systems often depend on availability of a key person to establish and maintain the files and to retrieve needed material quickly.
- The knowledge of just what is in a file, and where, is often in one person's head. When that person is absent or leaves, the replacement manager of the files may have a massive job relearning what is filed, and where and how, if no procedural chart of the filing system is available.
- Paper files often are not purged of obsolete material, since such regular screening is time-consuming—time that is rarely available.
- Filing systems tend to be unsystematic, complex, and disorganized.
- Paper files tend to bulge with multiple copies of the same documents.
- Filing often is not current, and material piles up on executives' or secretaries' desks chaotically, making it hard to locate.
- Filing tends to be according to inconsistent categories, such as by date, company name, subject, or an individual's name, with resultant cross-reference indexing or multiple filing—or what may be worse, no cross-indexing.

Certainly, specialists can be trained in file management and assigned to establish a system that minimizes these and other pitfalls; but all too often this is not done. Now that the technology exists, is practicable, and is available at the right price, more companies are switching to microfilm or magnetic filing.

ELECTRONIC FILING

File management—or data management, as it is also called—consists of:

1. **Input**—putting data into the system.

2. **Identification**—giving each batch of data its own label, number, or name.

3. **Storage**—recording the data on a magnetic medium.

4. **Retrieval**—calling it up for review and/or processing by keyboarding its label so as to get it back (on a VDT tube or on paper).

DISC STORAGE

The current trend is to disc storage, because data on discs can be retrieved almost instantly, discs can store considerable information, and they are comparatively inexpensive. A magnetic disc is a flat circular plate with a magnetic surface on which data can be stored by selective magnetization of portions of the surface. To make such a device, a magnetic coating containing iron oxide powder is applied to a flexible (nylon) or rigid (metal) backing material.

When entering data, text, image, or file information, the operator's keyboard strokes send signals to the device's computer that selectively magnetize the disc. The signals for the letter A, of course, are different from those for a Z. What actually happens when the operator strikes a key is akin to throwing an electric switch. Electric signals unique to that key are transmitted to the computer.

ILLUSTRATION BY JUREK WAJDOWICZ

The five main parts of a computer are:

1. **Central processing unit**

2. **Memory**

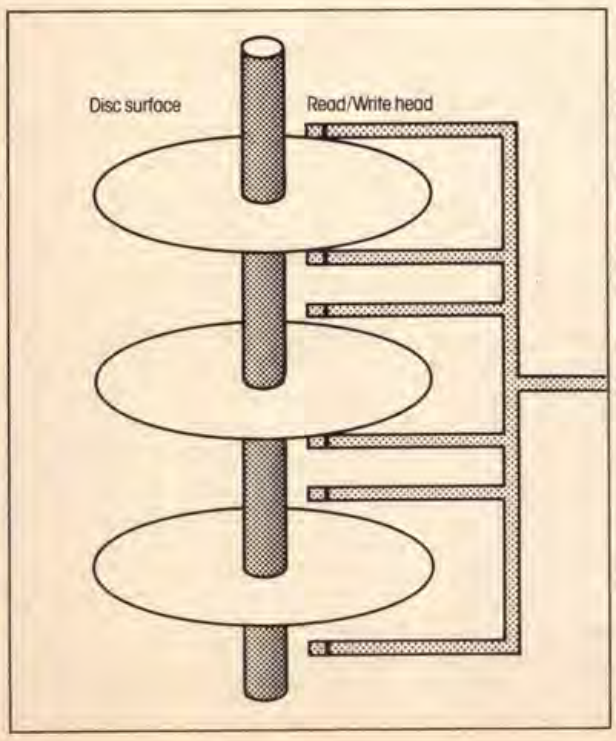
3. **Input interface**

4. **Output interface**

5. **Programs**

The memory inside the computer can take a variety of forms, such as a drum, chip, disc, or bubble. The present trend in smaller, powerful yet less costly devices is toward the chip, which consists of thousands of tiny areas (domains) and their circuits. The unique signals from the keystroke for A open and close a corresponding unique combination of circuits on the chip. These, in turn, when desired, can send out signals to selectively magnetize a disc so that at a given spot it has an electromagnetic record of A and can output it on command. What it outputs is a coded electric signal that causes a specific key in a position corresponding to the A to be struck (as in a word processor) or a lamp to flash (as in a phototypesetter) and thus to print or expose an A on the output device.

A disc is divided into tracks and sections, just as file cabinets are divided into drawers, drawer sections, folders, etc. The electronic file system is programmed to keep track of where information is stored. If information labeled "Intro," for example, is stored on track 2 in sections 1 and 2, the system will remember this (until the data is erased), and the data can be called to the viewing screen by keyboard command, by asking for it by name. But how does one remember all the names or labels of all the items stored on all the discs? One doesn't; the electronic file system does that, too.





A moving head disc. *Concentric tracks on magnetized disc surface are usually divided into 10-100 sectors.*

FILE INDEXES

Although every terminal and system has its own approach to file management, the basics are essentially as follows: When data is electronically filed, the operator enters on the disc (by keyboarding) the label or name of the material filed, its number (in case several entries are made for the same job or label), and the date of filing. Some systems also allow the operator to enter the date when the latest changes were made on the data and to indicate its quantity and how much storage space remains on the disc. This data is entered on the index or directory area of the disc, which the operator can access by keyboard command. An electronic file on a special disc can also be created to index all the discs, if so desired. The labels used to index filed items, created by the user, should use names, numbers, or words the user can immediately identify for future reference.

USING THE DIRECTORY

To use the stored data, an operator must first find the disc with the recorded data to be edited or output. Then the disc directory, a list of the contents on the disc, can be called to the screen. By positioning the cursor on or next to the label of the desired material and instructing the machine to call it up, the directory will then disappear from the screen, and the specific document or data wanted will appear. If the data are too extensive to fit on the screen, the opening part will be displayed first; then, since most systems permit scrolling (some vertically only, some also horizontally), the initial data will move off the screen as more data appear in desired sequence.

This system, which electromagnetically reads information from or writes information on a magnetic disc, is known as a **disc drive**. On a disc drive, one or more discs are mounted on a vertical rotating shaft separated from each other. Between the discs are "read/write" heads for each surface of each disc, which make contact with the discs as they rotate. Access time is slower than on a magnetic drum, but storage capacity is greater, cost is lower, and discs are interchangeable. A grouping of magnetic discs, resembling a stack of phonograph records, is known as a **disc pack**. Disc packs offer very large data storage capacities, as well as random access to the stored data.

A large IBM disc drive, the 3370, can store 571.3 megabytes (double the capacity of its IBM predecessor, the 3350) and has an average access time of 20 milliseconds. It is believed to be the first in an eventual family of thin-film head drives. This new technology is another factor in driving prices down, while stepping up performance considerably. Capacity of floppy discs is also being stepped up as new technologies permit putting more tracks to the inch (150) and stepping up the bit density on a track to 9,000 bits per inch. This could make possible a 5-megabyte floppy disc drive, which is a considerable increase in floppy disc capacity.

QUEUING

In some filing systems, units or packages of data can be held on line waiting for other operations to take place. This feature, known as queuing, permits the entering, from one or more sources, of more data sets than can be instantly handled by the output device.

The computer engaged in the electronic information processing also serves as its traffic director, which at the operator's commands moves data among input, file, editing, makeup, and output stations.

RANDOM ACCESS

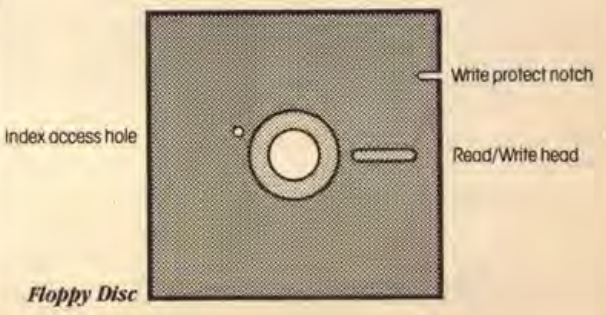
To locate and bring a particular block of copy to the display screen, the system, at the operator's command, must search its file and find the correct material. It does so decidedly more rapidly and more accurately than someone could find the same document in a paper filing system. But such a premium is now placed on speedy response that a system which takes but a few seconds to bring a document to the screen is much preferred to one that might take a full minute or more. Data is stored serially on magnetic cards, tapes, or cassettes. This means that the electronic search must proceed from the beginning of the tape, for example, until the system identifies the label for the desired document. If the document is the last one stored, this process could take a minute or more. Discs, instead, are random (as opposed to serial) access devices. The electronic search can home in on the desired label and document almost instantly, within just a few seconds even for data at the very end of the disc.

FILE UPDATING

In addition to the ability to review or edit stored information and return it to file, documents can be removed from electronic disc systems. Such deletion leaves the equivalent of an "empty folder" on the disc. The rest of the data automatically move forward (on some systems, so that all the available storage space is left at the end of the disc), and the available space is usually documented on the directory for the operator's convenience.

KINDS OF DISCS AND DRIVES

It is beyond the scope of Vision '80s to review the various discs and disc drives on the market, but one should realize there are many: two-sided and one-sided; flexible (thin, floppy) and rigid; standard and mini sizes. Some discs can store 80,000 characters; others, 80,000,000. (That's 40,000 pages of double-spaced copy. An 8½ x 11-inch page typed double-spaced holds about 2,000 characters.) Discs come with protective envelopes that shield them from dirt and scratches.



Floppy Disc

IMMEDIATE ACCESSIBILITY

Text that must be immediately available can be stored on-line: that is, the discs are incorporated in the system and accessible to the extent the system can store them, so that the desired disc can be called up by keyboard operation. Some machines hold only one or two discs at a time, which are manually selected from off-line storage and manually inserted; other discs, when not in use, are kept off-line (on a shelf).

Off-line storage is often used for large quantities of related material. Mini-floppy discs are inexpensive and easy to file along with the paper copies of documents until revisions are needed.

SCRATCH PADS

Some electronic filing systems (for example, Wang V, Redactron, AMtext™) divide their disc space into scratch-pad and data storage areas. The so-called "scratch pad" is for jobs in progress, and the data storage area of the disc stores programs. Thus the total capacity of a disc is not fully available for working text. The AMtext™ 425, for example, uses a 288,000-character disc. One-third of the capacity is reserved for program storage, queues, and save/call storage; this leaves a working-text (or scratch-pad) area of approximately 192,000 characters. In some systems the program can be read off a program disc into the core memory of the machine; then, when a blank disc is inserted, the disc can be fully used for working text.

The core memory in the system can be a drum, which cannot be removed readily, as discs are; but data can be added to and removed from it as required.

TRENDS

- Storage costs are being reduced dramatically. For example, Metro Peripherals, Inc. is producing mini-floppy disc drives that will read/write 96 tracks per inch instead of the usual 48.

- Many of today's storage media will still serve a purpose in the '80s but will be joined by bubble memories (described later in this chapter of Vision '80s).

- The amount of data that can be stored in a square inch will increase. MPI (Magnetic Peripherals, Inc.) is developing disc heads that can read and write densities of 100,000,000 bits per square inch; compare that to today's level of 3,000,000 bits per square inch.

In the '80s one disc system will be able to store 10 billion bits of information. That equals 100,000 pages of newspaper text or five year's production of an average newspaper. And, all this information will be accessible to the paper's editing terminals in milliseconds.

While this vast improvement is only a goal, it is indicative of the future of electronic filing costs and a measure of how such cost-effectiveness will further propel its use in the '80s. Such increased reading densities not only cut storage costs but also enable low-cost machines to store more data, text, formats, fonts, width values, or graphics. IBM is developing what is known as the "Josephson junction" for a real computer. Etching of circuit lines is done by an electron beam. The microscopic electric circuit is the thinnest ever made—1/500,000 inch. That is finer than a human nerve fiber. The resultant chips are chilled so that in operation they do not heat up. Thus they can be placed close together. The fine, closely spaced wires produce a superconductor that operates much faster and packs far more capability on a chip than is possible with conventional silicon chips. When in the '80s will these chips reach the market? "In 1984," says IBM.

- Problems of disc wear are being attacked, too. Qume, for example, in '79 introduced a disc drive that reduces disc wear well below previous industry norms. The Qume Data Trak 8 also improves reliability by increasing signal strength. Magnetic discs are written on and read by heads, much as records are read by styluses or needles. The new Qume drive combines a fast approach with a slow, soft landing on the disc, and a slow takeoff with rapid acceleration after lift-off. The new drive and the resultant longer-life discs should encourage more word processor and small business system manufacturers to use higher-capacity disc drives.

- For people really in a hurry, IBM is developing a new family of computer circuits that operate so quickly they "approach limits imposed by the speed of light." Three times faster than other high-speed circuits, they can operate within 13 picoseconds. (A picosecond is a trillionth of a second.) IBM researchers have also developed electronic circuit elements of 100 to 200 atomic diameters. That is 1/100 the size of today's micro-circuits. Think of how such miniaturization cuts the size and cost of devices in which they are used and thus widens the market for them.

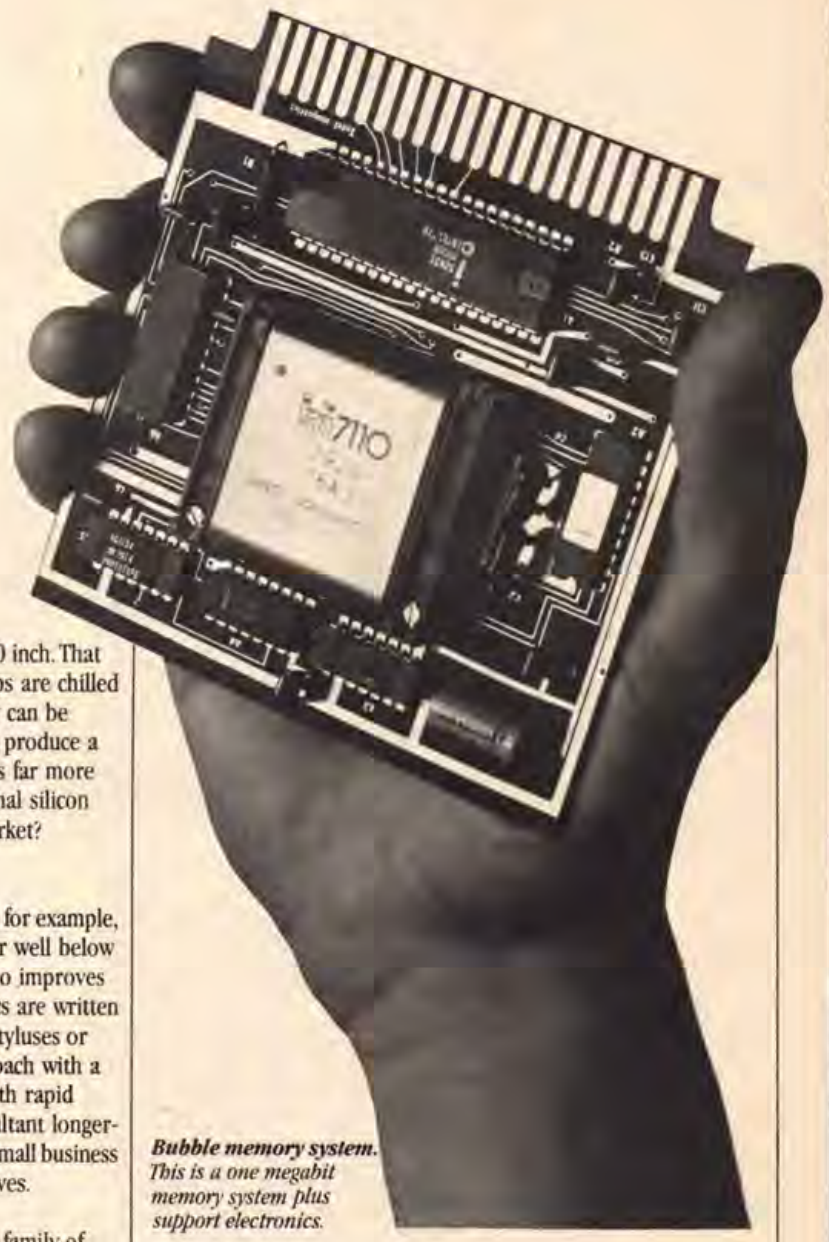
- Special-purpose storage and retrieval systems will appear. The ECRM 9100 Autowire, for example, is a storage device that enables newspapers to use high-speed wire services cost-effectively and without rekeyboarding.

WILL EVERYONE SWITCH TO ELECTROMAGNETIC FILING?

Hardly. In office and data environments sophisticated business managers will have to compile and analyze much information to determine when it pays to have their filing systems managed by the data processing system's computers. In converting from paper to electronic filing, an office seeks a rapid return on investment (ROI). As with so many of the trends discussed in Vision '80s, the driving force is to achieve greater cost-effectiveness. (A report on factors to consider when replacing a paper file system with an electronic system on-line to the company's data base systems appeared in *Modern Office Procedures*, July, 1978.) In word processing and typesetting operations, however, most text- and image-setting systems have their own file management systems. These are the systems many creative printers, editors, and designers will be using in the '80s.

IMPROVED CHIPS

A ¼-inch-square chip containing 7,000 transistors and their circuits has been developed by Bell Labs. Texas Instruments is developing a chip, to be introduced in '79 or '80, that is a 265,000-byte device, more than five times the power of current microprocessors and the equivalent of a very large machine of just five or six years ago.



Bubble memory system. *This is a one megabit memory system plus support electronics.*

Dramatically increased capacity and miniaturization, combined with equally dramatic cost reductions in computer processors, are forces bringing computer-controlled electronic devices and systems of all kinds within the budget range of millions of companies. In the 1975-1978 period, for example, Hewlett-Packard's random access memory (RAM) chips increased in memory capacity by 800 percent while dropping in cost by 71 percent. Similarly dramatic developments are being made by other companies in the United States and Japan. Bell Labs has also found a way to double the speed at which electrons race through these tiny microprocessors at room temperatures so that they are becoming not only cheaper and of greater capacity but also faster. At lower temperatures the electrons flow 20 times as fast.

AND NOW, BUBBLES

But the real progress in the '80s in cutting cost while increasing performance of processors and memory devices will be in what is being called **bubble memory**.

The Texas Instrument bubble memory is a thin film of magnetic garnet sandwiched between the substrate and a permanent magnet. Only 3/10 inch on a side, it makes use of 287,000 tiny magnetic domains, or bubbles. Each bubble is cylindrical in shape and almost 3 microns across and 3 microns high. (A micron is about 40 millionths of an inch; a man's hair is about 4 thousandths of



an inch.) Each tiny bit of stored information is either of the same polarity as or of opposite polarity to the permanent magnet. Each bit's polarity is determined by the commands fed to it by a keyboard operator, for instance. The particular combination of bit polarities adds up to a given batch of information that is "read" and acted upon by the computer. IBM is developing a bubble memory that can store 100,000,000 bits of information (equivalent to the contents of 30 large volumes).

In the '80s, bubbles are expected to replace disc memories when their costs come down. At the present level of development, the cost of disc storage, per bit stored, ranges from about the same as bubble storage to one-tenth as much. The bubble also is more compact than a disc, yet its drive holds much more information and does not lose its stored information when the power is off. Even in this earlier stage of development, a bubble can store about six times as many bits as the largest programmable semiconductor memory chip can. The bubble, like the disc, can store data, text, programs, formats, and even width tables. Video display terminals (VDTs) with bubble memories are already on the market. A new bubble memory introduced in late '78 is more than 2½ times as powerful and can store 250,000 bits.

Bell Labs is also developing high-capacity bubble memories which can operate 10 times as fast as present smaller bubble memories and, importantly, which are easier to manufacture. And, from California's Silicon Valley comes word that Intel Corporation is out of the lab and on the market with a bubble memory chip that can store 1,000,000 bits of information. Texas Instruments, Rockwell International, and Hitachi already have 256,000-bit bubble memories on the market and are expected to join the million-bit race. All of which reinforces the forecast for faster, larger, cheaper memories in the '80s.

MICROGRAPHIC STORAGE

Microforms such as microfilm and microfiche are another alternative to paper filing systems. For large-volume archival (long-term record keeping) storage, these systems can store a great deal of information (words, data, graphics) in very little space and at reasonable cost; further, the new digital automated microform retrieval systems are fast and accurate.

The worlds of micrographic storage systems and the electronic office or reproduction center are converging—or "interfacing," as they say in computerland. And so we have another acronym, COM, for computer output microfilm. The manipulative possibilities of a computer are used for editing and outputting the images recorded and stored on microfilm. In the '80s we can expect microfilm to be one of the storage media used by word processors and typesetters.

COM is print-out from an electronic or computer-organized file. Digital information from the computer memory is sent to a CRT screen, which is then photographed on film. In the case of a form, such as an order form, the blank form itself can be on a slide and the computer data can be combined on the CRT with the form, so that the microfilm will enter the specific information on the form and store the form with the entered information.

COM is finding favor in in-house publishing operations because it is less bulky and less costly. Instead of typing manuscript copy for the printer or typesetter, and in cases of typography where graphic arts quality is not needed, the computer print-out is used as copy for the in-house duplicating or printing department.

Price lists, parts' lists, and catalogs are frequently produced this way, and their costs have been significantly cut, from about $15 to $2 per page. At the same time, this method allows copies to be reproduced more quickly and more accurately. Technical manuals, directories, and a variety of other internal documents also lend themselves to this kind of storage and output.

With present technology, computers can generate data too fast for even the highest-speed impact printer to handle. They also generate a cumbersome volume of paper. A COM system can transcribe computer output much faster than can any impact printer and puts it onto easy-to-store and fast-retrieval microfilm. In use, microfilm is viewed first and paper copies are made only if needed.

Silicon wafer. *This 3¼-inch wafer holds 109 square silicon chips, each able to store 64,000 bits, or 6,976,000 bits altogether.*



BASIC MICROGRAPHIC SYSTEM

While there are many kinds of microfilm and system configurations, the essentials of a micrographic system are:

1. **Cameras** for exposing the film. A wide variety of special-purpose cameras can be used, including a COM device that converts electromagnetically stored information into light to properly expose the film to the desired image.

2. **Processors** for film development.

3. **Film**.

4. **Duplicators** for producing single or multiple copies on conventional film or on diazo (ammonia-processed) or vesicular (heat-processed) film.

5. **Readers** to enlarge the miniature film image for viewing (enlargers can be used to produce readable prints).

6. **Storage and retrieval systems** for the actual microfilm or microfiche or for storing the film's text and graphics digitally.

MICROFICHE FOR ACTIVE FILES

Data, text, and images recorded on microfiche can, thanks to recent developments, be updated and have deletions made in daylight. All processing takes place outside the machine. This makes for an easy-to-use device, extends the use of active files, and maintains security of stored information. These aims can be accomplished, for example, with the A. B. Dick/Scott System 200.

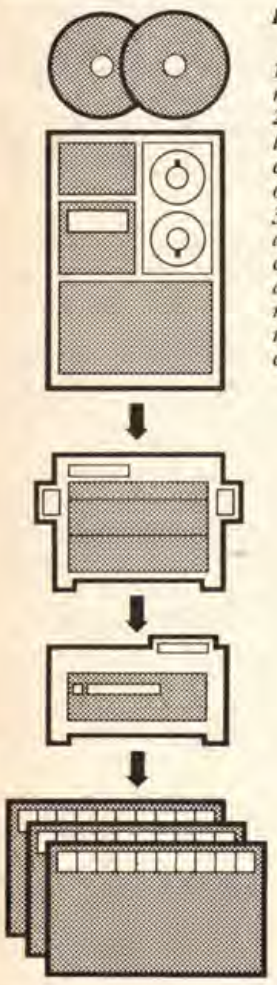
WHITHER PAPER?

Those who dream of a totally paperless office are looking past the '80s, at least. The filing demands of business are such that, even while more and more filing will be done electronically and micrographically, the amount of paperwork involved in communications is expected to grow about 14 percent a year throughout the '80s.

Microfiche. *(On the right, approximately 86 percent actual size.) This 3M microfiche holds 98 pages of material.*



IBM System/38 LSI. *(At left.) Large Scale Integration chip (shown with soft crystals around it for size comparison) contains 704 high performance logic circuits.*



How COM Works.

1. The computer output is recorded on magnetic tapes. 2. In a tape-to-film recorder the tape's electronic impulses are converted to latent visual images on microfilm at ultra-high speed. 3. Microfilm is developed automatically. 4. Duplicate copies of the microfilm are made as needed. 5. One 4 × 6 inch microfiche can hold and index up to 690 11 × 14 inch pages of computer information.

THE SAVINGS ARE GREAT

Cost-conscious business managers know that going from paper files to micrographic storage can effect tremendous savings. For example, an acre of paper records in cabinets can be stored with a micrographic system in one 20 x 20-foot room; that's condensing 40,000 square feet to 400 square feet. In large-scale operations, the need for whole new buildings or wings for files can be avoided by converting to microstorage. Additional savings come from eliminating many file cabinets, transfiles, and folders and from the low cost of making duplicate prints.

Other advantages, which bear both on costs and on office efficiency, include rapid and sure retrieval and elimination of the likelihood of lost and duplicated records. In the United States we are presently doubling every seven years the amount of information we file. At this rate, we'd eventually bury ourselves under paper.

WORD PROCESSORS AND COM

A document created on a word processor that outputs on a magnetic medium (tape, cassette, disc, or card) can be converted to 9-track magnetic tape, which in turn can send the digital information to a CRT, where it appears in graphic form. As the first step in creating the microform record, cameras can record the CRT image.

TYPESETTER AND COM DEVICE ALL IN ONE

The COMp-80/2 is a modification of the VideoComp 570 CRT typesetter (more fully described in the section of Vision '80s on typesetting). It can generate full-size output or record on standard microfilm or microfiche, and it records in standard microfilm formats. It can draw random vectors, plot graphs, and create charts or engineering drawings. It can write in fonts especially designed for microfilm and, like the VideoComp 570, can scan, digitize, and store logos and line art.

The Xerox 9700 (described more fully in the Vision '80s section on word processing) is a nonimpact printing system that can have a microfiche (COM) recorder/processor in addition to its electronic printer, so that it can output on paper or micrographically.

MICROGRAPHICS, PICTURE ARCHIVES, AND CBS

The technologies of COM, digital storage, and micrographics have applications beyond the business office. Publications, broadcasting networks, and large commercial or in-office graphic arts operations may someday use a variation of Electronic Still Store (ESS). The CBS News archive has an information retrieval system that stores over 67,000,000 feet of newsfilm, 16,000 hours of videotape, more than 6,000 documentary programs, and over 35 years' accumulation of news scripts. Large amounts of this material can be instantly retrieved from magnetic storage, and put on ultra-microfiche (at 12 x and 210 x reductions). This material is stored on-line in a microform data systems image memory for instant access. The instant random access to this image memory is the ESS device, which can instantly retrieve a picture or a series of pictures, in black-and-white or color, for local display or network transmission. The software and system integration were done by Zytron Data Systems. The exciting prospect for offices and communications centers in the '80s is for electromagnetically stored pictures that can be retrieved and transmitted anywhere almost instantly.

FOR SMALL USERS

In the '80s several developments will bring the advantages of micrographics to small companies, publications, and graphic services.

1. COM service bureaus will develop to meet the demand from companies that do not want their own full installation.

2. Dry processors and laser systems will eliminate chemicals and darkrooms and make the system easier to use and more cost-effective.

3. Updatable microfilm, referred to above, will make micrographic storage attractive to those with large active files.

4. A lightweight desktop camera-processor, using standard current and costing about $10,000, will bring microstorage within reach of secretaries, librarians, and other small-volume users. This system, the 3M/Ovshinsky MicrOvonic File, uses amorphous semiconductor technology. (A semiconductor is a material that is a conductor under some circumstances but not under others. An amorphous material is one with helter-skelter molecules, such as glass.) Mr. Ovshinsky, using the same semiconductor technologies, has also developed a new kind of energy converter.

5. Improved software, such as 3M's COM/Quest, will facilitate job setup and retrievability and make systems more reliable and easier to use.

COM AND GENERATED GRAPHICS

An example of the graphics generating capabilities a COM system can offer is 3M's Model 715, which at the command of the keyboard/console operator, can draw lines (as used in engineering graphics, forms generation, or business graphs and charts). This system stores type fonts in a variety of display styles (including regular, bold, and italic) and can output them in up to 128 sizes. It can underline, overline, and handle superscript and subscript. It can output over 160 characters per line, 105 lines per page, and also on 16mm, 35mm, or 105mm film.

3M's 715 System is really a combination of a word, data, and image input terminal and an electrographic storage/retrieval/output unit. Its major features, however, may be its high-speed operation and its dry-processing option. (It can expose traditional wet film, too.)

Until recently, the new dry-silver processors could not be used to process CRT images because of the CRT's low light level. The CRT is important to COM systems because, in combination with a computer, it is extremely versatile in graphic capabilities. Dry processing not only is easier but is accomplished simultaneously with film exposure. The 3M Model 715, combining the features of a CRT system and dry processing, was made possible by development of a high-intensity CRT with an orange-colored phosphor instead of the usual low-intensity blue-green image.

MICROPUBLISHING

The first role of micrographics in communications was as a storage medium for infrequently used long-term material—that is, for archival storage. It is now used increasingly to store material that is to be recalled frequently and even edited prior to output, then updated for restorage. Both in its archival and in its active filing (plus editing) roles, it is a service arm to office and communications functions, which is increasingly becoming a publishing medium on its own. Because the costs of mailing and shipping catalogs and documents, price lists, and reports of all kinds are becoming prohibitive, converting of such materials to microfilm, especially to microfiche, saves time and money. The film can be viewed at the receiving end on microfilm readers or, if necessary, can be copied on paper there. Several sheets of microfiche, containing perhaps the equivalent of 1,200 pages of material, can be mailed for the price of one first class stamp, and airmail is feasible for overseas distribution of such lightweight documents.

CONVERTING PAPER FILES TO MICROFORMS

Among the existing devices for converting paper documents to any of the numerous types of microfilm information systems is Bell & Howell's ABR System 100. This is an automatic system: you can literally tell it what recording tasks you want it to perform, and it will follow programmed instructions.



VDT EDITING

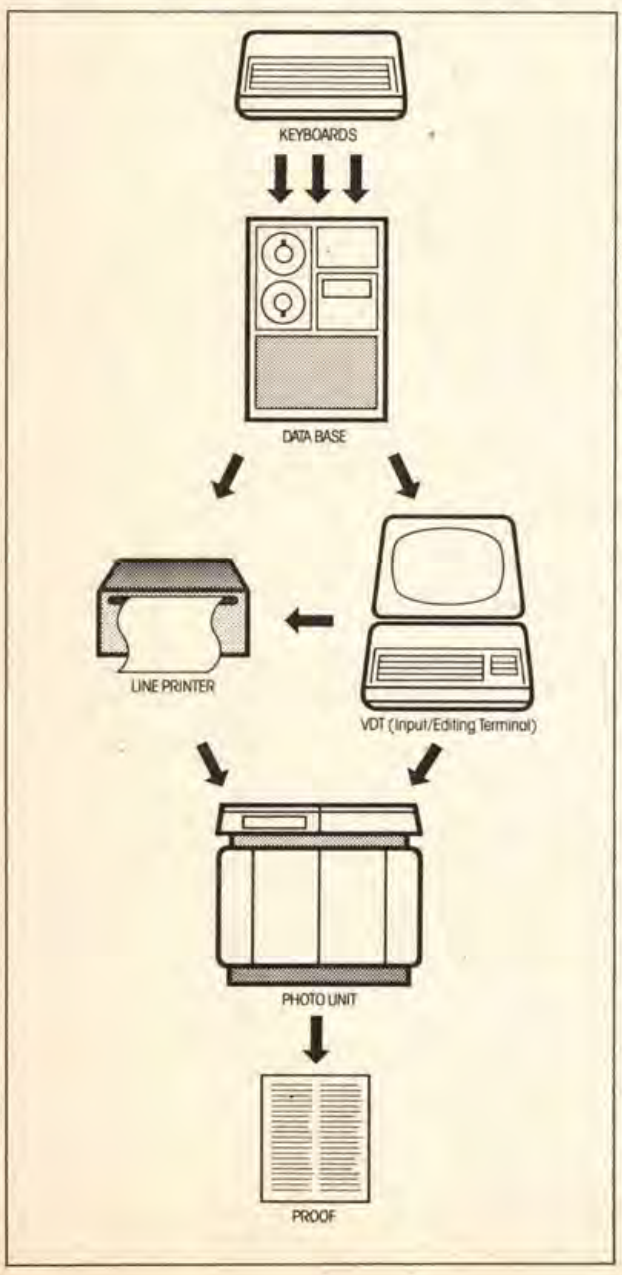
Editing, or the making of corrections, is done for a number of reasons, at various stages in the communications process and on different devices.

REASONS FOR EDITING

From the very beginning, revisions are nearly always needed. Writers often write and revise several drafts (of letters, books, reports, advertisements, whatever), and then editors and executives and clients make their changes. Then, after everyone is satisfied, new information or a new need or idea may upset the applecart. Even when final OK'd copy enters the production process, it is faced with typesetting errors, updating, and last-minute revision to fit space.

EDITING STAGES AND DEVICES

Corrections can be made at any stage of the process and in many ways: by pen or pencil, on a typewriter, on punched paper tape, by OCR (wherein editing is actually done manually), and on video display terminals (VDTs). As we move into the '80s, more and more editing is being done on VDTs. It is with such terminals that Vision '80s is concerned.



Not so long ago, the steps from manuscript preparation through shipping or distribution were neatly defined: writing, input, editing, typesetting, makeup, printing, binding, mailing, etc. Today, and even more so in the '80s, several previously discrete operations are accomplished in one stage, on one device, and by one person.

Consider, for a moment, where this is likely to lead us in the foreseeable future. We may have a digital combination word processor/typesetter with a full-page screen. It will be an input/electronic file/editing/pagination device, priced for the in-office market. With off-line software programs, it will handle stored graphic formats, draw data from the company's data base or central or dispersed files, and, with modems, send or receive its digital information to or from remote sites for OKs, editing, or processing. It will also work either on-line or off-line with such multiple-copy nonimpact reproduction units as electrostatic/fiber-optics printers or ink-jet printers. Fantasy? No. All the pieces are already here, and putting them together in one system at a mass-market price is a technical challenge for the '80s.

Ponder what this could mean to you. Will one person monitor the entire system? At what point is creative (art, writing) control exercised? By whom? Must all creative decisions be made before a job enters the system, or will there be a later point, such as the pagination stage, when text and graphic revisions can still be made? Will the writer or designer be involved at that stage—and if so, how?

LET'S RETURN TO TODAY

We're not in the one-system-does-it-all era yet, but we're on the way. The sections of Vision '80s are neatly divided into the obvious sequential steps in communications production. But reality intrudes. We now want to consider VDT editing devices, but most such editing terminals also handle input; moreover, many can compose tabular matter and pages and also set type or output on strike-on typewriter-like printers, and some can even retrieve information from a data base. But right now let's focus on their editing capabilities.

TERMINAL TEXT EDITING

The traditional editor's red pencil and the paper manuscript are yielding to the electronic pencil, the keyboard, and the CRT. The manuscript can be viewed on the CRT screen. Additions, deletions, and corrections, made at the keyboard of the editing terminal, appear instantly on the screen, where they can be promptly verified. Below are some operations that can be accomplished at a text-editing terminal, whether it is part of a word processing or typesetting system.

Terminals made by different manufacturers, as well as the various models, have different abilities, and many are designed for specific uses, for instance, to receive direct input by newspaper reporters and editors, as part of an automated office system, or simply as a powerful and versatile typewriter for an executive secretary. Here, then, are some things that can be done on a text-editing terminal:



Correct errors. Misspelled words can be corrected by moving the cursor control so that the cursor is over the incorrect letter and then striking the key for the correct letter. This operation is called **overstriking.** The incorrect character will be replaced both on the screen and in the disc by the correct character. If the correction involves adding rather than merely substituting characters, any resulting excess characters or words that do not fit on the line will move down to the next line automatically, and so on down until they are finally accommodated. Most VDT editors will "word-wrap," an expression describing their ability to move an entire word to the next line if it won't fit at the end of a line. On VDT editors with hyphenation and justification programs, the word-wrap ability would prevent breaking at other-than-permissible hyphenation points. Some systems word-wrap automatically when setting or when editing; others do so on request.



Delete copy. Most VDTs have a delete key. To delete a character, the cursor is positioned over the character and the delete key is struck. In most systems this causes the following characters to move back one space. Line endings and subsequent lines are automatically and rapidly adjusted and word-wrapped on most systems. Some systems can delete entire words, lines, or sentences in a similar manner. This is usually done with **delete word**, **delete line**, etc., keys. These keys often have repeat functions, so that multiple word deletions, for example, can be expedited.



Insert new copy. Insertions are usually handled by positioning the cursor at the point of insertion, striking the **insert** key, keyboarding the insertion copy, and then striking an **end insert** key. Most systems will automatically move copy ahead and word-wrap as necessary. If the copy contains hyphenation, most systems will automatically rehyphenate as required by the resetting.

Merge documents or portions of documents.

Transpose whole blocks of copy.

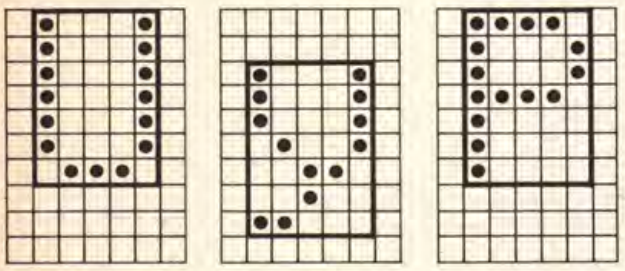
Global search-and-replace. Find a given word or phrase that appears throughout a document and, based on one command, automatically correct it wherever it appears.

Resequence sentences and paragraphs.

Reformat the material.

ILLUSTRATION BY ANDRZEJ DUDZINSKI

VDT EDITING



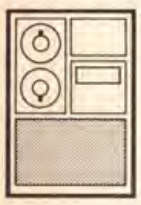
CRT character matrices: Characters form in a 5 × 7 dot matrix but occupy a 7 × 10 matrix on the screen so that capitals and letters with descenders can be positioned properly.

KEY PARTS OF A VIDEO EDITING SYSTEM

1. **Keyboard**

2. **Screen**

3. **Storage area** (such as core memory and/or magnetic disc). The storage, which may not be part of the VDT, is a necessary part of the editing system.



4. **Computer.** This is a necessary component for relaying signals from the keyboard to the screen, memory, and output medium. In addition to the computer in the VDT, a system may have several input and editing terminals and one or more typesetters, for example, linked by a central computer or CPU (central processing unit).

5. **Input/Output.** The VDT may be on-line to a typesetter or other system components such as an input device or an electronic pagination unit; or the VDT editing unit may stand alone. That is, it may not be directly wired to other devices but "connected" to them via paper tape, magnetic discs, or other media that can be moved from device to device, the output of one device becoming the input of another. Editing terminals can be **counting** (capable of hyphenating and justifying) or **noncounting**. They can also be used to enter typographic commands, if this is not done at the input or output (typesetting) stage. Increasingly, in fact, editing terminals are becoming input/editing devices, less often stand-alone units and more often on-line to a CPU, and through it to the full system from input to output devices.

WHO EDITS?

Editing can be done on-line or off-line. Editing is a decision-making process that is generally performed by an editor or writer or an executive acting in such a capacity. Off-line editing is done by marking on a paper copy in pen or pencil so that the typist or typesetter operating an editing terminal can implement it. In some office, newspaper, and magazine systems, and perhaps increasingly in advertising and promotion departments, in the '80s the editor, copywriter, or art director will have an editing terminal and will make the corrections thereon—that is, on-line editing. The corrected document can then be returned to the electronic file or transmitted to another editing terminal for review; or it can be made a print-out on paper and distributed; or it can be sent electronically to a typesetter or multiple-copy printer for output and ultimate distribution.

KINDS OF WORD PROCESSOR TEXT-EDITING TERMINALS

First let's consider editing terminals in office systems.

Blind text editors (providing no electronic display of the keyboarded text) are the least expensive to purchase and operate, but in many offices and reproduction centers they are giving way to **display text editors**, which cost more but also do more. The advantages accruing from their ability to electronically display keyboarded text and offer the operator an opportunity to correct it on the spot are often considered well worth the added cost.

This visual feedback increases productivity on display text editors. Typists, for example, can revise and correct copy before any paper copies are made, thus bringing closer the day when the first paper copy will be the final copy. There are display text editors with:

*One-line displays

*Partial-page displays

*Full-page displays

The one-line displays show about 21-37 characters at a time. Partial displays show 6-40 lines of from 32-96 characters, although some models can display lines of 122 characters. The full-page displays (about 66 lines) also generally handle line widths of 32-96 characters.



A one-line text editor. The basic Qyx electronic typewriter with added electronic modules is a dual mini-diskette text editor with communications capability and a 24-character mini-display.

SPECIAL FEATURES

In choosing the right editing terminal for a specific installation, one should check their many special features and determine which are meaningful to the system of which they will be a part. Some features to consider are:

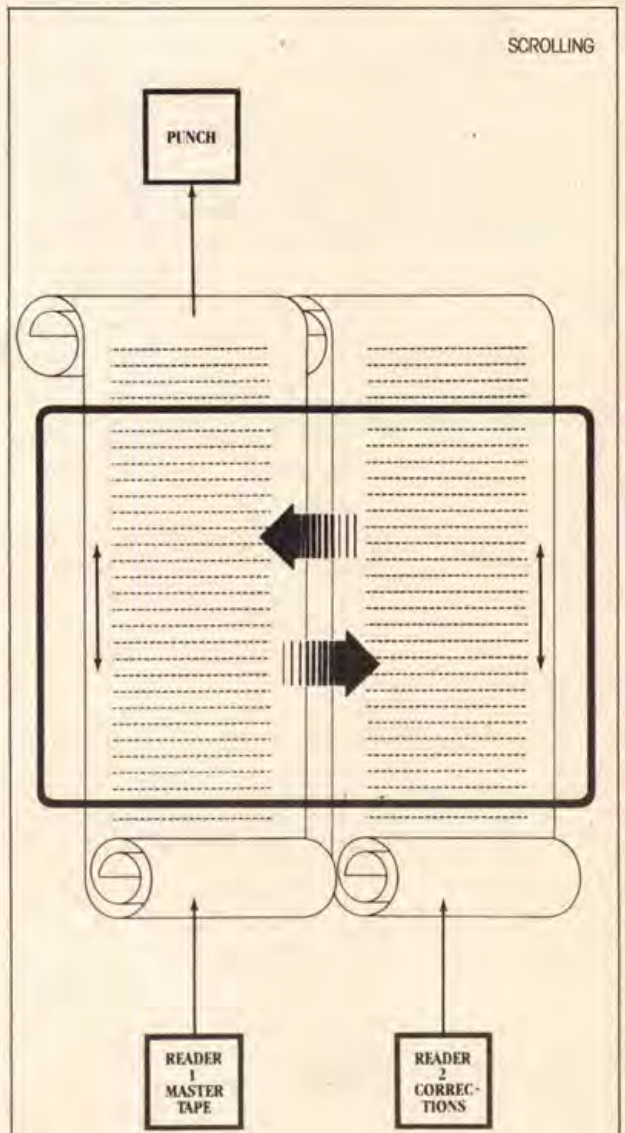
***Kind of display** (CRT, gas plasma, light-emitting diode (LED), for example). The kind of display affects, among other things, cost, durability, and ease of viewing.

***Highlighting**. This feature is the ability to call a portion of the text to the operator's attention, as by underscoring (on the electronic display but not on the output), by blinking letters, or by increased intensity in a specific spot or area. Some displays reverse the brightness (from light characters on dark background). Highlighting helps the operator spot a portion of text so that it can be verified before being edited.

***Pitch representation**. This feature presents the text as it will print, i.e., 10-pitch, 12-pitch, or PS (proportional spacing).

***Adjustable screen angles**.

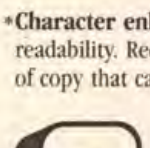
***Grammatical notations**. Quotation marks, underscores, and superior figures, for example, are displayed graphically in some systems, whereas in other systems they are represented by codes.



***Scrolling**. This feature involves the shifting of copy up or down on the screen. The document in the system memory may be too big to be viewed all at once, even on a full-page screen. Scrolling permits moving off the screen copy that has been OK'd or edited and moving onto the screen copy for which there had been no room. Scrolling on a partial-page display enables the operator to see and edit an entire page or document even though it cannot all be viewed at once. Some systems can scroll horizontally, so that long lines of copy wider than the screen can be brought in view successively.

***Variable line spacing**. This adjustment permits mixed display of single-, double-, and one-and-one-half-line-spaced copy.

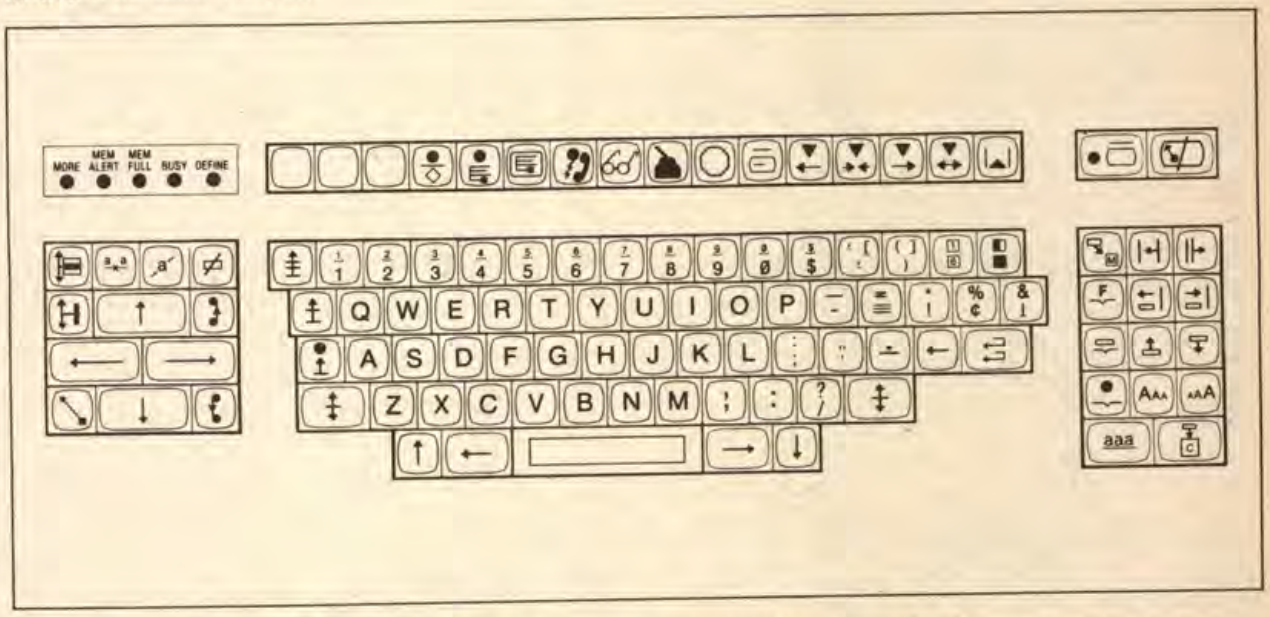
***Character enlarging/reducing**. Doubling letter size increases readability. Reducing characters to half-size increases the amount of copy that can be shown on a screen at one time.



Diagonal cursor movement. The cursor is the light spot on screen that is moved about by a cursor control on the keyboard (such as a group of keys, a cue ball, a joystick, or other device). The cursor is positioned at a point where an editing action is to take place. All cursors can be moved both horizontally and vertically; some can be moved diagonally as well.

***Adjustable viewing brightness**.

***Separable display screen and keyboard**, so that the operator can arrange them most conveniently.



***AM 4800 keyboard**. For an electronic composition terminal, it differs from typical editing keyboards because it must select, position and modify typographic elements and edit copy.*

CAPACITY AND EASE OF EDITING

Key considerations in comparing text-editing terminals are how much copy can be edited at a time and how easily. Many word processing systems are page-oriented to match the needs of an office that outputs, distributes, and files information in complete page format.

Word processor text editors with full-page displays, unlike typesetting editing terminals, are often so page-oriented that editing can only be done easily within a page. That is no handicap when correcting spelling errors, for example; but it can slow things down when, in a multipage document, one must transpose a block of copy from page 2 to page 6. If the system is document-oriented and the full document is stored on one disc, transposition of a block of copy from any part of a multipage document to any other part is a simple keyboard operation.

Page orientation requires the operator, in the example cited, to call page 2 to the screen. By means of keyboard instructions, the block to be transposed is deleted and stored in the machine's buffer memory. The operator closes the gap made by the deletion. To bring forward a corresponding amount of copy from page 3, page 2 is returned to file and page 3 is called up. Copy to be moved from the top of the page is put into the buffer memory. Page 3 is returned to file and page 2 is brought to the screen, and the stored copy from page 3 is inserted on page 2.

This process is repeated page by page until the copy removed from page 2 is ultimately inserted on page 6. Some page-oriented systems automatically rearrange the text affected; however, this, too, slows the operation.

Lexitron's recently introduced VT-1303 offers a new level of control. It permits the operator to move blocks not only to another page within a document but to another document—whether on the same or another disc—without closing out the first document.

Some word processors and most typesetting editing terminals are document-oriented. In an office, with document orientation, an entire document is typed and corrected before any of it is printed out. To be cost-effective, the printer unit of the word processor should be off-line, stand alone, (or be able to operate in the printer mode on one batch of text while the keyboarder is inputting or editing another batch), and have an automatic paper feed so that the operator need only set it up in order to run a multipage document, thereby leaving the operator free to enter or edit other documents or to do other work.

With page-oriented machines, the operator need only feed a sheet of paper and press a button to get each one printed and then is free to proceed editing the next page. Unlike document-oriented systems, when the operator finishes editing the last page, all pages except the last have already been printed out. The advantages of one system over another vary for each specific operation.

PAGE SIZE

Page size in word processor text-editing systems is defined in number of characters. Some systems have 8,000-character pages; others take up to 11,000. These are the number of characters that can be stored for one page in the buffer memory. Sometimes this quota is more than can be displayed at one time on the screen. A **buffer** is a temporary storage area for data or information being edited or being transferred between parts of a computer-controlled system. In some systems the buffer capacity is the same as that of the display screen; in other cases, with page-oriented devices, it may be larger.

In a document-oriented system, the buffer memory might be a full disc and hold perhaps the equivalent of 75 pages of material. If this was all one document, the operator could scroll through the entire disc (assuming that storage is on a disc) and bring any part of it to the screen without having to call it up page by page from the file directory. This ability to scroll through a file of any length is known as **infinite**, or **virtual**, scrolling. On some page-oriented text editors, by defining a page in file as consisting of 999 lines instead of the customary 66 lines, one can fool the system and scroll through all 999 lines—the equivalent of 15 pages in this instance. The pages can then be defined after final editing, or as on some DEC systems, the document need not be broken into pages until it is ready for the output stage. Some discs hold much more: some Vydec discs hold 60 pages, and some IBM and Wang discs hold up to 120 pages.

LOCATING CORRECTIONS

The editing terminal needs first to be told where a correction is to be made and what kind of correction, and then must be fed the correction. To locate the correction, the cursor or movable light spot is directed to the place on the screen where an insertion, deletion, or correction is to be made. In the case of transposing a block of copy, the block may be "defined" by positioning the cursor first at the beginning of the block and then at the end while striking the appropriate **begin** and **end** command keys. Systems with a highlighting ability, as described above, would highlight the block to be deleted so the operator could be sure it had been correctly defined. By keyboard instruction the block can then be deleted, stored, or inserted at another place in the copy. If it is necessary to keep track of the various versions of a document, each version can be kept in the electronic file, or hard copies (paper) can be produced for temporary or permanent manual filing.

MOVING COPY BLOCKS AROUND

There seem to be as many different ways of moving blocks of copy in a document as there are makes and models of editing terminals. Essentially, however, those systems that can move blocks of copy around do so by one of two methods, using commands known as **block move** and **save/call**. A block move is a one-step operation, as explained above. The operator defines the block of copy to be moved, gives it a number, scrolls to where it is to be inserted, calls it up by number, and, by cursor positioning and keyboard command, inserts it in its new position. A block move is almost easier and faster to do than to explain.

A save/call, operation, on the other hand, requires defining the block with the cursor, giving it a name, and putting it in the electronic file. Then the document is scrolled, or the new page on which it is to be inserted is called up, and the block is recalled from the file by name and inserted. Some word processing systems offer both block-move and save/call capabilities. The former is easier and faster for some moves; the latter is useful when there are multiple moves.

The size of the block of copy that can be moved, how far it can be moved within a document (or whether it can be moved to another document), the number of blocks that can be moved at a time, and the precise method of making the moves can all vary from system to system.

SEARCH-AND-REPLACE



You may need to find a particular string of characters, such as an incorrectly spelled name, that recurs throughout a document. Most word processor editing terminals can be instructed to bring the section of the text with the incorrect name to the screen. The operator can then keyboard the desired correction and see it made. Some systems will continue to locate subsequent occurrences of the same name, so that it

can be corrected quickly wherever it appears. And some systems have a search-and-replace ability so that not only is the wrong name automatically located but it is automatically corrected or replaced with the correct name. The term **global search-and-replace** applies to systems that can search out and correct the same character grouping throughout a document. Some systems can handle several global search-and-replace operations simultaneously.

HYPHENATION



Many text editors have hyphenation and justification programs, such as discretionary hyphenation or logic systems. Some have exception-word dictionaries. The Quadex Typographer-4, for example, has a 30,000-entry exception-word dictionary. These are words that hyphenate differently than according to the usual rules or logic stored in the system. If a word must be hyphenated, the machine automatically searches the dictionary and, if there is an entry for it, hyphenates the word accordingly. If the word is not in the exception dictionary, the machine's ordinary stored hyphenation rules are followed. If the situation cannot be coped with at all (e.g., proper names, foreign words), the system will stop and await an operator decision. Some text editors even verify spelling. The Quadex 280 hard-disc system has a 200,000-word hyphenation and proofing dictionary to provide error-free first-past output. The concept of its "spelling checker" is liable to become an industry standard in the '80s.

INPUT/OUTPUT

Some text editors, in addition to handling input from their own keyboards, can take input of material produced on other machines or systems on either paper tape or a magnetic medium (tape, card, cassette, disc). In some instances, to be compatible with the text editor's system, the input must be translated by an interface. (Interfaces will be reviewed in subsequent sections of Vision '80s.) Likewise, some text editors can produce output either on paper tape or on a magnetic medium, or both. And some can be connected to function on-line to an input terminal and/or to an output printer or typesetter.

OFF-LINE TYPESETTING TERMINALS

Editing terminals used in typesetting systems have many of the features described above with reference to office system text editors. In some cases the same editing terminal can serve either a word processor or a typesetter. The AMtext™ 425 word processor can be the input and editing terminal for a Comp/Set® or a Comp/Edit™ typesetter, which, of course, has its own keyboard and CRT and is a combination input/editing/typesetting device. The EditWriter is virtually a word processor and a typesetter in one box. Interfaces, as described elsewhere in Vision '80s, can convert the output of almost any word processor or OCR device into input for almost any typesetter. The editing functions, then, can be performed at a number of places: by a word processor; by an input/editing terminal; by a typesetter; or by stand-alone (not cable-connected to other parts of the system) editing terminals.

There would seem to be some duplication of capability here, and it would not be surprising if in the '80s we have more "slave typesetters" (without any intelligence of their own) fully driven by the output of editing terminals. This development could reduce the cost and increase productivity of the typesetters.

More editing terminals are using more automatic programs, including for hyphenation and justification and for formatting. Many terminals can facilitate multicolumn makeup—as of charts or tabular material, for instance—so that the operator can input the first column, see it on the CRT, then back up to the top of the page and set the next column, aligning its parts horizontally with the corresponding parts in the first column. Some word processors have this ability, and others have added it via a software program.

There is even a portable editing terminal for on-location reporters. The SCRIB (Bobst S.A.) system links reporters to their editorial department computers. Its portable acoustic coupler can tie into phone lines anywhere in the world, and two-way communications are possible with it.

EDITING TERMINALS FOR DIRECT-INPUT TYPESETTING

Some of the major manufacturers of direct-entry typesetters offer off-line input/editing terminals compatible with their typesetters. The high-speed models of typesetters, such as the EditWriter 7700, the Comp/Set 3500 and 4500 series, the Comp/Edit and the high-speed Linoterm can handle the output of more than one input station. Some of these terminals also accept input from word processor or OCR devices and thus double as an off-line editing terminal and an input/typesetter interface. These terminals and their input linkages are:

TERMINAL	INPUT ACCEPTED FROM
Comp/Edit Terminal (AM) Comp/Set 5404 VDI (AM)	AMtext™ 425 word processor and, with GPI (General Purpose Interface), almost any word processor
2750 (Compugraphic)	1750 or EditWriter
1750 (Compugraphic)	OCR (using UniScan option); Wang and Vydec WPs, using Word Com VI; also IBM, Vydec, and Redactron via interface
Quadritek Editor (Itek)	OCRs, WPs, via interface
MVP-2 (Mergenthaler)	WPs via interface
MVP-1 (Mergenthaler)	Paper tape from OCRs or other paper-tape input devices

Obviously, the increased speed of the formerly slow and restricted-ability typesetters has spawned not only additional input stations but linkages to other sources of off-line input, so that, with not too great a cost increase, the direct-entry typesetter has become a centerpiece in the faster and more versatile input/editing/typesetting system.





The EditWriter 7700. *This higher-speed model outputs 50-80 lines per minute.*



The Comp/Edit Terminal. *This terminal produces a magnetic diskette which can drive the Comp/Edit typesetter. One Comp/Edit system can support up to five terminals.*

EDITING CAPABILITES OF DIRECT-ENTRY TYPESETTERS:

Direct-entry typesetters include the AlphaComps, a Bobst/VariSystems model, the Comp/Set series, the Comp/Edit, the Diatext, the ExecuWriter, the CompuWriter series, the EditWriters, the Quadriteks, the Linocomps, and the Linoterms, the Omnitech/2000, the CRTronic, and Berthold's FPS 2000. Of course, their editing capabilities differ considerably (a feature-by-feature comparison is updated annually in *The Seybold Report*), but their editing features are essentially as follows:

•**Storage medium**: Some have no storage capacity. The EditWriter 7400 can be upgraded with storage. The 7500 and 7700 models have a floppy-disc capacity of 300,000 characters. The Quadritek 1200 uses a 100,000-character magnetic cassette, while the 1201 holds two floppy discs of 246,000 characters apiece. The Linocomps are paper-tape-oriented. The Linoterms can take dual floppy discs, each holding 29,000 characters, as well as a paper-tape reader. The AlphaComps use magnetic tape with a 40,000-character capacity. The AlphaComp II, as an option, can also handle dual floppy discs with a capacity of 500,000 characters. The Comp/Sets, depending on the model, can work either with paper tape or with one or two floppy discs. Dual floppy discs are standard on the Comp/Edit. The Diatext works with magnetic tape.

•**Access:** Random access is much faster than serial access (running through the disc sequentially until the desired area is located). The newer direct-entry typesetters with a storage medium have random access. The EditWriter 7500 and the 7700, the Quadritek 1201, the Linoterms, and the Comp/Edit all use random access.

•**Other editing features and functions:** These machines vary greatly in their other editing abilities, too. Some have no editing or scrolling ability at all and no memory. Others can overstrike for corrections and can insert or delete characters, words, lines, or defined blocks of copy and can move large blocks, as well as perform multiple global search-and-replace operations. Obviously, each machine is tailored to a need and a budget. Vision '80s is not a buyer's guide. The point stressed here is that, at prices within the budgets of hundreds of thousands of offices, there are already many alternative machines and systems with considerable input/editing/typesetting abilities; further, many of these are upgradable.

TYPESETTER EDITING TERMINALS

As we swing into the '80s, more and more devices are becoming multifunctional, are becoming whole systems in one box, and it is difficult to isolate them according to a single function, such as electronic editing. However, there are many editing terminals on the market that have, among other features, great editing ability in feeding typesetting machines capable of handling the most difficult and demanding copy.

As an example of what such editing terminals can do, let's take a look at the Model 51 terminal that is part of the CPS-300 composition system (Itek Graphic Systems). It can insert or delete words, sentences, or paragraphs; can word-wrap and move blocks of copy; can store up to 6,000 characters, recall, scroll, highlight (or blink on screen), and input corrections for errors; can reverse (light to dark) defined text blocks and identify pi characters; and has underlines to indicate typeface changes. Lengthy



The V-I-P Comet II/MVP. *A complete typesetting and editing package from Mergenthaler Linotype.*





Communicating editing terminals. *This Teleram 2277 is an example of an input/editing device that can, when connected via modems, transmit or receive copy via phone lines.*

command sequences can be stored and executed with one keystroke. On a 15-inch screen it displays 24 lines of 80 characters each, at 14-point. It is adaptable to different language and function requirements.

THE SPECIAL PROBLEMS OF BOOKS, CATALOGS, AND TABULAR SETTING

An example of a high-powered text management, storage, editing, and composition system is the Composer 1550 (Imlac Corporation), which can:

- Enter a book manuscript piecemeal as it comes in, and later merge and properly sequence the pieces.
- Automatically measure column depth.
- Enable the operator to place folios, running heads, footnotes, figures, and artwork or photos in position. The screen shows all these elements in position, and the keyboard controls can move them around, so that little or no paste-up is required. The full page can be seen and OK'd before setting type. Copy appears on the screen line-for-line as it will be set, with all hyphenation in place.
- Insert or delete characters, lines, or whole sections; move unlimited blocks of copy forward or backward in the text.
- Offer visual control of runarounds, ragged margins, indentions, and interline spacing (leading).
- Store unlimited amounts of copy and documents off-line on removable discs.
- Store up to 40,000,000 characters on-line.
- Store graphic formats.
- Update stored information by means of a sophisticated search-and-replace routine.
- Put tab commands into the computer so that they can produce perfectly justified columns of tabular matter on the screen and, of course, in the output. This enables the operator to enter tabular matter with the same ease and speed as is possible for standard text.
- Accept input from almost any device—paper tape, magnetic tape cassettes, OCRs, computers; compatible magnetic tape transports as well as from input equipment of such manufacturers as Redactron, AKI, and Context.
- Feed a broad range of typesetters, including but not limited to AM-744, -747, -748, Itek Pacesetters, Mergenthaler V-I-Ps, the Compugraphic Unisetter and ACM-9000, and the Harris TXTs and Model 1200.
- Hyphenate and justify. The discretionary hyphenation program can be supplemented by a 10,000-word exception dictionary.

This system, like many others, is interactive. That means the operator can see the results of the keyboarding on the screen instantly and can correct errors in text or positioning before type is set.

A device such as the Composer 1550 is for commercial and large in-plant installations. Other editing systems, produced by Imlac and other manufacturers, are geared to diverse markets such as newspapers.

COMMUNICATING EDITING TERMINALS

Some terminals can, with a modem, be put on a phone line or cable to transmit or receive copy. An example of such a terminal is the Teleram 2277. This unit is a stand-alone communicating input/editing device that can store copy on floppy discs. It is designed for remote gathering of news, interoffice correspondence, financial data, and all other text that must be written, corrected, and transmitted to another location. Used singly or grouped, it can be the remote-entry device of a business telecommunications network. The Teleram 2277 can transmit and receive blocks of copy or operate interactively for editing on a character-by-character basis. It can simultaneously transmit while the operator is preparing additional copy.

ULTRA-SPEED EDITING

You don't need a long memory to recall the last time you sent a job back to the shop to reset it without widows or rivers and a hair more leading. It may even have been this morning. And maybe you were told there's no such thing as a "hair" more leading but, yes, you'd get new proofs pronto at 9:00 A.M. tomorrow.

With today's editing terminals, not only can you get a hair more leading, but you can get it and see it in ten seconds. An ad for Computer Composition International (CCI), headed "Speed. Responsiveness....You won't believe," listed these editorial functions and the time it would take to make and see them using CCI's latest equipment:

Set in 9 pt	60 seconds
Try it rag right	12
How about Times Bold?	14
Italics	16
Needs 1 pt leading	20
Helvetica Light	18
Name in bold	30
Spread it—use hyphens	10
Kill the widow	20
Tighten it up	10
A hair more leading	10
Total time	**220 seconds (=3:40)**

That's right. Three minutes and 40 seconds. Not 9:00 A.M. tomorrow. Virtually immediately. Even more important than its capacity for cutting schedules and speeding deliveries, electronic editing keeps pace with a writer's or an art director's mind. Your thought processes don't get interrupted by other jobs while waiting for this one to come back. It doesn't show on the bottom line or in a P & L report, but this uninterrupted flow of creativity may be the greatest value the electronic editing systems have to offer—at least to the creative person.

EXPEDITED PROOFREADING

The new tools also enable you to cut the time and costs for proofreading and probably help in doing it better, too. A number of machines do this, such as the Execuscan, which was devised to reduce executive time spent proofreading revised documents.

With systems in which original keystrokes are captured, much proofreading time is already saved. Now it is possible to reduce the time spent checking revisions. Execuscan is a feature of the Redactor II display text editor. To flag the location of changes, it puts a slash next to each revised line of printed text. Only those lines need to be reread.

SCREEN FORMATS

In what format do you want to see your job on the CRT? In one wide column? In two or more columns? How about seeing two separate texts side by side—perhaps so you can compare them, merge them, or edit them simultaneously or independently? Among the editing terminals with a choice of screen formats is Mergenthaler's MVP Editing System.

There is room on the MVP screen for up to 24 lines and 1,920 characters. The screen display is divided by a horizontal rule into two sections. Above the rule is a single line of control data that shows the operating mode in effect and displays machine status messages for the operator. Below the rule is the 23-line text data section containing the actual copy. The operator has a choice of three screen formats for text display. The single-column format, or mode, displays one sequential 23-line column, or 40 characters per line.

The dual-column mode displays two 23-line columns, 40 characters per line, separated by a gutter. The two columns consist of sequential text.

The vertical split-screen format is similar to the dual-column display; however, each half of the screen is completely independent and the text need not be sequential. Copy can be input to either side of the display from the keyboard, tape readers, or diskettes. Each half-screen can be scrolled in either the forward or reverse direction, and blocks of copy can be easily moved from one side to the other. The split-screen mode is particularly helpful for merging one job with another and for updating or revising copy.

SPECIAL SYMBOLS



Not only can editing terminals store, display, and set many special symbols (mathematical, scientific, medical, logos, or what-have-you), but they can modify them, too. The MVP, for example, stores 128 different letters, figures, and graphic symbols. Any symbol in this memory can be called to the screen, enlarged up to 12 times, and its dot matrix edited into a new



Compact, low-cost terminals. *Compugraphic's Mini-Disk Terminal, MDT-350, is an example of the small terminals that pack a lot of capability at a low price, including a 14-line display, scrolling, editing capability and format storage keys.*

shape by using the cursor. This new shape replaces the original symbol in the electronic memory, so that when the key is struck the redesigned symbol is displayed.

This character generator feature is particularly helpful when editing scientific materials, mathematics, and foreign languages. Modifications of the displayed character set can be stored on paper tape or on a diskette.

STORED FORMATS

Storing formats that will be used frequently is another editing terminal feature. On the MVP, for example, there is a row of 15 programmable format keys across the top of the secretarial key pad. Multiple-keystroke formats or repeatedly used keyboard commands or copy blocks can be assigned a format key and stored in the MVP memory. Not only can TTS codes be stored in a format, but also such screen functions as **home** or **search**.

Striking a programmed format key at any time will automatically insert the stored text or perform the command functions at the point indicated by the cursor. This significantly reduces operator keyboarding time and error. The 15 format keys can be programmed from the keyboard by using the **define format** key or from information stored on paper tape or a diskette. Stored formats can also be replaced or edited.

REPAGINATION

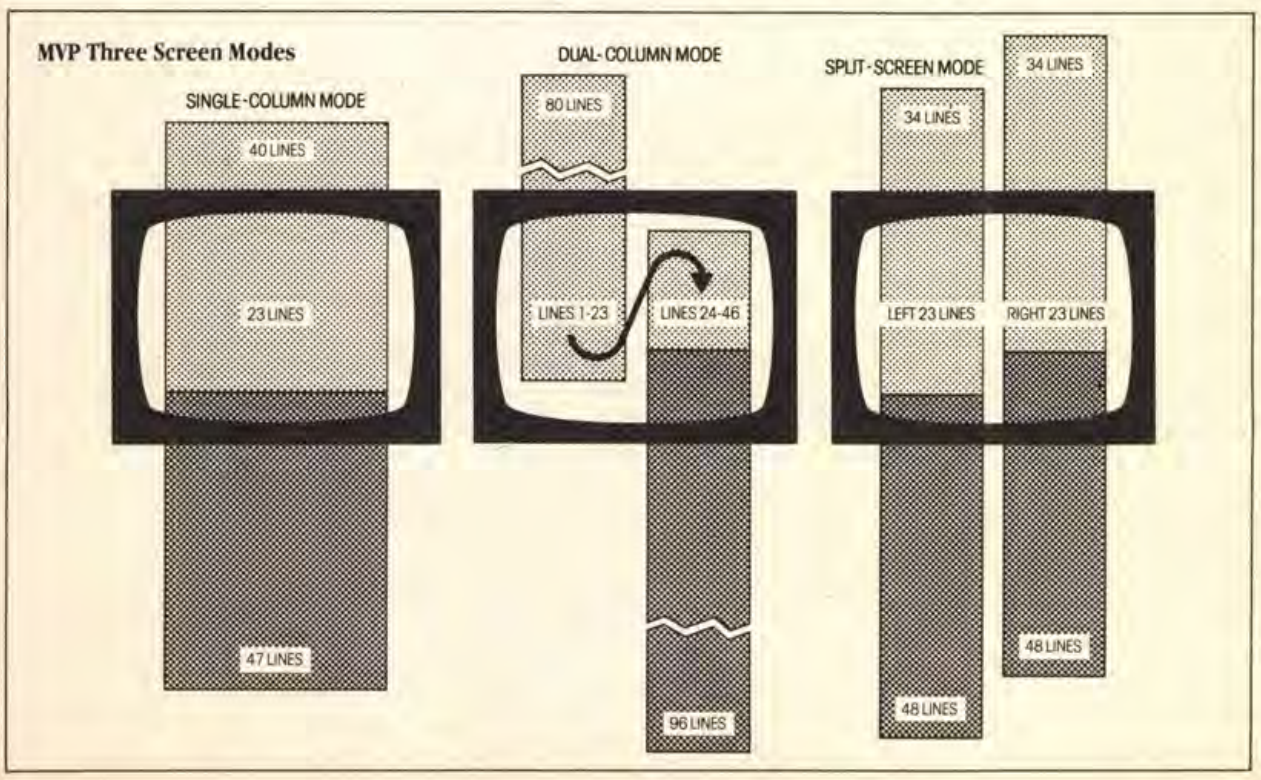
Format editing makes it easy to change the entire appearance of many pages of copy without extensive operator editing and rekeyboarding. Repagination — to eliminate widows, for example — is quickly accomplished, and it is easy to add or delete copy without changing page design elements such as indents and runarounds.

EDITING PICTURES ELECTRONICALLY

Pictures, like text, can be edited electronically. After all, as explained earlier in Vision '80s, picture elements (pixels) can now be converted to digital bits — tiny electromagnetic charged or uncharged spots. Editing terminals or devices can modify and manipulate such digital bits, just as they can for bits representing data and text. In earlier sections of Vision '80s, we discussed methods of electronically creating and manipulating graphic images. In the next section we shall discuss methods of electronically making up pages, combining text and images, and outputting them in a predetermined format.
Electronic color scanners and electronic and laser platemakers will be reviewed in the section of Vision '80s covering platemaking and reproduction processes.

But, in addition to devices concerned solely with page makeup, creation of images, or platemaking, there are multifunction devices — systems really — that do it all. The most commercially prominent of these, as we enter the '80s, is the VideoComp 570. Made by Information International, Inc., it is generally described as a typesetter. As such it is in a category with the Harris 7400, the Mergenthaler Linotron 606, Autologic's APS-5, the MGD Metro-Set, the Pagitron, and others. But of all these models in substantial commercial use, the VideoComp 570 is unique in its multifunctional range. Yes, it is a typesetter. It is also an electronic editing and makeup terminal. It can output an 8 5/16 × 11 1/8-inch page with all typographic and **picture elements** in position. It can digitize, store, manipulate, position, and output line or tone copy and can screen the latter. To properly screen a halftone for reproduction size, the picture must, when being scanned and digitized, be pretreated to compensate beforehand for eventual reduction or enlargement.

Although it is beyond the scope of Vision '80s to explain in detail how the VideoComp 570 works, one should know that it can also size, crop, and position screened or unscreened pictures, alter tone values, and transmit them and the full pages electronically to remote sites for platemaking and printing. A number of large publications use such systems now. One making notable use of the VideoComp 570 is *U.S. News & World Report.*



TYPESETTING A PICTURE

The VideoComp 570, the Linotron 606, the Pagitron, and the APS-5 with the APS-43 optional laser scanner, for example, are said to typeset pictures. As we move into the '80s, we not only will see more of this done and at lowered cost but, besides output onto film ready for platemaking, will see it put directly onto printing plates or even a system that bypasses plates and reproduces multiple copies by a nonimpact method (electrostatic or ink-jet perhaps) after exposure to an image of the full page on a CRT. This possibility will be examined further in later discussion of nonimpact printing in Vision '80s.

SOFTWARE

Programs and methods of enabling machines or systems, with minimum intervention by operators, to compose and make up a wide variety of matter exist and are widely used. They serve for everything from charts and tabular matter to converting data base information to typeset material. They can cope automatically with mathematical/scientific formulas, as well as with classified ad programs or display advertisements. These systems, usually blends of software and hardware that are heavily concerned with area or page makeup, will be described in the next section of Vision '80s.

Where are we going? Like the man who jumped on a horse and rode off in many directions, we are headed many ways. But unlike his roads, our many ways, seemingly different and even contradictory, are destined to cross and recross and merge and lead to a common dual goal: increased communications effectiveness and greater cost-effectiveness.

In the specific area of editing devices we will pursue many roads in the '80s. Some of the major probable developments include:

- More editing functions will be accomplished electronically.
- They will be increasingly performed on multifunctional devices — either editing terminals on-line to a system or devices that input/edit/make up/output/communicate.
- Costs of such devices will come down, and they will be within reach of a wider and wider market.
- A new generation of artists, writers, executives, support personnel, and technicians will take all this technological change in stride.
- The present generation's greatest problem in coping with these changes will not arise from the easy-to-use devices themselves but from people's state of mind regarding them. Those who fear or resent them, or who mistakenly think they hamper or replace human creativity, will not make the most of the tremendous advantages and opportunities for creative and financial reward they offer.



PAGE/AREA COMPOSITION

A major advance in typesetting technology that will especially affect art directors, graphic designers, and all those, whatever their title, who are concerned with planning and executing the way printed matter looks is the proliferation of low-cost, high-capability electronic pagination devices. These devices are part of what Alvin Toffler, in *Future Shock*, calls the era of Super-industrialism. The industrial revolution of the 19th century developed machines that required many operations to perform endless, boring, repetitive tasks. Charlie Chaplin, in *Modern Times*, was so affected by the arm-swinging motions required by his job that even when walking down the street he looked as if he was opening and closing giant scissors.

But in the Super-industrial era, technology will assume the burden of more and more of those repetitive tasks and will leave to people the functions requiring judgment, taste, personal skill, and imagination.

Electronic pagination will become as widespread in the '80s as photographic typesetting is today. But, for the immediate future, while we are still pasting up and stripping manually, text-editing terminals such as those described previously in Vision '80s will cut manual makeup to a minimum. Some text-editing terminals, with their scrolling, reverse leading, and cursor controls, can also compose, display, and output multicolumn or tabular matter.

ON-LINE OR OFF-LINE

Some text editors will operate on-line to electronic paginators and, through them, to typesetters. Smaller operations will continue their phototypesetting through the '80s much as they do now, adding newer devices perhaps, but not necessarily configured into a large on-line system.

ILLUSTRATION BY JACQUI MORGAN

TREND: MULTIFUNCTIONAL DEVICES

As has been noted elsewhere in Vision '80s, there is a trend toward putting many functions in one box. This whole technological revolution will most probably progress through the '80s in this manner:

1. Develop an electronic/digital device to do a job formerly done manually, mechanically, photographically, or in some way slower than and incompatible with other new devices.

2. Make the new device, via an interface or by itself, electronically and digitally compatible with other devices in the production chain.

3. Cable-connect the various devices into a system so that they are electrically on-line to each other and can communicate to each other directly or through a CPU (central processing unit).

4. Combine two or more of these devices and their functions into one multifunctional unit.

Many beginnings have already been made toward developing multifunctional units. An example in the area of electronic pagination is Itek's DyText 300.

DyText 300:

This system is designed for commercial in-plant or book or publications operations using advanced techniques. As an example of a system that can process both content and form, it can:

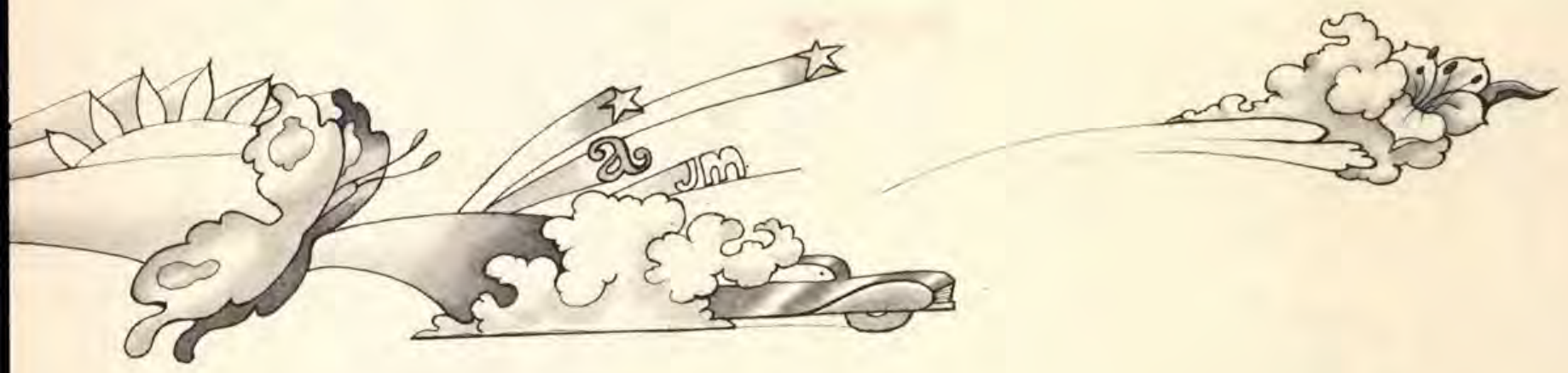
- Store up to 192 font tables on-line, all quickly accessible and interchangeable.
- Process edited copy immediately and extensively.
- Insert footnotes, folios, running heads, captions, crop marks, and slug lines.
- Use the GDT (Graphic Display Terminal; described elsewhere in Vision '80s) to preview the composed page or area in a range of type styles.
- Eliminate block makeup and paste-up operations.
- Store and easily access graphic formats.
- Kern/ligature-insert up to 1,600 letter combinations either from a standard set, which the user can modify, or from a user-created list.

Of course, DyText 300 has all the basic text-editing/storage capabilities. The features listed above show how some systems and devices are becoming both content and format processors.

Other electronic devices described herein vary from those which concentrate on manipulating the format while facilitating a minimum of text editing to accommodate the format needs, to those which are virtually text editors and format editors in either a single system or device.

Before considering some of the fantastic new tools being made available to art directors and graphic designers, one should know a few basic facts about them as a group.





KINDS OF DISPLAYS

There are three kinds of displays used by pagination devices:

1. **Gas plasma displays.** These show what is in the system but are not interactive. That is, the operator cannot manipulate the content or format and see the changes immediately on the display.

2. **CRT displays.** These are interactive and are of two kinds. Raster scan displays have high resolution. You need a good magnifying glass to see the dots or scan lines that create the characters. Random-stroking CRT displays operate more rapidly but have coarser resolution.

3. **Storage tubes.** These displays have high resolution but are not interactive.

APPLICATIONS

There are three kinds of makeup or composition terminals, classed according to what they can do:

1. **Soft typesetters.** Also known as passive terminals, these permit viewing of material in real or simulated typefaces but are not interactive. The material on the screen cannot be manipulated on the soft typesetter. To make corrections, one must go to another device, such as an editing terminal.

2. **Partially interactive CRT devices.** This type enables one to preview a job on a screen and to alter the content or the format.

3. **Fully interactive composition terminals.** These permit the user not only to preview and correct a job but also to generate, sometimes automatically, the typesetting parameters.

WITHIN REACH OF MANY BUDGETS



Some of these devices, the first on the market and those powerful and versatile enough for larger newspapers, cost from $60,000 to $150,000 and more. But now, as we enter the '80s, there are several excellent electronic pagination or ad makeup terminals in the $20,000 to $35,000 range, and when less expensive memories and microprocessors become more widely available, it is probable that their cost will drop still further. The likely drop in price puts them within reach of many an internal corporate operation, advertising agency, typographic or prepress service, and art/design studio. Among low-cost devices now on the market are the Harris 2220, Compugraphic's AdVantage, Xenotron's VideoComposer, AM's 4800, and Itek's GDT (Graphic Display Terminal).

WHAT DO THEY ACCOMPLISH?

Lots of things that affect production procedures, graphics, costs, and schedules; for example:

•With an electronic pen you can draw an outline of a picture or a shape on the CRT face, see it on the display, and then automatically set runaround type to match the outline.

•In the '80s it is probable that makeup terminals at remote sites will communicate with each other directly. This is not so much a technological problem as an economic one. When the market requires it, it will be done. Then an art director in Chicago, for example, will be able to transmit and display his layout, with actual text in position, to a client in San Francisco and get an instant and graphic response. Of course, this and more is already being done in very large publishing and printing operations that use larger, more expensive devices.

PREVIEWING

Low-cost markup terminals are already widely used to compose ads before they are typeset. One of the devices being used this way is the Optimix, produced by Automix Keyboards, Inc. (AKI). About 10 percent of the Optimixes are in in-plant operations, such as in Macy's advertising department. They are also used in publications departments and by commercial typesetters. Devices like the Optimix reduce or eliminate passes through the typesetter. In one hour on an Optimix the makeup person can accomplish what would take two hours on a paste-up table. In short, such a device can save time, money, labor, and supplies.

THE LOW-COST, HIGHLY INTERACTIVE XENOTRON VIDEOCOMPOSER

The VideoComposer, like comparable devices now or soon to be on the market, offers more than a low price plus high capability. Different models handle different page sizes and offer a graphic tablet option. The VideoComposer is simple to learn to operate; it is true it can use less skilled personnel, but there's a big "but" here. Yes, purely in terms of machine operation, some of these devices are easy to use. The "but" for all of them is the points at which, as well as the degree to which, taste and creative judgment are input and controlled.

However, these devices do offer marvelous production advantages, such as:

•Seeing type in position before actually setting it.

•No rekeying.

•Elimination of markup and attendant codes.

•Proofing before actual composing.

•Cost-effectiveness.

•Ease of operation.

•Ability to edit and correct text.

•On-line storage.

•Compatibility with most or all typesetters.

•Interactive hyphenation and justification.

•Software programmability to meet customer needs.

•Acceptance of a variety of off-line inputs, including paper tape, magnetic media, OCR keyboards, and word processors.

The fact that, especially in office installations, word processors are now being used for inputs to the typesetting and makeup processes is further indication that in the '80s the two systems—word processing and typesetting—not only will be increasingly compatible but will merge into a single device or system.

LOW COST AND HIGH CAPABILITY

Perhaps the most exciting news about electronic paginators is that they are becoming widely affordable. Consider Compugraphic's AdVantage, which claims to save 66 percent of the cost of converted paste-ups. Its basic components are a screen, electronic pen (the markup tool), graphic tablet (markup board), drawing board, a pullout keyboard, and a disc storage capability.

The AdVantage screen can handle up to 2,000 characters, with a maximum output width of 45 picas. However, by composing in sections, the AdVantage can produce ads larger than 45 picas wide or 11 inches deep. Because of the precision relationship between the screen and the markup board, these separately composed segments will fit together perfectly. The screen shows the ad in its current stage of composition and can immediately reflect changes made by the operator. You actually see the changes taking place on the CRT. In computer language this is "real-time" composition. Cost savings due to real-time composition systems can be dramatic.

The **electronic pen,** the system's only markup tool, tells the system, at your judgment and direction, how you want each portion of the ad to look—what size, shape, position, typeface, etc. You simply touch the pen to a selected function on the markup board, and it tells the system what to do. Everything you tell it shows up instantly on the screen.

The **markup board**—or graphic tablet, as it is called in some systems—arranges all the necessary typographic functions logically and identifies them in easy-to-read, plain English. The tablet shown here is from the Camex 1351, a large-scale and powerful system for major installations such as large newspapers. (The AdVantage is a lower-cost similar unit with a smaller screen and modified markup board.)

Look at this illustration and note the many functions this board and the electronic pen literally put at your fingertips. Furthermore, for the Camex system, this board can be customized and expanded.

For example, suppose you want to make a word larger. After cursor-identifying the word on the screen, you simply touch the pen to the area on the markup board that says "Larger" and the word changes to the next-larger size available in the typesetter. A similar procedure is followed to make a word smaller. Or the word could be changed to any selected point size available in the typesetter by touching the pen to the correct command rectangle on the markup board. Or the word or paragraph on any designated unit could be repositioned by "dragging" it across the screen by moving the pen. The procedure also enables the operator to make such changes precisely as wanted, since the operator sees them instantly and can modify a decision as necessary until it is exactly right.

PAGE/AREA COMPOSITION



The AdVantage. *This is typical of the interactive display ad markup/makeup systems that are low in cost, high in capability, and easy to use. The operator creates the ad visually by moving the electronic pen to the appropriate box on the graphic tablet.*

Type, previously keyboarded on an input/editing terminal, can be called to the screen and positioned by the operator. Guidelines, rules, boxes can be drawn by the pen and displayed on the screen. Last-minute corrections can be made with the pull-out keyboard.

When the ad is completed, the AdVantage translates the ad's specifications into typesetting coding automatically so that the typesetter will output it in the correct typefaces and sizes, with all elements correctly positioned and precise space allowed for pictures.

With the **electronic drawing board** you can put your own graphics on the screen. And bear in mind that what goes onto the screen also goes onto a disc and into the system. Here you can see a drawing being traced on the drawing board by the electronic pen as its image simultaneously appears on the screen in a cursor-selected position. In a similar manner, one can trace logos or picture outlines or even create shapes that will control runaround typesetting. With the aid of a software program, ruled forms can be drawn by the electronic pen, viewed, corrected and filled in on the screen and self-coded for the output typesetter.

The **keyboard** on both the AdVantage and Camex 1351 is essentially used for editing copy to make it conform to makeup requirements. Input and major text editing would normally be done before the job reaches the makeup terminal.

The AdVantage's **electronic storage** enables the user to store copy and formats that are not ready for immediate output. Stored copy and formats can be recalled later for further editing or for output as is. The system also has a safeguard so that copy and format will not be lost in case of power failure.

LOOK, MA, NO CODES!

One of the great features of this kind of a system is that there are virtually no codes. Without such a device, a job containing 1,000 characters may require over 600 additional keystrokes to code it for the typesetter.

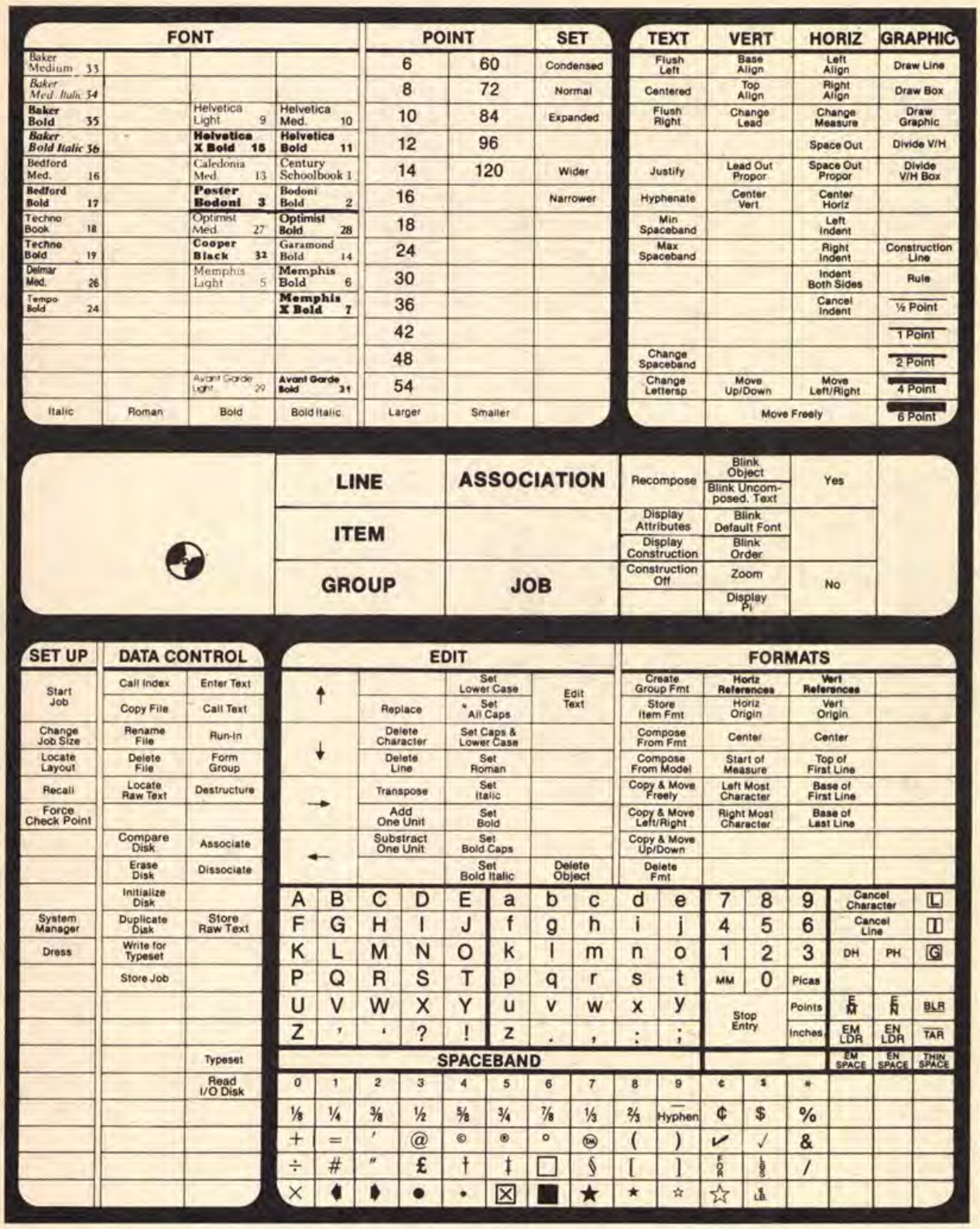
Input to an AdVantage is raw text (codeless) from a tape perforator, a mini-disc terminal or other keyboard, or a scanner, for example. The operator uses the electronic pen and the markup and drawing boards to change or move copy until it is finalized. Then, a simple touch of the pen to the "Prepare for Typesetting" block on the markup board effects automatic insertion of all the codes the typesetter requires to produce the ad or document displayed on the screen in the typeface sizes and styles selected. The actual typefaces do not show on the screen, but the copy on the screen is sized and copyfitted correctly. Typesetting instructions, like layout instructions, are entered by means of the electronic pen and the "plain English" markup board. This kind of system literally converts raw-text input to automatically coded output. The only paste-up required would be for inserting illustrations, and other more expensive systems can even do this.

FOR SMALL NEWSPAPERS

The **Harris 2220 Video Layout System** is a low-cost version of the large newspaper-oriented 2200 System. Priced and designed to automate display ad production for small newspapers, it claims to reduce such preparation costs by 50 percent. It is designed for papers in the 10,000 to 50,000 circulation range. When used in conjunction with the Harris MicroStor, it becomes a total ad management system that can electronically store/file libraries of ads by client, data, or subject and, with a simple recall command, can recall any within seconds. In addition to its composition function, the Model 2220 permits on-line copy input, editing, and storage; ad control, monitoring, and invoicing; and automatic insertion, expiration, and shipping date tasks. The Harris 2220 is priced in the low $20M range.







*Graphic Tablet (left) and **Camex 1351 Terminal** (at bottom, left). Labels on the AdVantage and Camex graphic tablets are in plain English. The Camex 1351 accepts layouts up to 17 x 22 inches.*

The **Ad Graphic System (Optronics International)** automates and composes the complete graphic portion, including art and photography of pages or display ads up to a 17 x 22-inch area.

SOFT-COPY PROOFS

The **Graphic Display Terminal (GDT)** is an example of devices that enable the operator to see an image of typeset material, but not to manipulate it on the screen. The GDT has a gas plasma display. It is designed to operate as a unit within a system, such as Itek's CPS-300, which is a complete text management and composition system that permits full editing and manipulation. Other units in the system offer editing and makeup control.

The GDT is an electronic viewer of the job in progress. In conjunction with the rest of the system, it facilitates area/page composition and can display hyphenated and justified copy in representative type fonts and sizes, thereby providing a proof of the page before committing it to typesetting. In combination with such editing terminals as Itek's Model 50 or 51 (which can be at remote locations), the GDT displays type images in their relative point size and in a representative (but not necessarily identical) font. The copyfitting characteristics of the typesetter font selected are also taken into account. A scaling feature permits reductions for viewing entire pages and enlargements to facilitate viewing and reading specific text areas.

***The Graphic Display Terminal.** This is a soft typesetter, a device for generating electronic proofs. The GDT is compatible with other Itek machines.*

Soft typesetters, such as the GDT, enable the operator to view a composed page or area but do not permit manipulation or editing. Other units in the system are used to effect desired changes which, in turn, can be viewed on the GDT for final approval.

Representative but not actual type fonts can be displayed. The GDT displays type in its relative point size and takes into account the copyfitting characteristics of the font the typesetter will use. Screen images can be enlarged or reduced to facilitate viewing full pages or reading specific text areas.





PAGE/AREA COMPOSITION





Area composition on the Comp/Set 4800. *Reading left-to-right, copy that was keyboarded off-line; first part of job composed on screen as per designer's layout with copy in correct size and position; job fully composed and ready for output onto a floppy disc; final typeset output.*





ONE-PERSON CONTROL



Here we go again. One person controls the electronic composition process. That person may be making decisions concerning layout, size, position, and cropping of elements as well as other typographic refinements. This combined function is cost-effective, for it is fast and eliminates the confusion that seems to go hand-in-glove with divided responsibility.

But what about graphic control? How, short of being the machine operator, does the art director or designer keep control of the graphic appearance of a job? Different installations will have different concerns with and approaches to this problem; but as we move into the '80s, a recurring question will be: "Who and what's in charge here... which person... a person... a machine?"

These fantastic tools coming to the aid of the creative person must be used as tools; they should not be permitted to subvert the creative facet of graphic communications by imposing too-narrow parameters on it. It is, after all, the creative facet that maximizes communications effectiveness. Hopefully, the elimination of difficult markup, complicated coding, and extensive paste-up will not be at the price of cramped creativity. In this respect, each makeup system has its own advantages and shortcomings.

THE COMP/SET 4800

This is a low-cost area composition terminal compatible with Comp/Set typesetters and input terminals. The keyboard, though it can be used to input copy, will be used mostly to manipulate and edit copy input by floppy discs from Comp/Set 5404 and 5408 input terminals or Comp/Set 3500 or 4500 phototypesetters. It will also accept perforated tape or magnetic discs, including copy originated on AMtext™ 425 or 225 word processors.

The basic steps in composing on the Comp/Set 4800 are: The CRT viewing area is 9 × 7½ inches; 28 type sizes from 5½- to 74-point are displayable. If some unavailable size is to be set, the size nearest to it will be displayed. The job can be output in fully made-up form or in made-up major blocks. Repeated formats are stored. When the job is completed on the CRT, typesetting codes are automatically generated for a Comp/Set or Comp/Edit typesetter. The keyboard operator fully controls the size and position of every element of copy. The input disc from a Model 5404, for example, is placed in the Comp/Set 4800, and after recording the typesetting commands, it is transferred to the typesetter it controls.

DIRECTIONS IN THE '80s



In the realm of typesetting, two major trends developing as we enter the '80s are toward digital (rather than photographic) typesetting and toward electronic page/area composition. In the latter sector, some directions that might be taken are:

ILLUSTRATIONS BY JUREK WAJDOWICZ

•Electronic composition terminals in the $20,000 to $30,000 range that can communicate with others. This would permit client, designer, typesetter, printer, and others involved to instantly see and OK or correct copy and layouts.

•More devices like Itek's GDT, with a library of 16 or 20 basic type styles, to more closely simulate the typesetter font than can devices using an all-purpose font. Such simulated type can match the real font in aspects such as character widths, point size, line length, and interline spacing.

•More low-cost devices showing actual rather than simulated type on their display, as the more expensive and versatile VideoComp 570 and APS-View now do. This might be done with the makeup terminal on-line to a digital typesetter, so that it can call on the typesetter's font storage, or by feeding in the correct font from a disc, just as is done now with many typesetters. Thus the ad or page or area on the display will be a much better preview of the finished piece than is presently possible with devices generating one all-purpose font.

•If costs can be brought in line, digitized halftones might be incorporated on the display screens of low-cost devices (as is presently possible on the VideoComp 570, for example), rather than simply showing blank areas or windows to represent their positions.

•Further cost reductions, as makeup devices not only cut markup, keyboarding, and paste-up costs but also reduce the number of passes through the typesetter.

•More software approaches to electronic makeup, including ways to enable word processors and low-cost direct-entry typesetters to output in area or page format rather than in galley form. (For more information, see the discussion of DPI, Penta, and other systems elsewhere in Vision '80s.)

•Microfiche output by more typesetting systems, as is done now by the Comp 80/2 of Information International, Inc.

•A trend to decentralization of electronic intelligence. This is supplementary to, and not necessarily contradictory to, a trend to more CPUs—more and larger central processing units servicing many terminals. The decentralization of intelligence simply means that more terminals at more stations will have their own microprocessors. As microprocessor costs come down, this trend will grow. It could keep the system operative when the CPU is down and would enhance communications between terminals.

•More self-contained terminals communicating to a common information storage base of data, text, formats, and pictures. This also implies a larger, more heterogeneous information base than the huge data bases already built by many companies.

•The basic manipulatable typesetting unit will be the page, perhaps even a spread. In the days of metal foundry type, the basic unit was the character. Linotype made it the line. In the '80s it will be the page or spread. In word processing, the basic manipulatable unit will be the entire page or document.

•Markups will be done on layouts instead of on manuscript, so they can guide operators of electronic page-makeup terminals.

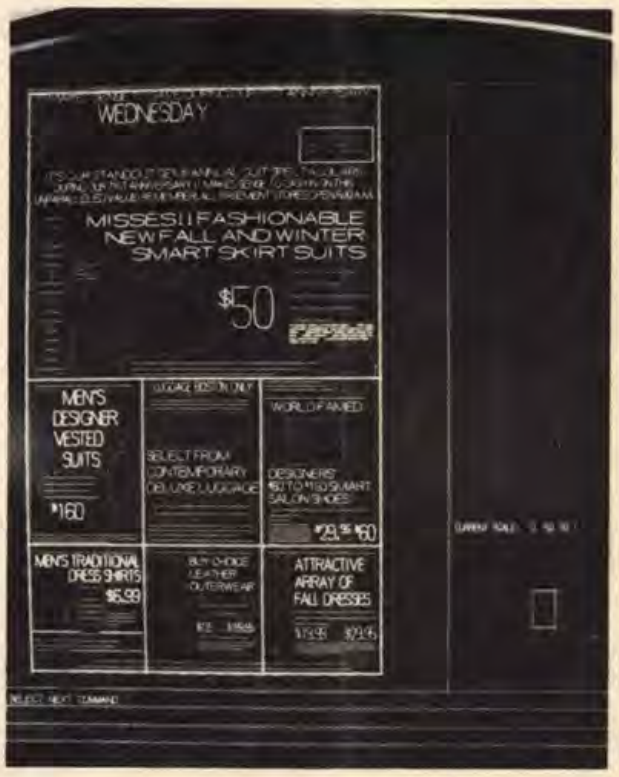
•What is now an electronic makeup tool may become an electronic design device. Once information is input to an interactive terminal, the designer-operator can manipulate it into almost any format, get immediate feedback, revise, finalize everything almost instantly, and output it to a typesetter or even get a paper proof prior to typesetting.

•New career paths will open up. With Redactron's UP/1, for example, a typist can become a programmer. The AMtext™ 425 and other word processors, typesetters, and editing and makeup terminals also accept customer-created programs. This trend is expected to intensify in the '80s.

SYSTEMS FOR COMPOSING AREAS, PAGES, DISPLAY ADS, AND FORMS

In addition to the lower-cost devices described above, there are devices in the medium- and high-price ranges designed for specific applications or market segments. It is beyond the scope of Vision '80s to describe each of these or to compare them, but the following list includes the most important of these terminals, along with a brief comment about each.

AD—Graphic System. Automates and composes the complete graphic portion of a page or ad. Provides the ability to size or distort graphic material as well as combining screens and rules, which are internally generated within the system. Material for scanning can be any combination of line art, continuous tone or text materials, all of which can be manipulated in any manner





The Camex 1351 at work. *Reading left-to-right, a full newspaper page at half size; a small section zoomed up to 1.75 to 1 with the small rectangles at lower right showing the section's location on the page; copy in the center before spacing out; center copy spaced out.*





the designer wishes. The system accepts material up to 17 × 22 in size and has the capability of producing either paper or film output, positive or negative with bendays or halftone screens. The screens can be generated by the user from 65 lines per inch to 175 lines per inch. The system includes a 60-megabyte disc for storing data, mini-computer, scanner/plotter and Textronics 4014 interactive graphics terminal. Any graphic element, once scanned, can be recalled and combined with any others currently on file. (Optronics International)

***AKI's Optimix.** More than a soft typesetter, this device is interactive, permitting the operator to edit, move, and resize copy on the display. But unlike the AdVantage, Harris 2220, Camex, Comp/Set 4800, and Raytheon devices and Xenotron's VideoComposer, it does not generate typesetting and makeup instructions. It is promoted as a computerized layout pad that lets you justify copy, change fonts and leading, modify type size, move blocks of copy, relocate pictures, and see all as it is changed and finalized before going to the typesetter. (Automix Keyboards, Inc.)

***APS-View.** This system (also known as the APS-21) enables the APS-5 typesetter user to see the fully composed ad or page before it is output. It will show, in correct size and position, logos and line art and, unlike most other devices, the exact style and size of type, making it possible to judge the aesthetics as well as the mathematics of the page. APS-View, a soft typesetter, takes input from the APS-View typesetter and is an electronic instant-proofer. Corrections are made on the APS-5. It can also produce hard-copy (paper) proofs. The APS-View terminal has been augmented with a scanner and the APS-22 graphics terminal. The scanner will scan line and tone art and photographs (opaque or transparent). The APS-22 will position, size, and crop graphics and merge them with prepaginated text. The output will be a data stream of composed text and graphics that can be typeset on the APS-5 without further processing. The system will also put a halftone screen into continuous-tone copy.

Note that the APS-View shows the actual typeface that will be set on the APS-5. This system not only makes up the type page but also incorporates graphics, so that type and pictures can be "set" on the APS-5 typesetter. (Autologic, Inc.)



***Berthold ADS-3000.** This is a total system for input, data storage, retrieval, editing, and formatting. Stored or newly input material can be viewed on the visual display unit for editing and formatting. The typesetting parameters can be given before, during, or after input. The automatic correction process makes deletions, corrects errors, changes typographic specifications, and even enlarges or reduces rules. A unique feature of this system is its ability to draw rules in a wide range of thicknesses and lengths and to set them horizontally or vertically on a normal base, inverted, or centered. (Berthold Fototype and H. Berthold AG)

***Berthold's APU-3618.** This device is an area composition photo unit for advertising, business forms, and text matter. It can take input from the ADS-3000, Diatronic "S," Diaset, and Diasetter. Berthold Fototype and H. Berthold AG)

***Camex 1351.** Using continuous zooming and panning, the Model 1351 is able to show a full broadside newspaper page at half-size, or 11-inch display. A graphic tablet, similar to but larger than that described previously for the AdVantage, accommodates a full-page dummy. The 1351 can be interfaced to a variety of front-end systems and typesetters, either locally or over telephone lines. Fully interactive, it includes a hyphenation and justification program. (See illustration of the Camex graphic tablet.)

The Camex approach has proven itself in operation over several years in the production of newspaper display ads. Powerful new functions have now been added to enhance and simplify the creation and precise placement of rules and boxes, as well as of text elements.

ProFormer.™ This equipment allows an operator to create a complete and accurate model of a business form on a CRT screen. This is done quickly and easily through use of Camex's highly interactive computer graphics techniques. Once the model has been completed, the ProFormer™ sends the necessary information to a CRT typesetter to generate the form ready for reproduction. The model is then stored to allow any later revisions to be handled with minimum effort.

***Comap.** This typographer's computer system automatically breaks pages on galleys and generates headers and folios.

It can set and justify up to 16 tab columns or align them right, left, or center. With Comap there is no need for reverse leading to compose tabular matter or multicolumn work. It works with such typesetters as V-I-Ps or Pacesetters and includes a 120,000-word exception dictionary for hyphenation accuracy. Comap features multisector kerning, enabling unlimited and precise kerning of characters, not merely of selected pairs. Comap is essentially a text-editing system with some composition capabilities and a strong tabular program. (CompuScan, Inc.)

***DCS (Display Composition System).** This is a complete computer-assisted area composition system for text: all classified

PAGE/AREA COMPOSITION



Linoscreen Composer. *From Mergenthaler Linotype, this machine lets you see ad layouts before you set them.*

and display ads, charts and forms, and periodical, catalog, and book pages. The system components include an editing terminal, a hard-copy printer, a typesetter, and PreView. PreView is a 19-inch video monitor displaying a soft-copy (nonpaper) proof of an ad or page before it is set, including all display type, rules and boxes, reverses, and layout composition. The PreView itself is not interactive, but with the Unified Composer it allows instant proofing and correcting, so that error-free copy can be set on the VideoSetter Universal in one pass. The PreView displays type in its correct size, typeface, and specified position and can also show type in reverse. The display area is 7½ × 14 inches. (Compugraphic Corporation)

***Digiskop.** This soft typesetter lets the user see what the job will look like before setting it. Part of a complete typesetting/composition system, it works in conjunction with the Digiset typesetters and other Hell devices. (Dr.-Ing Rudolf Hell GmbH)

***DPI.** This is a collection of software programs that make it possible for even direct-entry typesetters and word processors to output in composed areas, pages, or entire documents instead of in galley form. Presently in an advanced stage of research and development, it will show alternate solutions for a wide range of media (newsletters, price lists, promotional material, catalogs, etc.) and will offer a short simple code for their execution. The user simply selects the disc, for example, that holds the codes for executing the selected layout and loads it into the machine. The manuscript is marked up by the user, using the simple DPI code, and then the operator keyboards both the DPI codes and the text. It will also have a mode in which it will display operator prompts and enter codes automatically unless the operator changes preprogrammed specifications. The result, within the capabilities of the word processor or typesetter used, will be a completely made-up page, with spaces for the pictures correctly sized and positioned. DPI, which will bring outstanding graphic designers into its program, will enter the market at the direct-entry typesetter and interactive composition terminal levels. (DPI — Design Processing International, Inc.)

***GraphCom System.** This includes a device called the Manipulator. Complete pages, as of books and magazines, can be laid out and modified until the designer is fully satisfied with them. No paper proof or paste-up is involved. (International Computaprint Corp.)

***Imlac Composer 1550.** This interactive display composition system is designed for commercial and large in-plant word processing and typesetting installations. The system includes a mini-computer, a video display terminal, keyboard, and a dual disc storage unit. Expandable to four work stations, it can work with paper tape and optical character readers. The Bookmaker is a software option offering a simplified way for a writer or editor to enter codes for setting and composing book pages.

***Linoscreen Composer.** This interactive makeup terminal can add a printer for rough proofing and a graphic tablet for those who prefer it. Intended for display ads, page layouts, etc., it shows text in true point sizes. (Mergenthaler Linotype Company)

***Page View Terminal.** Part of System V, the PVT displays an interactive representation of a complete tabloid newspaper page at 95 percent actual size. It is a soft proofing device and the viewing part of a full electronic pagination system. Most editing is done at an editing terminal, but the PVT can view a full page or view a portion of the page enlarged. It can also draw horizontal and vertical rules in seven weights. It has a cursor that can define (identify) lines for editing anything not corrected at the editing terminal. Blocks of copy can be moved around, and finalized pages can be electronically stored in the system.

For display ad work, guide boxes and lines can be constructed to aid in placing the text. Point sizes, line lengths, and indents can be changed; characters can be expanded or condensed; runarounds can be modified. Actions are performed interactively with the system, and a soft proof can be brought to the PVT screen at any time. A selection of typeface styles, stored digitally, is designed to simulate those being used on the typesetter. Type sizes on the display screen can range from 1 point to full-screen size (11 × 15 inches). The PVT stores eight standard fonts: roman, bold, italic, and bold italic in serif and sans serif styles. The fonts have from 100 to 200 characters. (Mergenthaler Linotype Company)

***Pagitron System.** The Pagitron is a complete pre-press system, performing all prepress operations from receipt of copy to finished film ready for platemaking.

The system will handle full broadsheet pages or multiples of smaller sizes. Sizing, screening, distortion, or any camera function is possible. The system allows for full page makeup with line art, pictures and text. Material can be flowed from page to page for automatic story continuation.

Partial pages or graphics can be stored and retrieved for revision at a later date. Output can be positive or negative film for offset or gravure.

***Penta Systems.** This is a group of software programs designed to automate many operations and to extend the capabilities of many typesetters. Penta Systems are being used with typesetters of many manufacturers. Most phototypesetters are physically capable of setting, composing, and outputting complete pages if the proper instructions are given when the job is keyboarded.

The Penta Systems' basic package consists of 18 software programs and a computer/processor with a large memory. The programs (typesetting and makeup parameters), as well as alphabets and width data, are stored on rigid discs in the computer memory. This computer subordinates that of the typesetter because it is larger and more versatile, is preprogrammed for recurring problems, and can be customized to the needs of a specific installation. With Penta Systems, the typesetter becomes, in industry language, a "slave"; that is, its intelligence function is taken over by Penta's. Because Penta automates many repeat operations, markup is done faster.

Penta also offers the PentaVue terminal. This input/editing terminal is for use with Penta Systems. The PentaVue terminal knows which words or sentences will be set in italics, bold, or bold italics. It's easy to lose track of what's what... particularly when several paragraphs are set in a typeface other than the regular font. The PentaVue terminal solves the problem by automatically underlining italicized copy. Bold type is displayed at half intensity, and bold italic type is displayed at half intensity, underlined. In addition to working with many kinds of typesetters, Penta can handle input from many different kinds of keyboards and in a variety of codes, from paper or magnetic tape, computer tape, floppy or rigid discs, editing terminals, OCR scanners, word processing systems, and Hollerith cards.

The system uses menus or checklists, which prompt the operator, via instructions on the screen of a terminal, on what to do. This feature can be customized to the needs of the particular installation. There are 18 basic Penta software programs. Extensive programs control word spacing, hyphenation, letterspacing, kerning (500 combinations can be custom-selected for each font), creation of ligatures, elimination of widows, selection of pi characters, AutoSort, and many other typographic considerations.

The Penta System also counts keystrokes (for billing records) and can store formats for repeat character strings to reduce keystrokes.

There are four optional programs for page makeup, data base conversion (to convert stored data into typographically correct and usable style), and a PentaMath program, and a program that sorts nine fields alphabetically or numerically.

As an example of how Penta handles hundreds of typesetting and makeup problems, consider how it copes with this messy equation, which it set in less than 5 minutes.

$$\sum_{n=K+1}^{L}\left(\frac{2n}{L}-1\right)\left(\frac{L}{n}\right)=\sum_{m=(L-(K+1))}^{0}\left[\frac{2(l-m)}{L}-1\right]\left(\frac{L}{m}\right)$$
$$=\sum_{m=K}^{0}\left(1-\frac{2m}{L}\right)\left(\frac{L}{m}\right),\ L\ \text{odd},$$
$$=\sum_{m=K+1}^{0}\left(1-\frac{2m}{l}\right)\left(\frac{L}{m}\right),\ L\ \text{even}.$$

1. Notice this equation contains:

a. Font changes
b. Vertical positioning
c. Centering within tabs
d. Pi characters
e. Rules
f. Superiors
g. Inferiors

2. With this equation there was no need for:

a. Copy markup
b. Counting characters
c. Using reverse leading
d. Flash/no flash
e. Manual/calculation and definition of tabs

With PentaMath:

1. Leading adjustments are performed automatically.

2. Multilevel superiors/inferiors are produced in diminishing sizes with vertical position adjusted automatically.

3. Equation numbers are keyed at beginning to be output centered or flush left/right.

4. Point size can be changed without special calculation.

With the Comp/Set 4800 terminal what you see is what you set.

With our Comp/Set 4800 area composition terminal, you can compose complex layouts without preliminary mark-up or time-consuming paste-up. Because you'll view actual typographic arrangements on-screen before the type is set.

Input keyboarding on the 4800 is as simple as typing, because copy is entered in "raw" form, without typesetting commands. Type size and placement are precisely controlled by a few easy keystrokes, and you see the changes on-screen as you make them. When the on-screen layout is the way you want it, the system automatically creates the correct typesetting commands as it records the job on a floppy disk, ready to control the output of your Comp/Set or Comp/Edit phototypesetter.

All of our products are backed by our nationwide force of locally-based service technicians. So you get local service when you need it, throughout the United States and Canada. Talk to us today, and we'll send you, free, our copyfitting calculator, a valuable tool you can use when specifying type. Call toll-free (800) 631-8134, except in Alaska and Hawaii. From New Jersey, (201) 887-8000 extension 666.



This page was fully composed on the

Comp/Set 4800

area composition terminal.

The Comp/Set 4800 area composition terminal will help you to dramatically reduce your production time and costs by significantly simplifying every step from the keyboarding of original input through the production of camera-ready mechanical art.

The low-cost, easy-to-operate Comp/Set 4800 terminal displays copy in actual size and position on a completely interactive CRT screen. Your operator has full control of the size and placement of every element of copy through direct keyboard command, with all changes reflected on-screen as they are made.

When the layout is completed on the screen, a touch of a key records it on a floppy disk, ready for phototypesetting. There is no need for your operator to be concerned with complex typesetting commands, because the system will create them automatically from the final on-screen layout.

With the Comp/Set 4800 area composition terminal, you will virtually eliminate time-consuming, manual mark-up, and you'll reduce inputting to simple typing techniques. You'll eliminate most paste-up, too, by reducing assembly of the most complex typographic arrangements to simple keyboard operation.

In the typical system represented here, original input is typed on the Comp/Set 5404 video display input terminal and recorded on a floppy disk. The disk is transferred to the Comp/Set 4800 terminal where the area composition function takes place, and the completed job is recorded on the same disk which will control the operation of the phototypesetter as it sets the final output.

Operating efficiency at the input stage

Use of simple typing techniques, with few, if any typesetting commands, will result in a reduction of as much as 50% of the total keystrokes required for traditional typesetting input.

Input copy can be typed on a variety of off-line units, as well as directly on the 4800's on-line keyboard. In most installations, however, the on-line keyboard will be employed mainly for copy manipulation and editing, with only occasional direct entry of copy.

Off-line entry is by floppy disk from the Comp/Set 5404 and 5408 video display input terminals, as well as from the on-line keyboard of Comp/Set series 3500 and 4500 phototypesetters. Perforated tape input, entered through an optional tape reader, can be input on Electro/Set keyboards and on other units.

The Comp/Set 4800 terminal lets you see what you set.

This ad was entirely composed on the Comp/Set system.

Comp/Set, AM and Varityper are registered trademarks and Comp/Edit and The Informationists are trademarks of AM International, Inc.

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AM Varityper
the Informationists

5. Input may be from:

a. Any paper-tape-producing keyboard
b. Ordinary typewriter with copy fed through scanner
c. VDT terminal

6. Codes are few and easy to learn.

7. No technical knowledge of math is necessary.

8. Cottage typists can be used. (Penta Systems International)

***RayComp 100, RayComp II, and RayComp AdSet.** These are interactive full-page electronic makeup systems. The RayComp 100 is for large installations and, with on-line output, costs about $182,000. It has large storage capacity and a paper-tape reader and punch, and it uses a graphic tablet. It handles 255 fonts. The composition area of the screen is 150 square inches and can display a 100 x 159-pica newspaper page in actual size. Type size ranges from 4½ to 96 points; character width and position on the display are accurate, but height is approximate. Text can also be viewed half-size or double-size. RayComp will display and output a variety of rules and boxes, with square or rounded corners. Dimensions, shape, and position of art can be traced on the graphic tablet and displayed on the screen; type can be set to the contour of the art. The RayComp 100 also has programmable keys for storing codes for repeated formats or repeatable blocks of text. The keys can be custom-programmed for each terminal. It accepts OCR, paper tape, or input from a front-end system and outputs to a variety of typesetters.

The RayComp II, similar to the RayComp 100, is for small and medium-size newspapers. The RayComp AdSet is a new and low-cost, full-page ad composition terminal for small publication, commercial, and in-house operations. Its display is a 17-inch CRT, and it can output an area up to 101 picas wide and 159 picas deep. (Raytheon Graphic Systems)

***Rice Automatic Book and Booklet Design.** This is a fully automatic typographic formatting system for computerized typesetting. There is also a program to format business correspondence. (Stanley Rice, NYC)

***Syntext.** This interactive editing and pagination system controls content and job appearance on the same terminal at the same time. The visual display terminal in the system is the Synterm 3. All characters are shown in their correct size, weight, and position. It handles multicolumn page makeup and text editing and can store and use formats of any length. As with other interactive devices, the operator sees and can accept or change the current content and look of the job. Final copy and full-page layouts can be stored in the computer for reuse, for recall and editing, or they can be output to a typesetter. If customer proofs are needed, they can be produced on a typesetter or on a dot matrix printer, which will reproduce on paper a copy of what is visible on the screen. A basic Syntext system, which could cost about $150,000, is a complete editing/makeup system with the full range of essential capabilities as described previously in Vision '80s, together with extensive formatting and storage capability and flexibility. This system is especially geared to the needs of periodicals, catalogs, financial printing, and some manuals. (Syntext Systems)

***UP/1.** This is another indication that the new typesetting/composing technologies are moving into the office. They were first meaningful to large newspapers, then smaller papers and typographic services. In the '80s we'll see more electronic pagination done in-office, as well as more keyboarding, text editing, and typesetting. UP/1, described as "the first office-user programming capability for electronic text-editing systems," works with a Redactor II display system and offers the operator automated text editing and formatting. It brings to the former secretary/typist the ability not only to set but compose (i.e., lay out) reports and complex forms. It is the first step in moving more sophisticated makeup responsibilities, via stored programs or interactive devices, into the office. Again the question is raised: How and at what point in the communications process will the graphic designer or art director exercise control? (Redactron Corporation)

***VideoComp 570.** This typesetter, described more fully in the section of Vision '80s dealing with typesetting, sets text, halftones, and line art. Interfaced with other components in its system, it inputs, updates, and composes text interactively. Its CRT displays the actual typeface in which the job will later be set (3300 Text Editing Compositor Systems). It positions and scales selected text and illustrations interactively (2020 Page Layout Station). It scans and digitizes continuous-tone photographs, line art, and logos (3600 Illustration Scanner). It sets text and illustrations true size or in microform, draws random vectors, and has utility fonts designed specifically for high-speed microform recording (Comp 80/2). A 2001 File Merger controls and interfaces the entire system. Of course, this is presently a high-cost system intended for large users, but it dramatically illustrates what can be done. It will be interesting in the '80s to see how much of this capability will come within reach of market levels other than the larger publications. (Information International, Inc.)

OTHER AREA/PAGE COMPOSITION TYPESETTERS AND SYSTEMS

The above description of pagination devices and systems is not exhaustive. It is intended only to indicate the large number of approaches to electronic makeup already on the market, how greatly they vary in what they can do, and at what market segments they are aimed.

The major directions in the '80s will be toward more interactive terminals (like the AdVantage, Harris 2220, Comp/Set 4800, Camex, Mycro-Tek's Adcomp, the RayComp, and Xenotron VideoComposer devices) and wider availability of such devices, at costs within reach of an increasingly broader market segment.

Other devices and systems presently on the market but not described above include large systems such as those offered by Atex, Hendrix, Optronics, Inc., DEC (Digital Equipment Corporation), CSI, Bobst's MOPAS, and Imlac; medium-size systems such as TalStar's T410C and Itek's CPS-300; and such smaller systems as Quadex, Datalogics 6300, and CCI system. For data on other multiterminal composition systems for commercial typesetters, please see the *Seybold Report*, Vol. 9, No. 7, December 17, 1979.

Two typesetters also feature area composition capabilities especially suited for setting charts and tables. These—Mergenthaler's Linotronic and Berthold's Diatronic—will be reviewed in the section of Vision '80s dealing with typesetters.

REAL TYPE VS. SIMULATED TYPE

For control of a job's appearance, it certainly is more desirable to be able to view the job before it is set and in the real, rather than simulated, typefaces. As noted above, the APS-View (in the APS-5 system) and the VideoComp 570 system offer this advantage now; both systems have digital typesetters. In such systems, originals (type, logos, line art, tone art) are converted to a series of electronic signals, which turn an electron beam on or off in various sequences to create patterns that correspond to the original copy they represent. The beam activates the phosphor coating on the CRT, and the character or picture element represented is reproduced thereon. In systems that are digital/electronic from input through output, such as the APS-5 and the VideoComp 570, the actual typefaces stored in the output or typesetter unit of the system can be called to the screen of the viewing component.

This cannot be done with phototypesetting systems, which use simulated fonts, as do Itek's GDT and Mergenthaler's PVT, both described above. Such systems have a small font library—usually a sans serif and a serif family, each in roman and italic versions in several weights. They are also capable of modifying the characters so that the width of each matches that of the actual face on the typesetter. Such devices can be passive or interactive, as is explained above.

The trend in the '80s will be not only to more interactive devices but also to more digital typesetters. Thus, we can expect more viewing/pagination systems that will show real type.

We may also see in the '80s a combination electronic makeup/electronic design device with electronic scratch pads. The designer or artist would literally create a design on it, as well as finalize the design into a format, add real text and pictures (not just spaces for them), and output all as a unit to the digital typesetter, as APS-5 and VideoComp 570 are now doing, but at prices that more market segments can afford.

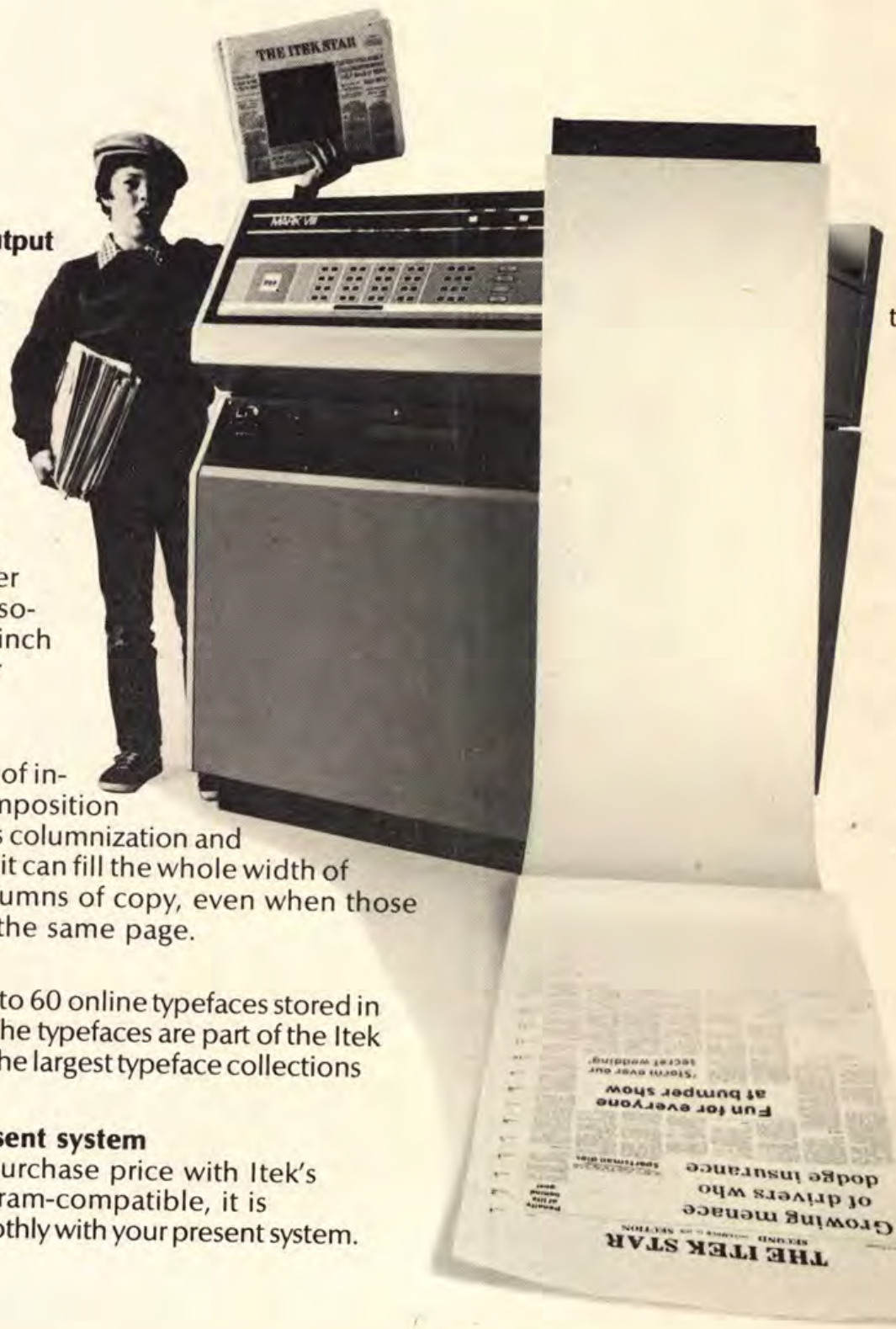
JAPANESE TECHNOLOGY



The Japanese are very advanced in the development and commercial application of electronic interactive computer-controlled systems, whether for TV or print. They have full-page electronic composition terminals, digital typesetters, powerful microprocessors and bubble memories, fully automated presses, nonimpact printers, new plate technologies, automated mailing, and much more. As we move through the '80s, we will see more Japanese devices and systems for the graphic arts appearing in Europe, the United States, and throughout the world. In many respects the Japanese, with regard to the technologies reviewed in Vision '80s, are most advanced. Their impact on the world market in these fields will be felt throughout the '80s, as it has already been in the '60s and '70s in advancing the technology of photography, radio, and television. They will be a significant force in improving performance while reducing costs, thereby competing increasingly with American and European manufacturers.

PAGE MAKER

The Itek Mark VIII composes full page!



High speed, 100 pica output
Itek's® Mark VIII is making front page news. It's the only digitized CRT typesetter in its price range with 100 pica wide output. This saves time and money by eliminating pasteup and stripping.

Output speed of the Mark VIII is 600 lines per minute and character resolution is 1300 lines per inch at 5 point, 650 lines per inch at 72 point.

Cost-cutting flexibility
The Mark VIII cuts waste of increasingly expensive composition paper and film. With Itek's columnization and reverse leading software, it can fill the whole width of its paper or film with columns of copy, even when those columns are not part of the same page.

Large typeface library
The Mark VIII provides up to 60 online typefaces stored in inexpensive floppy disks. The typefaces are part of the Itek phototype library, one of the largest typeface collections in the industry.

Integrates with your present system
Save on more than the purchase price with Itek's Mark VIII. Since it's program-compatible, it is designed to integrate smoothly with your present system.

It also replaces the costly operation of the numerous phototypesetters you may now be using.

Let us help
Discover how the Mark VIII can make front page news in your operations. And ask for details on the Mark IV and V also. Call us toll-free at 1-800-225-0892 and ask for the Advertising Department. Or complete and mail in the coupon.

The innovator in photocomposition systems

Itek

All copy in this ad was composed on Itek Photocomposition equipment.

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A Division of Itek Corporation
355 Middlesex Ave.
Wilmington, MA 01887

ULC 6/M8

☐ Send literature on Mark VIII
☐ Have an Itek Representative call.

Fill in the information below or staple your business card to this coupon.

Name _____

Position _____ Phone _____

Company _____

Address _____

City _____ State _____ Zip _____



INTERFACING

Moving information, **in usable form**, from one device to another is called **interfacing**. Major applications of interfaces in our business are those between word processors and typesetters and between OCRs or keyboards and editing/makeup terminals and typesetters.

A key phrase in the above paragraph is "usable form." Devices within a system may be made by different manufacturers and may use different storage media (paper, magnetic tape, disc, etc.) or different codes to command the same action. Why mix such seemingly incompatible devices? For the same reason a hi-fi devotee chooses a particular mix of components: to get what one believes is the best device at the best price at each station in the system. In our communications systems the devices that enable the terminals at the various stations to communicate intelligibly are known as **interfaces**.

INTERFACES AND THE CREATIVE PERSON

Interfaces, while not likely to be operated by art directors or designers, will affect creative people in the '80s. In addition to linking a variety of graphic arts devices into a communications system, interfaces will increasingly link the automated office of the '80s to automated communications systems. In so doing, they will greatly expand the variety and volume of work accomplished in communications systems and thus the nature, scope, and volume of work for the creative department. The '80s will see a new and very different job market for creative people.

Interfaces, by themselves the most remote of devices from the creative viewpoint, will forge the link between office and communications operations. By the end of the '80s, this variable link may be more like a thorough fusing or a merger. In any event, just as this will stimulate sales of all kinds of machines, so will it expand the market for all kinds of creative talent to get the most out of these machines.

TRANSLATING

Essentially, an interface is a translator. Digital codes, the language of the communications systems and terminals of the '80s, are conveyed by electrical pulses. The pulses are analogous to Morse code, in that a certain combination of "off" or "on" spots (in Morse code it would be a combination of dots or dashes) defines a character, a picture element, a format command, or whatever function it is assigned in a given system. The interface not only translates from one digital code to another, but may have to convert the electrical frequency and pulse pattern as well.

Interfaces contain translation tables, so that when told they must convert from one code to another they can do so instantly and automatically.

The interface, of course, is installed in the system somewhere between the two devices requiring it. The interface can be on-line (cable-connected); on-line interfaces translate codes and convert electrical signals. However, when information must be physically moved from one terminal to another, as by transporting a floppy disc, interfacing becomes more complicated. Discs and disc drives of different manufacturers record and play back differently. My LPs of Beethoven's Fifth may play on my Dual turntable as well as on your AR record player, but my Amtext™ 425 floppy disc may not work on your EditWriter 7500, even when the code and electrical signals have been translated. Therefore, interfaces are also designed to compensate for the different ways in which discs and other recording media work. Interfaces, in some instances, can convert any of many inputs to any of many outputs.

When all the units in a system are electrically and also code- and medium-compatible, no special interface is needed. The units in the system can be cable-connected or can operate together via transportable tapes, discs, cassettes, etc., as does the Amtext™ 425 with the Comp/Set and Comp/Edit typesetters.

Similar compatibility exists between the AlphaComp typesetter and the Xerox 800 word processing system, which can also communicate to remote sites via telecommunications. The trend in the '80s will be toward more such compatible systems, especially in using word processing text editors as input/editing stations for typesetters.

WHY THE WORD PROCESSOR/TYPESETTER CONNECTION?

Every "intelligent" typewriter, as well as every stand-alone or shared-logic word processing system, is a potential input/editing station for a typesetter, whether the typesetter is part of an in-office reproduction department or is located at a typographic service. Whether direct or via an interface, the word processor/typesetter connection:

- Eliminates rekeyboarding for typesetting.
- Reduces proofing, proofreading, and correction operations.
- Speeds job production.
- Saves up to 69 percent of typesetting costs when keyboarded copy has already been proofread and corrected and the keyboard output is code-compatible with the typesetter.
- Improves copy accuracy.
- Makes it easy and economical to typeset work that was formerly typewritten.
- Compacts multipage documents by typesetting them. Phototypeset material can save 73 percent of the space taken by double-spaced pica typewritten copy and 35 percent of the space used by single-spaced Elite typewritten copy. This copy compaction cuts down on paper costs, filing space, and distribution costs by 40 percent or more.
- Improves legibility and job attractiveness by facilitating typesetting of jobs that formerly were not typeset.

DIRECT INTERFACES

The easiest-to-use but least versatile type is the direct interface. The medium, a floppy disc, for example, is taken from the text editor and inserted in the interface unit, which translates its codes and does whatever else is required to output a new disc that can drive the typesetter. Such an interface can also be directly on-line to the typesetter.

TELECOMMUNICATION INTERFACES

Most electronic signals can be transmitted via telephone systems, and most word processors have a telecommunications port allowing them to be converted to a phone system. A **modem** (acronym for modulator-demodulator) converts the word processor output to signals that the phone system can handle. At the receiving end (which could be at a remote site), an interface stores the data in a form the typesetter will accept. The phone transmission serves as a code structure common to both sending and receiving devices. Of course, the interface and modems used must be compatible to the sending and receiving devices—the word processor and the typesetter, for example. Use of a telecommunications system makes it easier to interface devices using different recording media, such as interfacing an IBM Mag Card I Unit with a magnetic-disc- or a paper-tape-oriented typesetter.

OCR INTERFACES

In this method the word processor output uses an OCR-readable type of element, such as an OCR-A font. The final draft for output uses this font. The OCR scans it and outputs it via a medium, so that it is code- and signal-compatible with the typesetter.

THE TRANSLATION PROCESS IS NOT SIMPLE

Converting word processor input for a typesetter is not simply a matter of translating one code for an "A" to another. Some symbols in word processing systems are not used in typesetting, and many symbols and commands for typesetting specifications do not exist on a word processor keyboard. Consider open and close quotes, for instance. They are one and the same on a typewriter or in a word processor font.

Problems of ligatures, hyphenation, letterspacing, column width, typefaces (e.g., a typewritten underscore may require an italic or bold typeface), leading, and indents and the whole myriad of typographic instructions, if input at the word processor station, must be translated by the interface and communicated to the typesetter. Some interface systems use mnemonic codes keyboarded by the word processor to represent the various typographic specifications that must be sent to the typesetter; others used stored formats. By this latter technique, short operator-inserted codes (usually consisting of a precedence code, so that the system can distinguish instructions from text, and a two- or three-letter mnemonic code) trigger a longer code stored in the interface. These longer codes control the operation of the typesetter.

CODING PLUSES AND MINUSES

Whether to code and insert typographic instructions at the word processor keyboard or whether to defer such instructions for the

ILLUSTRATION BY JACQUI MORGAN



How Vision '80s was interfaced. *Vision '80s was completely keyboarded in the office on a word processor using hard-sectored floppy discs. On the WP, the text was transferred (in about 60 seconds per disc) to soft-sectored discs. These were then run on a typesetting editing terminal to produce discs that could drive a digital typesetter. About 30 percent of the typesetting bill was saved by this procedure. All typographic specifications were q-coded. The reduced section of the text shown here illustrates some of the q-codes. ITC Garamond Bold Condensed, 10/11, no hyphenation was called for by qq3; ITC Garamond Book Condensed, 10/11, no hyphenation was called for by qq1; ITC Kabel Ultra, 11/11, no hyphenation was called for by qq4. The codes were keyboarded and inserted during the final editing phase. At the right of the manuscript segment is the corresponding typesetter output.*

```
devices:
1. qq3Gas plasma displays.qql  These show what is in the
system but are not interactive.  That is, the operator
cannot manipulate the content or format and see the changes
immediately on the display.


2. qq3CRT displays.qql  These are interactive and are of two
kinds.  Raster scan displays have high resolution.  You need
a good magnifying glass to see the dots or scan lines that
create the characters.  Random-stroking CRT displays operate
more rapidly but have coarser resolution.


3. qq3Storage tubes.qql  These displays have high resolution
but are not interactive.


qq4APPLICATIONS
qqiThere are three kinds of makeup or composition terminals,
classed according to what they can do:
```

There are three kinds of displays used by pagination devices:

1. **Gas plasma displays.** These show what is in the system but are not interactive. That is, the operator cannot manipulate the content or format and see the changes immediately on the display.

2. **CRT displays.** These are interactive and are of two kinds. Raster scan displays have high resolution. You need a good magnifying glass to see the dots or scan lines that create the characters. Random-stroking CRT displays operate more rapidly but have coarser resolution.

3. **Storage tubes.** These displays have high resolution but are not interactive.

APPLICATIONS

There are three kinds of makeup or composition terminals, classed according to what they can do.

typesetter station is an unsettled question. There is no universal answer. The decision requires discerning analysis of copy complexity, operator skills, and the software capabilities of the interface unit.

Of course, the word processor keyboarder can work more rapidly if freed from continually coding and entering typographic instructions. And, while the typesetter operator may be better qualified to enter such specifications, doing so may slow down the typesetting operation substantially and thus add to its cost. Which road to take requires customized cost analysis.

STORED FORMATS

At whatever station the typographic instructions are eventually entered, we are likely to see more use of stored formats in the '80s. They will save time, reduce likelihood of errors, cut operating costs, and require less highly skilled operators.

INTERFACES

In addition to more systems having compatible units that do not require special interfaces, there will be more interfacing as systems with incompatible units also proliferate. There will be more multipurpose interfaces linking many word processors to many typesetters and accommodating a range of codes, protocols, and transmission speeds. The importance of word processor/typesetter interfaces is underlined by the fact that about 15 percent of word processing output is not typeset, and this percentage is expected to grow.

Current examples of such devices are Mergenthaler's WPI-100 and various Shaffstall units, and the G. O. Comm EW, a single-circuit card device, can be installed inside an EditWriter 7700, 7500, or 2750 to convert it into virtually a communicating typesetter capable of accepting data from an unlimited number of word and data processors. Universal interfaces such as Xitron's and Intergraphics' InterCom 100 will link any input to any output. On the other hand, such multipurpose and all-purpose devices will be too powerful and expensive for many installations where special one-to-one configurations may suffice.

The following thumbnail sketches of just some of the currently available interfaces illustrate the variety of special and multi-purpose devices now on the market:

- **Communiverter** (Graphic Products Corp.) converts information recorded on magnetic cards or tape in an IBM word processing unit to perforated paper tape for entry into standard wire communications systems such as telex or teletype devices. The company's Typoverter-Mark I converts information recorded magnetically on IBM word processing units into paper tape to drive a number of AM phototypesetters.

- **G. O. Graphic's Pi-2** takes a Xerox or Redactron cassette and translates the information so it can be output on-line to a phototypesetter or a paper-tape perforator. The G. O. Comm, a more versatile device compatible with most text editing (word processor) and phototypesetting or floppy-disc text editors, can output paper tape or go directly on-line to a typesetter. It comes in models that can produce whatever a given typesetter requires.

- **Compugraphic Corporation's** interfaces include the EditWriter WordCom V.I. (Visual Interface), which makes it possible to translate information keyboarded on most word processors and store it on an EditWriter floppy disc. It also helps users to capture an existing data base and access remote locations. Another interface, the EditWriter WordCom Media Converter (M.C.), links specified magnetic-card/floppy-disc word processors to the EditWriter family of phototypesetters. The more versatile WordCom V.I. costs under $7,000. Programs to adapt it for specific word processors are priced at $500 each. There is also a WordCom Scanning Interface (S.I.) to link the EditWriter with the output of Compugraphic's UniScan, a high-speed OCR. Typewritten copy is fed to the UniScan, which sends the keystrokes to the WordCom S.I., which in turn outputs a disc that will run on the EditWriter. Early in 1980 Compugraphic introduced its Intelligent Communications Interface (I.C.I.), which already can support interfaces (via telecommunications) from word processors of 15 manufacturers.

- **Intergraphics Inc.'s** InterCom 100 is for users, often typographic services, who must interface with a variety of keyboards, word processsors, and other inputs. This equipment can be configured so as to match any supported word processor to any supported output machines. It also uses codes to format the document as well as translate it for typesetting. With modems, it can answer the phone and take copy keyboarded at a remote site, translate, format, and send it to a computer or a typesetter.

InterCom 100 is a single piece of hardware containing all the software for all the devices it must interface. It will be field-upgraded as new input devices and typesetters reach the market. It must always be connected to an "input device," from which it receives data, and to an "output device" that can receive the translated and encoded data it has produced. The input device for InterCom 100 is almost always a modem supplied by the telephone company. The "output" device can be one of a variety of computer systems, typesetting terminals, or typesetting machines. InterCom 100 was designed to allow very flexible hardware interfacing with other devices.

InterCom 100 also has a bubble-memory buffer option to store copy being received until the typesetting system can accept it. This option, offered in '79, can be retrofitted to the existing InterCom 100's.

- **Mergenthaler** offers several interfaces, including the TCR-2, a magnetic-tape cassette reader linking Sperry Rand or Redactron cassettes to the V-I-P typesetter. Its WPI-100 adapts almost any word processor input for editing or typesetting on an MVP editing terminal, a Linoterm, or a V-I-P typesetter. The WPI-100 can take copy over the phone from any word processor with communications capability. Mergenthaler's V-I-P Easy Reader reads MVP diskettes, translates them, and inputs them to a V-I-P, thus eliminating the V-I-P paper-tape operation. Another Mergenthaler device is the MVP/V-I-P Interactive Interface. This enables the MVP editing terminal to display on its screen what is being done on the V-I-P, such as information on remaining line space, word spacing, leading, hyphenation and justification, operative commands, and instructions. Before actually setting type, the operator can evaluate this information and experiment with alternative solutions.

- **Quadritek's** Data Communications Interface (DCI) links word processing systems, computers, optical character readers, and various text-editing devices for ultimate typesetting on the Quadritek 1200 phototypesetter. The DCI option can be installed on any Quadritek Editor, which outputs a magnetic-tape cassette that can drive the typesetter.

- **Shaffstall Corporation** is one of the major independent manufacturers (i.e., does not make word processors or typesetters) of interfaces. Shaffstall makes devices for specific hookups, such as the Model V2030 linking Vydec text editors to phototypesetters and the Model 2100 CDI linking word and data processors to Comp/Set phototypesetters. They also offer the Model 2300 MDI, which can work on-line or via telecommunications ports to most communicating word processors, computers, and OCRs and also on-line to most of the popular phototypesetters. Typesetting command codes may be entered on the word processor, computer, or typewriter.

- **Telesystems Network, Inc. (TNI)** is an interface service bureau, which can connect from almost any recording medium to any other and adjust codes, protocols, etc. The TNI office has "black boxes" or interfaces to meet a wide range of needs. Input material is shipped to TNI, and turnaround time ranges from 24 hours to 3 weeks. The company also produces the TNI-202, a stand-alone device for converting IBM magnetic-card information to input for any editing device with an RS232 port, including computers, teletype machines, word processors, typesetters, and OCR devices.

- **Xitron** markets a universal interface, which is an anything-to-anything device with format storage capability.

There are many other interfaces and interface services on the market, as well as the OCR devices described in the section of Vision '80s dealing with text input. Such devices, as noted earlier in this section, are also interfaces.



Typesetting cost breakdown. *Source: National Composition Association.*



INTELLIGENT ELECTRONIC TYPEWRITERS

Intelligent typewriters are a new breed of electronic typewriters. They have microprocessors, can perform some basic text-editing functions automatically, and have storage capability and a small (presently one-line) display. They can also send and receive text on-line or to remote sites via telecommunications.

Why should art directors and designers care about a new office typewriter? Because the intelligent typewriter is smart enough to step out of the office and enter the communications process as a new, low-cost, interfaceable input device. As such, it will bring more people and more jobs into the world of typesetting and printing.

HOW IMPORTANT WILL THEY BE IN THE '80s?

Very important. It is estimated that in '70 about 120,000 units were installed worldwide and that the number of units installed will grow by a compound rate of 33 percent into the mid-'80s. Martin Simpson Research Associates, Inc. estimated that, at the rate at which new units have since been installed, by '83 (allowing for some attrition) about 2,000,000 units will be in use.
At current prices of about $1,200, intelligent typewriters cost only about $400 more than a standard Selectric. But, by eliminating redundant work, cutting labor costs, and considerably stepping up office efficiency, they have a strong appeal to efficiency-minded office managers, and in many offices it won't take long for management to appreciate how the intelligent typewriter can fit into the communications process.

WHERE THE ELECTRONIC TYPEWRITER FITS IN

Of the seven classes of word processing equipment or systems, intelligent typewriters are the least expensive to purchase and have only limited editing features and no file management capability. Although best suited for routine typing, they can—via OCR interfaces, for example—capture keystrokes for ultimate typesetting. The seven classes of word processors are:

1. Intelligent/electronic typewriters.

2. Stand-alone hard-copy systems.

3. Single-line display systems.

4. CRT display-based systems.

5. Shared-logic systems.

6. Time-sharing systems.

7. Shared-resource systems.

Any electronic typewriter or ordinary typewriter equipped with an OCR-readable font can, of course, be used to keyboard input for a typesetter; but in the '80s it is anticipated that, in the typewriter area, the intelligent units will take over an increasingly large part of the market.

KINDS OF TYPEWRITERS

Office electric typewriters today have such convenience features as quickly replaceable ribbon cartridges, interchangeable fonts, and self-correcting devices. They also boost output with automatic carriage returns and buffered keyboards. Most electric typewriters use typebars or type balls. Some feature proportional spacing, so that, for example, an "i" takes less space than a "w." But even the interchangeable font (type ball) units assign the same width value to a given character—lowercase "w," for instance—in all fonts.

Type-ball units can use an OCR-type readable font and thus can serve as input devices for a word processor or typesetter.
Some electric typewriters also have self-correcting units, which either cover up the error or actually lift the carbon image off the paper. The former method uses an opaque white ink, and the latter uses a lift-off tape. Such typewriters have a special correcting key added to their keyboard.

With the introduction of the Olivetti ET201 and ET221, we now have electronic, daisy-wheel office typewriters. Though not truly word processors, they do have small displays (2 characters on the ET201; 20 characters on the ET221) and a microprocessor and can automate and expedite many secretarial operations. Later models of these are expected to offer text-editing/word processing capabilities.

IBM's electronic typewriters include Models 50, 60, and 75, the latter having the most storage space and editing capability. These machines seem aimed at the administrative support market rather than at the true word processing operation.

Vision '80s is concerned primarily with the electronic machines that are expected to proliferate in the '80s. There are many such machines now on the market, most either of the daisy-wheel or type-ball varieties. Not all electronic typewriters available have the same capabilities and features, but here are some features and some things you can accomplish on some of them:

- Store text and formats.

- Simplify error correcting (and thus reduce retyping).

- Repeat strikes; when depressed longer or harder, the keys strike until released. Such keys often include space, backspace, carriage return, X, the period, and the underscore.

- Permit upgrading, as do such modular systems as QYX and Xerox 850.

- Perform basic text editing.

- Communicate on-line or via telecommunications to other devices at nearby or remote sites.

- Offer dual pitch, a choice of 10- or 12-character-per-inch lines.

- Offer a proportional-spacing option.

- Test-run by printing inkless, slight impressions, so that the operator can see and adjust positioning of elements (e.g., centered lines) before actually printing.

- Have a buffered keyboard; to prevent jamming due to irregular typing rhythm, this holds one character in memory until the preceding character is printed.

- Type lines up to 28 inches wide, as on the Qume Wide Track.

- Have two type fonts on one element, as on the NEC Spinwriter, which uses a type thimble instead of a ball or a daisy wheel.

- Display typed copy before it is printed. Some electronic typewriters have no display; others display one line on a gas plasma display (66 lines of 102 characters each), as does a model of the Xerox 850.

- Print bidirectionally (alternately left-to-right, right-to-left) for an increased speed of about 55 cps.

- Mix two or more fonts in one document without changing the typing element. The Qume Twin Track features a dual head (see also the comments on the NEC Spinwriter above).

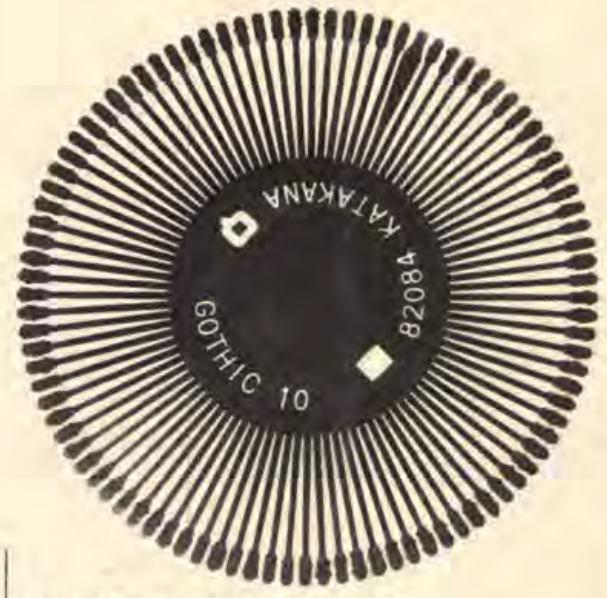
- Some, such as the QYX, can even mail a letter electronically, office-to-office, in 20 seconds—dialing right from the keyboard. A modem (optional) is built in so that the QYX can be plugged into any home or business telephone jack.

- The IBM Audio Typing Unit talks out loud, literally. It helps blind typists work independently by producing synthetic speech with an unlimited vocabulary. It can be attached to any of four IBM magnetic media typewriters.



Olivetti type balls.

The first commercial typewriter (1873). Picture courtesy of Remington Rand.





Qume daisy wheels.

Other features available on some models include automatic paper feeding, special tabular abilities, a tractor attachment for continuous forms, the ability to output on various media (such as magnetic cards, tape, or discs), half-spacing, paper injector/ejector, card holders, page-end indicators, express backspacing, automatic decimal tab alignment, automatic envelope feeds, automatic carriage return, programmable memory tabulators, phrase storage, automatic title-centering device, and reverse indexing to facilitate sub- and superscripts.

The current and projected electronic typewriters are a far cry from any of the typewriters we knew in the '60s, and even through most of the '70s. It is easy to understand how, with all these new capabilities, they will play a major role in the communications process as well as in the office of the '80s.

A WORD ABOUT DAISY WHEELS

Daisy wheels are the coming print element of at least the early '80s. Daisy wheels, like type balls, are easily interchangeable. Their big attraction is an output speed of 35-55 cps, compared with 15-17 cps for machines using type balls. The cost-effectiveness of this is obvious—and a compelling reason for the daisy wheel's popularity. Daisy-wheel characters, unlike those on type balls, can be proportionately spaced.

Daisy wheels generally have 88-96 "petals," each bearing a single character. The Olivetti daisy wheels used in the ET201 and ET221 models hold 100 characters. Some wheels, such as those made by Ricoh, offer dual fonts—a circle within a circle. Each font on such a wheel, now in the research and development stage, would have 64 characters. Each of the 64 petals would thus carry two characters (one for each font), giving a total wheel capacity of 128 characters.

Such wheels used on a dual-head machine could offer the typist four faces on-line. Furthermore, daisy wheels can be interchanged in a few seconds.

There are plastic and metal-clad daisy wheels. The major American supplier of plastic wheels is Qume. The major American supplier of metal-clad wheels is Diablo, a Xerox subsidiary. The plastic daisy wheel is for use in terminals where a combination of high speed and good print quality is sought. The resulting print quality is good, much superior to that attainable from line or matrix printers (described in the section of Vision '80s dealing with word processors). The metal-clad wheel offers excellent print quality, especially good when outputting carbon sets of up to five copies, but it runs at speeds somewhere between those of a type ball and a plastic wheel.

In the '80s we can expect daisy wheels that will combine the speed of plastic wheels with the durability of metal-clad wheels. In fact, all-steel wheels may last the life of the printer and also be able to accept type styles with finer strokes than are now possible.



One must personally study the print quality of plastic or metal-clad daisy wheels and of type balls to decide which quality level will meet the demands of a specific terminal.

EVALUATING PRINT QUALITY

In evaluating print quality, one must consider density, character definition, and character location or sequence of characters on the wheel.

Density, the blackness of the printed characters, is determined by the force with which the print hammer strikes the letter petal and also by the paper and ribbon used. Some print hammers have several adjustable levels of impact. Uniform density over many impressions is a desirable result to be sought. Plastic wheels aim for 2 to 3 million uniform impressions for 12-pitch wheels and 4 to 5 million for 10-pitch wheels. This optimum life is expected to be extended in the future. Like a chain, however, a daisy wheel is only as good as its weakest link. Some plastic wheels reinforce delicate characters to extend the wheel life. Metal-clad print wheels are much more durable than plastic wheels and can absorb more hammer impact for improved character density.

Character definition—how faithfully the character prints—is affected by wear in use as well as by design and manufacturing procedures. Strokes or serifs that are thin or delicate will lose their proper definition sooner than less subtle details or characters will.

Character location, the juxtaposition of letters, is important for several reasons. Close tolerances can give printed characters desirable vertical and horizontal relationships between them. Also, by judiciously positioning wide characters next to narrow characters, maximum average petal width is achieved with minimum space between. This permits a wider choice of letter styles.

FONT TRENDS IN THE '80s

As the market demands letter styles comparable to those used on typesetters, many typewriters and word processors will be capable of, with modification, using some of the most popular typeface designs. Proper character location on the wheel will add to the number of styles that can be successfully adapted. Also, software programs in the '80s will enable some electronic typewriters not only to offer proportional spacing within a font but to customize each font, as is done in typography, so that a "w" in one style, for example, may take less space than a "w" in another style. The '80s, then will see a wider choice of type styles available on electronic typewriters and the letterspacing coming closer to that of a typesetter. Overall, this will make for more compact copy and better-looking, more readable output. The '80s will also see electronic typewriters that offer a better size range than the traditional 10- or 12-pitch we now have.

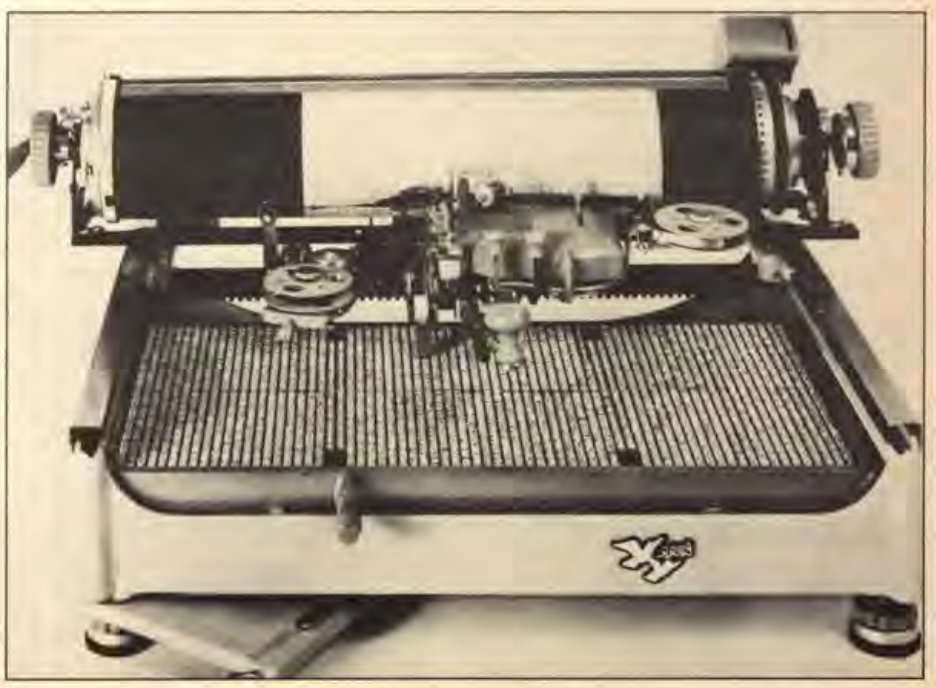
OTHER PRINTERS

Type-ball, daisy-wheel, and spindle-element typewriters give the office and/or communications center a blend of high-quality/high-speed output. For computer printouts, line printers or dot-matrix printers offer higher output speeds but sacrifice image quality. These techniques, along with typesetting, ink-jet, and electrostatic printers, will be discussed in later chapters of Vision '80s. But one must assume that, in the '80s, manufacturers and users will strive for the best of both worlds and will seek a more ideal blend of greater speed, high-quality output, and cost-effectiveness.

A NEW TYPEWRITER TECHNOLOGY

A typewriter with infinite electronic font flexibility, multicopy capability, and silent operation is being developed by Centronics Data Computer Corp. The Quietwriter can even duplicate script, and the font selection range accommodates foreign languages and special characters. Superior print quality is claimed. Characters are printed through an ordinary ribbon by an electronically controlled stylus. It can handle italics, superscripts, and variable line widths. It is scheduled for the market in mid-1981.

A Chinese Typewriter. *The "Double Pigeon" Chinese-language typewriter is now available in the United States. Instead of the 43 keys that most U.S. models have, this has one key; and, instead of 84 symbols, it has a capacity of 2,500. A gliding head picks up characters from a tray, stamps the character through a carbon ribbon onto paper, and then returns the character to its proper place. Since a Chinese character represents an entire word, a good typist can type 25 wpm on the average. In all, 5,000 characters are available (2,500 in each of two trays).*



WORD PROCESSING



Word processing (WP), as compared to conventional typing, uses machines and systems to input (record keystrokes), file/retrieve, edit, and output typewriter-quality copy on paper. It started as an office system, as part of today's and tomorrow's automated office. Its big initial appeal was to office managers trying to increase productivity and cost-effectiveness. Very quickly it became apparent that WP was much more than a sophisticated typing station or typing pool. It was also capable of drawing input from data bases and, after editing and even formatting, of outputting it to typesetters. Further, it was compatible with electronic communication systems.

Previous sections of Vision '80s have reviewed where we are now and where we are moving in the '80s with respect to inputting, electronic filing, text editing, and electronic pagination. In this chapter we are concerned with WP's place in the total communications structure, with WP output, and with the range of units and systems currently available.

PRODUCTIVITY

In 1920 a typical secretary using a manual typewriter typed 50 to 60 words per minute. In 1970, with an electric typewriter, the average secretary typed 50 to 60 words per minute. That's a productivity gain of zero. During the 50 years from '20 to '70 the average annual wage increase for secretaries was 6 percent (adjusted for inflation), and annual turnover in offices was about 30 percent. The net result of this 50-year record of level output and soaring costs was lowered productivity.

The cure, to improve productivity and office cost-effectiveness, could hardly be to add more secretaries. In some businesses it now takes $150,000 in new sales to pay for one secretary. Studies also show that the average secretary is nonproductive 38 percent of the time and is doing administrative work 37 percent of the time. Only 25 percent of the secretary's time is spent in typing.

The way to improved productivity, studies have shown, is to streamline procedures and use more efficient equipment. Word processing became a big part of the solution because it could capture keystrokes so that a document would need only one full typing and corrections could be made easily and quickly, with minimum likelihood of introducing new errors.

Just what did this mean? Consider the 60-wpm typist. When all error white-outs and page remarks are counted, the secretary using a conventional typewriter really produces only 3 to 4 wpm. Typing specialists using automated equipment produce 15 to 30 wpm, after taking into account setup time, referencing, etc. That's a gain of 500 to 1,000 percent! No wonder WP interested office managers even before its links to data bases, typesetters, and communications systems were achieved.

UNIT COSTS PLUNGING, MARKET EXPANDING

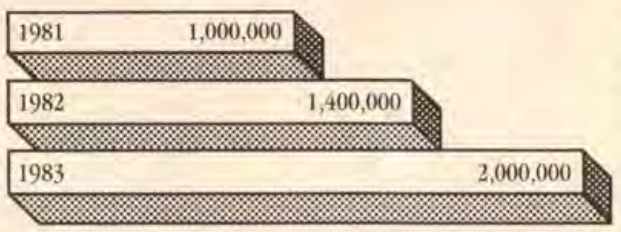
The cost of word processors has dropped because of the usual influences of mass production and competition. But the greatest influence on reducing the cost of a WP unit has been the reduced cost plus increased capacity of their computers. The full force of these lowered computer costs is still to be felt in the '80s. One research organization (Frost and Sullivan, Inc.) foresees the equivalent of a $15,000 '78 model selling for $1,600 in '84, as minicomputer costs drop from $40,000 to $2,500 and microcomputers from $1,000 to $60. This will, of course, further multiply the number of WPs for swollen office workloads as well as of those used to link with data bases and typesetters. In the United States alone, of about 3.5 million offices, about 1.5 million are now large enough to use automated text editors effectively. Not only is this market unsaturated, but as WP costs continue to drop, more of the remaining 2 million offices will find WPs a good investment.

WHAT KIND OF WP IS IN YOUR FUTURE?

Printer-oriented word processors, such as those marketed by IBM, dominated the market in the mid-'70s; but even then one could see the eventual emergence of the CRT text editors. Although CRT display units held a small share of the market, they showed an annual growth rate of 190 percent and throughout the '70s took an increasing share of an expanding market. This trend should continue in the '80s, especially among companies using WP as typesetter input.

WHAT WP GROWTH MEANS

Estimates derived from different sources of the number of WP installations existing by the early '80s generally paint this picture:



The implications of this fantastic growth rate reach beyond its obvious impact on operations. With their ability to take input from data banks and translate, edit, compose, and output it to typesetters or multiple-copy printers, word processors in the '80s will be the catalyst that will speed the development of completely integrated data, office, reproduction, and communications systems.

SOME WP DIRECTIONS

Word processing for capturing keystrokes is an accepted fact. The current phase in the ever-evolving WP scene is marked by a changeover from viewing WPs as typing stations to using them, with their CRT displays, as text-editing stations. This phase takes different forms in different companies, including:

1. WP stand-alone units.

2. Stand-alone units that can operate alone or share peripheral devices.

3. Fully centralized WP centers.

4. Departmental (decentralized) centers — also called distributed word processing, or DWP.

5. Departmental units or centers that can communicate with others and with a central independent production center that also accommodates their overloads, as well as the work of departments too small to have their own equipment. Executives who want faster access to information can have their own terminal in such a system.

Some companies, of course, go through one or more of these phases, starting with one stand-alone unit and gradually building up a network of stations.

As we move into the '80s, we recognize three major directions in WP equipment and systems:

1. More WPs are adding power and versatility for volume storage and heavy text editing by adding full-page CRT displays, microcomputers or microprocessors, and software programs to facilitate hyphenating and justification, multicolumnn makeup, handling of tabular matter, and other special composition problems.

2. The trend to interfacing with each other, with other input and output devices, and with communications systems (including outside services) will intensify; this expanded capability will both speed production and reroute large projects from overloaded stations to those able to handle the work.

3. Increased use of shared-logic equipment to reduce the number of input devices while increasing output. One text-editing station, for example, might link six or seven input stations to several printers. This is more cost-effective than having six or seven stand-alone WPs, each capable of inputting, storing, editing, and printing. This concept encompasses the recent development of shared/clustered systems in which stand-alone terminals (each having a processor, software, and local storage) can be connected to a large rigid-disc CPU/data base. This system architecture offers the best of both worlds — distributed as well as centralized power and intelligence.

TWO-WAY COST-EFFECTIVENESS

With WPs, fewer secretaries are needed to support principals and the output per secretary is increased. Also contributing to the cost-effectiveness of WPs is specialization of function in some

ILLUSTRATION BY ANDRZEJ DUDZINSKI

offices, whereby some secretaries work full-time on text editors and others specialize in filing, copying, and administrative duties.

JOBS, CAREER PATHS, SALARIES

As secretaries develop into skilled text editors, their pay scale rises. The number of such jobs available is increasing, and as a result career opportunities for women are improving. More and more are moving beyond being WP operators to become managers of integrated WP centers. More and more are following this recent path toward becoming middle- and top-level executives.

But there are negative aspects to this technical and career progress. As the most competent people are graded up from the secretary level, the quality and quantity of available secretarial help continues decreasing. Consultants in this area expect this problem to intensify in the '80s.

OTHER TRENDS PROJECTED FOR THE '80s



More use will be made of magnetic or photographic media for filing, and correspondingly less use of paper. This will not at first mean that less paper will be used, because the overall information market will be expanding; but it does mean that paper's share of that total market will decrease.

*As displays replace hard copy for proofing, communicating, editing, and composing, the paper share of the market will decrease further.

*Card storage will give way to tape and disc media.

*More WP moonlighting by at-home operators equipped with communicating terminals will be common.

*WP units and systems will saturate large offices early in the '80s and will be installed increasingly in medium and small companies.

*More vendors will offer terminals that can handle both DP and WP functions. These may become known as **multifunctional** terminals, since they are more than just word processors.

*More software programs will be available to increase the applications of these multifunctional terminals for increasing the capabilities of the hardware. To make the most of such programs, the system or terminals should have adequate storage. As 8-inch rigid discs and increased floppy-disc density become more common, more dual-disc drive terminals will be able to handle more software (on disc) programs. Software programs also are operator modifiable. Such programs include math setting, sort (lists), security, records management, EM control, and forms generation, as well as the gamut of DP programs such as inventory control, payroll, ledger maintenance, and computational capabilities for processing numeric data.

*User programming, whereby more experienced users can with a computer create customized programs, will be more in evidence.

*Dial-a-program: by the mid-'80s an operator may not need to change program discs but need only dial the desired program in order to call it up from a CPU or remote source.

*More communicating text editors will be in general use.

*Text editors will be able to communicate with others in the same office and of the same manufacturer. The Wang Inter-System Exchange (WISE) is an example of this. It channels messages through coaxial cables from work stations of one system to the components of another Wang system. The result is an intrasite electronic mail system. Another Wang communications linkup, Mailway, also combines various Wang systems into an electronic mail network. Mailway is a software package. With it, Wang claims, internal delivery of paper mail with bags, envelopes, stamps, mailrooms, and messengers can be eliminated. In the '80s such systems will be in wider use, hopefully available to smaller organizations, and will interconnect systems and terminals of different manufacturers.

*Raster scan graphic technologies and color terminals for handling color graphics as well as text will be more widely employed.

*More capabilities for foreign/multiple language work. The System BII—Arabrite is the world's first Arabic/English word processor. It has a dual-language keyboard and memory with both Arabic and English fonts (Thompson Ferguson & Associates). A new electronic typewriter reproduces words in Korean. It features a matrix printer and a keyboard for a Korean phonetic word. The Korean words are in its memory. The Korean phonetic system is much more compact than Korea's 1,800 Chinese written characters.

WHO'S IN CHARGE HERE?

All this raises an interesting question. As data processing, word processing, typesetting, administrative support, and repro center operations interface and fuse, will they all fall under one manager? Probably. And it is unlikely that this person will have a graphics background. Just how art directors and graphic designers will perform in this new environment, with a new administrative structure, will be revealed as the '80s unwind. It is likely the manager of the integrated operation will come from either word processing or data processing ranks and will carry a title such as Manager of Information Systems or Manager of Information Resources.

PAPERLESS WP

The 3M Series 4000 Word Processor linked to a 715-COM (Computer Output Microfiche) unit is an example of paperless word processing. The text keyed into the WP unit is recorded directly on microfilm, bypassing paper. An immediate application for this is in micropublishing and microfilming systems.

THE DP CONNECTION

The technology exists to link or even merge word processing and data processing systems. The need or desirability for doing so is not always present, and as of today most administrative and data processing managers are not rushing into such a systems merge. In the '80s, however, such linkages are expected to gather momentum and be paralleled by links to the production system (typesetting, platemaking, printing), right through to electronic distribution systems. A management information systems (MIS) director will combine the functions of today's DP, administrative, and reproduction center managers. From which ranks will the MIS director be drawn?

With the introduction of a new line of office systems, a major step in merging DP/WP functions into one system was taken in mid-1979 by Wang. A number of other companies, including AM Jacquard Systems, Shasta, and 3M, already offer such multifunctional terminals.

Today both DP and WP systems are "software-based," meaning that instructions are recorded on magnetic media (discs, tapes, cards, etc.). This makes it easier to change instructions and to add capabilities than if hardware had to be rewired, or even rebuilt or replaced, to handle new functions. With both systems now software-based and using similar keyboards, terminals, microprocessors, printers, and information storage systems, linkage of these systems in an organization mostly awaits management's decision that such a merger would improve cost- and/or communications-effectiveness.

The DP/WP connection can accomplish such operations as:

*__Sort.__ For example, it can rearrange data variously, as in numerical order or alphabetically by cities or last names, etc. It can sort an address list by zip code and, within zip codes, by names.

*__Merge.__ It can combine two or more sets of records.

*__Collate.__ Similar to merging of data, this function merges data in a specified order.

*__Select.__ Specific records or groups of data can be called up from the electronic file.

*__Update.__ It can add, delete, or change data or text in the file.

*__Calculate.__ It can perform such mathematical operations as addition, subtraction, multiplication, division, and even exponential functions.

*__Store.__ It has the capability to hold data or text on magnetic media for future editing or processing.

*__Report.__ It can furnish information called up from the file on the CRT display or print out a paper record or even give an audio report, as well as transmit to a communications system.

An exciting picture of what a DP/WP system can mean to an executive is given in an advertisement by ACS America, Inc. for its PRIMACS system:

"The executive using the CRT in his office is reading his 'In-tray.' He will probably underline and annotate the document on the screen and electronically file it. Then, he may send a memo on this subject over the PRIMACS system to his personal diary or to one or more selected addressees with complete confidentiality. The memo might arrive at the recipient's desk by CRT, a letter, a Telex, or a TWX. It's his choice.

WORD PROCESSING



"Its destination might be the office next door, down the hall, across town, or around the world. No problem. It will arrive electronically, usually in a matter of seconds. If he wishes, the text will have been computer proofread, with multilingual processing where necessary. He can order it stored in an almost unlimited number of confidential files, available for instant retrieval. Next, he may arrange for a conference with other users of the PRIMACS system, which has a constantly maintained schedule grid. At his choice, a 'next available meeting' will be generated by the system. . . .

"**Security and confidentiality.** Extensive security and password control features are contained in the PRIMACS system. Only the originator determines who can access a document in the system. Only the originator determines who can see or print or change or reroute a document. Thus each originator can have a confidential diary, link his CRT with a secretary on an 'eyes only' basis, and limit the availability of data in his file."

MULTIFUNCTION/SHARED-LOGIC SYSTEMS

We are beginning to see more combination DP/WP systems being offered by vendors. Digital Equipment Corporation has altered the operating system of its widely used PDP-22 minicomputer so that it can handle several different programs simultaneously. Some stations linked to the central computer might be performing data entry while others might be doing WP jobs and still others might be sending or receiving electronic mail from terminals at remote sites. Systems that permit such multiple use are a form of shared-logic system, in which many terminals share the power and capabilities of a central processor while simultaneously performing different kinds of tasks.

The AMtext™ 100, another shared-logic WP/DP system, allows each of up to 15 terminals connected to the CPU (central processing unit) to use its text-editing, small-business, or other DP software programs. For output devices, the terminals can use either line or character printers. Each terminal in the system can work with a different software program; there are programs for general ledger work, payrolls, compiling reports from stored data, sales files, updating mailing lists, to name a few, plus programs that can be customized for different users.

Of course, such multiple-function systems do more than eliminate duplicate installations by having many terminals share one computer. They can centralize storage so that all stations have access to all stored information. They also offer a larger electronic storage file to all users than would be feasible with stand-alone units and make it possible to view on the terminal CRT displays anything in file and to update and edit it for restorage or output. The large storage capacity of such systems also makes it possible to file many documents awaiting editing or output.

Another dual WP/DP processor is the Shasta Daisy, which has a versatile text-editing terminal and can handle these tasks:

Data Processing
Medical/dental practice management
Accountant client reporting systems
Financial reporting systems
Legal practice management systems
Distribution/manufacturing systems
Government agency systems
Payroll, labor distribution, or accounts payable systems

Word Processing
Correspondence
Proposals
Document assembling
Form-letter preparation
List maintenance
Direct-mail campaigns
Legal documents

The IBM 3730 text-editing system also combines WP and DP functions in one shared-logic system, permitting the WP operator to use and retrieve data stored in the 370 computer. Another WP/DP combination system is the Algorithmics Inc. Algo-2100.

The various systems cited above illustrate the directions in which we are moving. Other manufacturers offer similar systems. Software programs to link DP/WP functions are offered by a number of companies, including IBM, Wang, Penta, CompuScan, Pagetec, Datalogic, Computype, Alphanumeric Publication Systems, Coopers & Lybrand, Information International, and B. I. Kahn & Associates in the United States and Turon Sanomat in Finland.

In addition to the word processing manufacturers and software specialists, data processing manufacturers are offering equipment that can handle both DP and WP functions. In the '80s, when managers decide the time has come to combine systems, they will have many options to consider.

THE TYPESETTING CONNECTION

Some experts feel that in the early '80s most of the type set by in-house reproduction departments will be input and possibly edited on word processing systems. As reported in the section of Vision '80s discussing interfaces, there are many ways to link the two systems, and the trend — certain to accelerate in the '80s — is toward disc-compatible systems or software-related WP/typesetter systems eliminating the need for special interface devices. The WP operator can simply enter the text rapidly and leave it to other stations to edit, compose, and insert typographic specifications. Or, all these functions may be performed at the WP text-editing station, with the typesetter used as a slave device simply to produce output. (This area was more fully described in the section of Vision '80s dealing with interfaces.)

Word processing/typesetting systems can also be tied together in a shared-logic system with various input, editing, makeup, communications, and typesetting devices sharing and linked together by one CPU.

An example of a shared-logic system, which could be installed in one location or at several, is the Astrocomp-D/1 offered by ICS Inc., enabling typing stations and printers to use the CPU simultaneously. This system also offers:

*Full composition software for a variety of typesetters.

*Stored formats and commands.

*Accurate dictionary hyphenation.

*Disc storage for high-speed access to stored text.

*Self-documenting file directory.

*Controllable document security.

*Four versatile input stations from which to choose — VDT, ETS, Selectric, or Gas Plasma.

*On-line OCR.

*Typesetter may be on-line or may use paper or magnetic tape.

*Powerful editing features.

*Choice of printers.

*Field expandability to fill future needs.

The Astrocomp-D/1 has these photocomposition features as well:

*User-defined stored formats for both text and command strings (store up to 6,000 characters).

*Unlimited number of tab columns.

*Simplified tab keyboarding through stored formats.

*Hyphenation program uses hyphenation dictionary plus basic logic rules. User can easily change standard dictionary entries, with expandable capacity of up to 20,000 word fragments. Each fragment may define hyphenation breaks for a large family of words.

*Foreign-language hyphenation optional.

*Automatic word/letterspacing and kerning fully controlled by operator.

*Can be instructed to produce hyphenless output if required.

*Computations may be done with command codes.

*May use word processing commands to create required final typeset formats.

*Throughput speed of approximately 120 characters per second.

Other shared-logic systems include those offered by Daconics (Xerox), Wang, and Wordstream (Management Assistance). For detailed information and a comparison of some of these systems, see *Future Strategies in Word Processing*, issued by Martin Simpson Research Associates, Inc.

SHARED-RESOURCE SYSTEMS

These systems combine the best features of stand-alone and shared-logic systems in that each terminal and station has its own intelligence and storage and each can also draw on a central processor and storage. Shared-resource systems also permit each station to share the use of such peripherals as OCR input, printers, typesetters, and electronic composition terminals.

Media 12/7 Printer output. *The Media 12/7 offers high-speed utility-quality output (left) or correspondence quality. Utility quality is produced in one pass at up to 198 cps. Correspondence quality takes four passes of the print head, prints up to 50 cps.*

TREMENDOUS AND FAR-REACHING CHANGES ARE TAKING PLACE RIGHT NOW, AND WILL ACCELERATE AND INTENSIFY IN THE IMMEDIATE FUTURE, WITH RESPECT TO THE TOOLS USED BY ART DIRECTORS, DESIGNERS AND WRITERS AND WHAT EFFECTS THEY CAN ACHIEVE WHILE AT THE SAME TIME SAVING TIME AND MONEY.

THESE CHANGES MAKE FULL USE OF CREATIVE TALENT, OFFER A GREATER RANGE OF CHOICES WITH VISUAL AIDS AND MAKE POSSIBLE QUICKER DECISIONS. THEY ALSO OFTEN REQUIRE FINAL GRAPHIC DECISIONS MUCH EARLIER IN THE PRODUCTION PROCESS THAN HERE-TOFORE.

THEY WILL AFFECT JOB OPPOR-TUNITIES BY CREATING NEW AND EXPANDED JOBS IN THE MARKET FOR CONSULTANT DESIGNERS, UPGRADE SALARIES AND ALTER LINES OF AUTHORITY AND CAREER PATHS.

Tremendous and far-reaching changes are taking place right now, and will accelerate and intensify in the immediate future, with respect to the tools used by art directors, designers and writers and what effects they can achieve while at the same time saving time and money.

These changes make full use of creative talent, offer a greater range of choices with visual aids and make possible quicker decisions. They also often require final graphic decisions much earlier in the production process than here-tofore.

They will affect job oppor-tunities by creating new and expanded jobs in the market for consultant designers, upgrade salaries and alter lines of authority and career paths.

Examples include the AMtext™ 100, Lanier, and CPT systems. A number of such systems are now on the market.

TIME SHARING



Sometimes such interface linkups are with computers that are located at a distance. Powerful computers owned by computer service bureaus offer some users more storage and processing capacity than the user could afford with only an in-house computer. Access to such remote computers is made possible by modems and telephone lines. Such "time sharing" offers some users greater capacity or capability than they could otherwise afford.

An example of such a computer service is Word/One, offered by Bowne Time Sharing, Inc. Word/One is used not only by companies not large enough (or not wanting) to install their own computers but also by very large companies that wish to contract out specific documents or kinds of work as well as any traffic overload. A facility such as a Word/One not only has great storage and processing capabilities but has interfaces and communication facilities that enable it to service a great range of equipment and locations.

Such services can give a boost not only to WP operations but also to WP/typesetting and WP/DP systems. In a sales letter explaining how their service can cut typesetting bills by 30 to 50 percent, National Share Graphics, Inc. states:

"You key your input on a word processing (data communication) terminal. Use your own or get one from us. It is difficult to realize such a terminal costs less than half the price of a new car. Complete training and implementation follow-thru is provided. For those who want to stay traditional, we will provide you with raw materials at supermarket prices.

"For those who want to participate, once you have your terminal, dial one of our local numbers and transmit your information. Our computer is very smart and precise. It checks the human sensible mnemonic typesetting codes and tells you if there is an error. Correct the error on your terminal and instruct the computer to proceed to the composition phase.

"Normally you have chosen to pre-style your work so single instructions are expanded to strings of codes. Lo and behold, out of NSG's photocomposer, your photocomposer, or your present supplier's equipment, if arrangements have been made with him, the product is produced.

"Revised galleys or made-up pages with the desired changes made evolve through the same process."

Itek's CPS-320, an example of a typesetting production/business system, is a combination text editor for handling editorial, classified ad, and display ad packages in a typesetting system. It automatically transfers relevant input data to the business system for such procedures as billing, updating accounts receivable, and maintaining statistical reports.

The trend toward linking of WP and typesetting operations in in-plant repro shops is expected to grow in the '80s. It will gain impetus not only because it is technologically possible and cost-effective but also because of the eventual economies inherent in typesetting's ability to reduce the space required by typewritten copy by about 40 percent while improving readability and appearance.

So as a result of the technical switch taking place, instead of a typesetting machine or system keyboarding the input, much input will be produced on word processors. But, instead of the word processor turning out finished documents, it often will give over its output function to a typesetter.

Of course, the same word processor that keys and edits copy for typesetting can run off letters automatically, address envelopes rapidly (with optional feeders), and be a truly multipurpose device. The video-based word processor of the '80s will be a most versatile unit in the office/reproduction-center/data-base complex.

PRINTERS

The actual printing of the characters is increasingly being done as a separate step (and often on a different machine) from the operations of the keyboarding unit. The output units are known as *printers*. Type balls, daisy wheels, and thimbles, all reviewed elsewhere in Vision '80s, are the type elements of the strike-on or impact printers used on WPs.

SPEED

Type balls on IBM Selectrics have a playout speed of about 15+ cps or 150 wpm — much better than previous manual systems. The daisy-wheel printer of the late '70s had an output speed of up to 55 cps. Daisy-wheel printers can be output-only devices and can operate semiautomatically and independently of the keyboard, thus permitting simultaneous input/editing operations and printing.

HIGH-SPEED PRINTERS

High-speed printers, such as the line printers used in the computer and data processing markets, do not produce the quality of output required for office correspondence or communications centers.

The line printer's high speed (300 lpm is slow; 3,200 lpm is fast) is obtained at a sacrifice of the niceties of letterform and of quality and uniformity of impression. Most dot-matrix printers have poorer print quality than do printers with fonts on metal drums or bands, although some new fine-resolution devices strive for the best of both worlds. The rapidly moving line printer bands, for example, don't really stop as characters are printed. To compensate for what could produce a horizontal slurring or thickening of vertical strokes, characters on such printers often have vertical strokes narrower than their horizontal strokes. But the appeal of cutting costs by speeding up the printers remains strong, and there are several approaches toward achieving faster output with little or no sacrifice in quality. We will see progress in this area in the '80s. Moreover, there are already accessible three major kinds of high-speed printers outputting a quality image:

1. Fine-resolution dot-matrix impact printers.
2. Electrostatic printers.
3. Ink-jet printers.

DOT-MATRIX IMPACT PRINTERS

Unlike character printers such as type-ball or daisy-wheel printers, dot-matrix printers do not print the full character at one strike. A character is built up from a series of dots. Some dot-matrix printers are very fast but employ a dot pattern too coarse for office and reproduction center requirements: these are better suited to the speed and quality requirements of data processing.

WORD PROCESSING



This is changing, however, and the Media 12/7 printer developed by Sanders Technology Systems, Inc. runs at two speeds (from 35 to 216 cps) and at 35 cps claims output quality comparable to that of a daisy-wheel, standard electric, or IBM ink-jet printer. It prints from digitally stored characters and, as such, offers an alternative printer for word processors and typesetters.

The Media 12/7, in its output versatility, is also somewhere between a strike-on printer and a typesetter. For example, it can:

*Output alphanumeric graphic images on plain paper.

*Do page makeup and position all elements correctly so that a complete document is output.

*Tie into telecommunications systems.

*Generate characters from 6- to 72-point.

*Set in foreign languages, including such ideographic languages as Chinese and Japanese.

*Print in any of 20 type styles and reproduce signatures, logos, and line art, which it can store digitally and which can be modified by software programs.

The Media 12/7 uses what is called the "Infinite Matrix Principle." The print head, which has seven pins aligned vertically, passes horizontally across the sheet, and striking only in image areas, pins drop and make contact at the command of the digital instructions fed to it. The utility-quality typeface is produced in one pass at about 200 cps. The printer is bidirectional. Correspondence-quality output is produced with four passes of the print head per line, with slight vertical motion of the paper between passes. In the four-pass operation, 12-mil dots are positioned to a 1-mil accuracy horizontally and 3.5 mils centers vertically. (The Media 12/7 is in the under-$5,000 price range.)

Matrix printers of other manufacturers may also be introduced in the '80s with correspondence-quality models. For example, on its Model 2300 matrix printer, Diablo Systems, Inc. now permits the user to mix up to nine fonts while printing a single document. This facilitates the mixing of special-symbol fonts with standard fonts. The Model 2300 also offers foreign-language fonts and a high-resolution printing capability achieved by slowing the print speed from 200 cps to 100 cps.

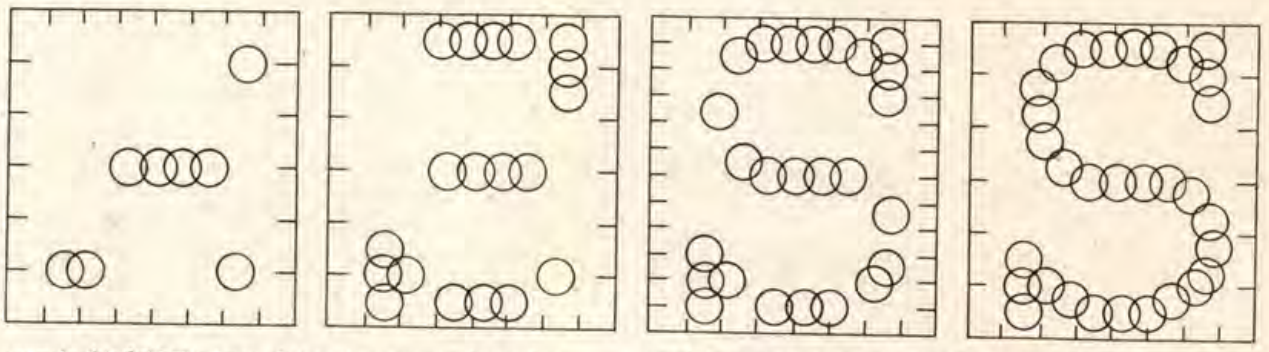
ELECTROSTATIC PRINTERS

Electrostatic printers, like ink-jet systems, are nonimpact printers. Nonimpact printers will grow in importance in the '80s, not only as printers for word processors but also for multiple-copy reproduction and as components in complete typesetting, makeup, and printing systems. High-speed electrostatic printers are described more fully in a subsequent section of Vision '80s that is concerned with reproduction processes (see Reproduction/ Multiple Copies).

HIGH SPEED AND HIGH QUALITY

The '80s will, of course, see a striving for the best of both worlds and Wang's Image Printer—a $32,000 device—was the first

Letter buildup. *How the four passes of a Media 12/7 print head build up a correspondence-quality letter.*



entry in this field. The Image Printer is an output device for Wang's Office Information Systems (OIS/125, 130, 140, and 145). These large office systems, which include up to 32 devices, can store 68,000 pages of documents (even more on the OIS/145) and support such peripheral devices as typesetters, telecommunications interfaces, or OCRs as well as data processing applications.

The Image Printer's principal features are:

*Very high speed—18 pages per minute, or the equivalent of 1,500 cps.

*Print quality comparable to that of a fine typewritten document and far superior to that of a higher-speed printer used in offices.

*Varied font selection: any two type styles and sizes can be mixed on one job; a third font is stored on-line for immediate use, and additional fonts are software-loadable in place of the third font.

*Four operator-selectable font sizes: 11-, 12-, and 15-pitch fonts and PS (proportional spacing).

*Characters stored digitally can be output vertically or horizontally.

*Choice of paper sizes.

*Documents automatically collated as they are printed.

*Because of its high speed, can be shared by up to 24 WP operators; can also queue jobs so that WP operators can do other work until the Image Printer delivers their job.

*High-resolution fonts: character images are formed at a resolution of 90,000 dots per square inch.

HOW THE IMAGE PRINTER WORKS

A document is originated on an OIS/130 or 140, a Wang computer system. The operator uses standard word or data processing computer techniques to keyboard and/or edit the document. The completed document is then stored on the system's storage disc until a print request is made—a simple function requiring few keystrokes. The operator exercises control by calling up a print menu at the work station and keying in necessary instructions.

When a print request is initiated, the document is transferred from the system's disc through a data channel to the microprocessor control unit of the Image Printer. This system component assigns the print commands and selects the font and type sizes specified by the operator. A character generator then converts the digitized document into precise visual images that are displayed, a line at a time, on a cathode ray tube (CRT) inside the printer. The light is then transferred through a series of optical rods to twin photoreceptors. A dry toner, precisely like that used in many copier and other reproduction systems, is then electronically bonded to the paper's surface to form each character. A series of brushes then sweeps the unused toner from the photoreceptor, and a finished page is turned out. Essentially, the Image Printer is a plain paper copier that both generates and reproduces images. A page formatted on a Wang word processor is output by the WP as digital information and transmitted as such to the on-line Image Printer, where it is produced as described above.

IBM 6670 INFORMATION DISTRIBUTOR

This laser printer is for use with IBM's magnetic card-oriented Office System 6. The Model 6670, which prints with a laser beam, can receive and send documents electronically over regular telephone lines and thus link WP/DP functions and remote sites, as well as interface with other systems. The IBM 6670 can:

*Condense large computer printouts to letter size.

*Transform data into good print quality without rekeyboarding.

*Print on both sides of paper.

*Change type styles on a page (except when Data I Rotated font is used).

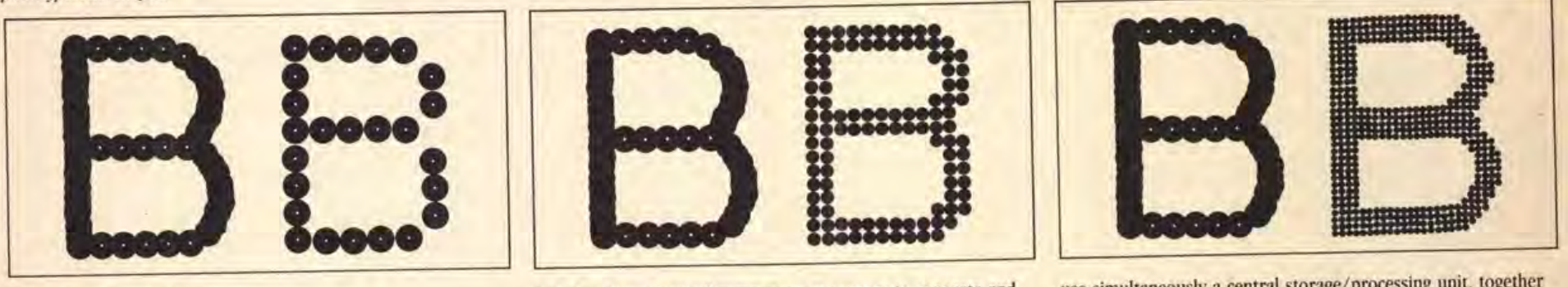
*Use customized printing formats.

*Merge text and data.

*Serve as a convenience copier.



Media 12/7 output (enlarged and at left in each sample) compared to conventional dot matrix, ink-jet technique, and a laser phototypesetter output.



INK-JET PRINTING

Ink-jet printing is used as a commercial printing process for special kinds of jobs and also on WP printers. The IBM 6640 ink-jet printer is one output device for the Office System 6. Characters are created by magnetically deflecting small droplets of ink and squirting them onto the paper. The IBM 6640 produces high-quality output at 92 cps.

The OS/6 is a modular word processing system. Besides the 6640 document printer, it includes a word processing video terminal with floppy-disc drive, a keyboard, and a magnetic card reader. Also, in place of the IBM 6640, there is a Qume daisy-wheel printer for those who want it.

The IBM 6640 cannot make duplicate copies or print continuous forms. At $25,000, it is rather expensive for some operations. Its combination of high speed with high-quality output is its greatest asset. It has an automatic envelope and sheet feeder and stacks sheets or envelopes after printing.

The ink-jet is a nonimpact printer with a technology based on electrostatic deflection of ink droplets. An ink-jet carrier assembly includes all mechanical components necessary to generate and control the ink droplets and a transport system for moving the carrier along the print line. Nominal carrier velocity during printing is 7.7 inches per second. This results in a print speed burst rate of:

77 cps	10-pitch
92.4 cps	12-pitch/PSM*

*Approximately, 92.4 cps for proportionally spaced fonts.

The IBM 6640 comes with three fonts, one of which is Prestige Elite. The other two are customer-selectable. Two additional fonts that can be accommodated on-line are available at extra cost. Three different letter styles are offered in 10- and 12-pitch and in PS, and there is a special font of symbols. One model of 6640 offers two speeds (to optimize print quality or productivity) and has seven resident electronic fonts.



KINDS OF WORD PROCESSING SYSTEMS

In addition to electronic typewriters discussed previously, there are six kinds of WP systems:

1. **Stand-alone hard-copy systems**
There were probably more of these than any other kind of WP installed at the turn of the decade. These systems are "blind" (have no display) and are mostly used for repetitive typing, assembling documents, and light revisions. They use magnetic cards or tape for storage and a Selectric typewriter or a daisy-wheel printer for output. These stand-alones are moderate in cost but are expected to be supplanted in many installations by CRT-based systems in the '80s.

2. **Single-line display systems**
If you have heard the phrase "window into memory," it applies to these single-line systems, which are between the stand-alones and CRT display units in price and capability. They facilitate light revisions and offer some file management capability, but formatting is difficult on them, and they are not as easy to use as CRT display systems. Such units will likely replace many of the blind stand-alones in the '80s.

3. **CRT display-based systems**
These CRT systems are the units of the '80s, especially if their prices keep coming down (due to mass production, competition, and reduced costs of memories and processors). They are easier to operate. The full-page display units especially facilitate text editing. Most units offer full-page or half-page displays, although IBM still offers only a six-line display. The Vydec 4000 series was the first to offer a 19-inch two-full-page display. Greater storage capacity, usually on floppy diskettes (60 to 120 pages per diskette), and fast random access are other features of such systems. Storage costs are low.

The printer in these systems is separated from the work station, and each station can operate simultaneously on different documents. High-speed daisy-wheel printers are most common. These systems have extensive text-editing capabilities (see section of Vision '80s on text editing: VDT Editing) as well as great file management capability.

4. **Shared-logic systems**
As described above, these systems permit many work stations to use simultaneously a central storage/processing unit, together with various processing, input, and output devices. Although such systems presently have a high price tag, their cost per work station is competitive for many offices, and such systems are expected to be more widely used in the '80s. Shared-logic systems are custom-designed and expandable.

There are two basic variations of shared-logic systems:

a. A number of "dumb" terminals share the logic of a central processor. This is most economical but vulnerable in that when the CPU isn't working the whole system is down.

b. Distributed intelligence systems have intelligent terminals at each work station, yet each station shares the central intelligence. With the lowered costs of processors and storage, such systems are economically feasible. These systems also work well in a combined DP/WP operation.

5. **Shared-resource systems**
Discussed above, these systems combine the best features of stand-alone and shared-logic systems.

6. **Time-sharing services**
With this system the user purchases or rents the necessary terminals or communicating word processors. This not only is a low-cost route for the user but makes available large main-frame computers that only big installations could afford independently, such as the IBM 370 or Digital Equipment Corporation's (DEC) PDP 11/70. At minimum cost, thus, sophisticated software and editing abilities, massive storage facilities, and tie-ins to electronic mail, label generation, typesetters, and other devices and systems are available. The user is also spared the ownership pangs of equipment obsolescence.

THE SCENE IN EUROPE

The move toward centralized typing and specialization of administrative and correspondence work is not so strong in Europe as in the United States. In the '80s, however, this may change as all WP devices and systems, from electronic typewriters through CRT-based display word processors and shared-logic systems, become less expensive and more versatile. As in the United States, there will be full systems linking DP/WP/typesetting, including page composition terminals. Output printers may shift from strike-on or impact printers to electrostatic, ink-jet, photo, or digital typesetters. Such full systems will require a large central memory and communications linkages not only within the input/editing/makeup/output phases but also to electronic mail and telecommunications networks.

AUTOMATED WP MANAGEMENT

The '80s will also see a growth in the use of microprocessors and software to simplify and control the management of WP centers. Among the first entries in this field are two Dictaphone systems, Master Mind and Time Master.

Master Mind monitors everything from on-line dictation and off-line input through output. The system can store and automatically enter the author's I.D. number and name and a department code. It records the type of work and the current



status of work in progress. It automatically enters the recorder and cassette numbers and notes the length of the job in minutes, the time logged in, the transcriber's code I.D., and the time logged out (end of transcription). Using this mass of information, the system manager can ask for lists of all authors or for job summaries by date, author, or type of work, for example. Status reports for up to 6,000 jobs can be read out on a screen or a printed report.

Time Master is a smaller, less expensive management system.

In the '80s, then, we will increasingly be using electronics, digital computers, and electromagnetic media not only to process and move information but to monitor what we do and how we do it.

WP SYSTEMS AND DEVICES COMPARED

To review the various machines and models on the market, one can check the trade magazines and newsletters, especially the *Seybold Report on Word Processing*, which describes them in detail. An upcoming issue will offer a chart comparing the available systems and machines, characteristic by characteristic.

TYPING TECHNICAL TEXT

For a report on different devices and approaches to the typing of mathematical and scientific text, see *Seybold Report on Word Processing*, December 1979, Vol.2, No.11. It reviews A.B. Dick's Magna SL, IBM's OS/6, the Lexitron 1202, NBI's 3000, and two Vydec and two Wang models with respect to their capabilities for typing technical text. It also reviews such alternatives as Professor Donald Knuth's TEX and Bell Laboratories EQN systems.

NONIMPACT PRINTING

One of the major breakthroughs in the '80s will be in nonimpact, or plateless, printing. It is expected in this area that quality levels will improve and costs will come down through the '80s, so that perhaps by the end of the decade electrophotographic, electrostatic, and ink-jet methods will be significant multiple-copy techniques in the commercial as well as the in-office printing market. As early as '81, *Strategic Business Services* estimates, laser and nonimpact printing equipment sales are expected to grow by 50 percent. For the next few years, however, nonimpact printers will be office-oriented.

Market analysts foresee a $1 billion market for nonimpact printers for use with text-editing equipment and other electronic office machines. The two major kinds of nonimpact equipment are ink-jet printers (such as the IBM 6640) and electrophotographic devices such as the IBM 3800, the Xerox 9700, and the Siemens ND-2, which print at speeds of up to 20,000 lines per minute, as well as a device being developed by a major Japanese vendor. The Japanese-made electrophotographic printer is reported to be an "intelligent printer" that merges xerographic and fiber optic technologies, prints 1,000 lines per minute on plain paper, and will sell to OEM vendors for about $7,000.

WHERE WILL THEY BE USED?

Nonimpact printers will be used for computer printouts and by word processors, including shared-logic systems. The high end of the market will feature electrophotographic and ink-jet printers, as listed above. In addition, Kodak, A.B. Dick, Computer Peripheral, Centronics, Dataproducts, Exxon, and General Electric are said to be developing such printers.

Electrosensitive, thermal, and electrostatic printers at the low end of the market will be used by personal computers and for message communication, instruction devices, and some kinds of graphics. Companies in these markets include SCI (Rotary Printer), Centronics (Microprinter), and Static Systems Corporation (Static-Typer, a liquid-crystal device).

MORE THAN PRINTERS

The big consideration about electrophotographic and the better ink-jet systems is that they are not simply alternate kinds of printers. They can be—and in some of the devices noted above, they are—full communications systems. They combine the functions of and replace conventional files, text editors, typesetters, platemakers, presses, and collators. In one (expensive at present) box, they can:

*Store text and formats.

*Manipulate (edit) and compose text.

*Output text in a choice of type styles and sizes.

*Output via an office copying machine, thus combining laser technology with xerography.

*Output via an ink-jet printer.

*Combine technologies to make it possible to go directly from a document stored on a disc to a device that will print and collate multiple copies at high speed on demand.

*Transmit copy (such as a document on a disc) to a printout device at a remote site.

These systems are not presently seen as a threat to quality or other publication printing, but they offer a cost-effective system for much utility printing. In such areas, typesetting machines and platemakers can be bypassed. The document prepared on a word processor may go on-line or via disc to the nonimpact printer, where it will be set, composed, printed, and collated. These systems also have their own input/text-editing station.

SPEED'S THE THING

Where production speed is a major concern, devices such as the IBM 3800, the Xerox 9700 laser printer, the Honeywell PPS electrostatic printer, and the Burroughs B9270-20, for example, can produce copy at speeds of 18,000 to 20,000 lines per minute. That's ten times the speed of most high-speed line printers! Yet some of these machines can mix fonts and offer resolution and output quality equal to that of good office typewriters. As these machines and others like them develop further in the '80s, they will offer—in addition to incredibly high speed and good output quality—full font flexibility and complete freedom in page layout.

This potential raises some interesting questions. When will these machines come down in cost and improve in ability to output pictures (photographs), so they will be feasible in the areas of quality printing and publishing? And when that happens, just how will the art director or designer keep control of the standards desired for design and reproduction quality? Will the process be too fast for such supervision? After all, users can program the information wanted and determine its appearance while it's being printed! At first these devices will serve in data processing and forms management areas, but later in the '80s they may become meaningful in other areas of printing.

INK-JET PRINTING

The basic principles of ink-jet printing were described earlier in this section of Vision '80s, when describing the IBM 6640, an output device for that firm's Office System 6. As a printing process, ink-jet has numerous other applications. Although the correspondence quality of the IBM 6640 is high, ink-jet printing quality for installations is not yet, in general, a present threat to lithography, gravure, letterpress, or flexographic printing. Among the developers of ink-jet systems, besides IBM, are A. B. Dick Co., Mead Digital Systems, Bell & Howell, and Recognition Equipment, Inc. Other companies working in this field include Casio, Gould, Olympia Werke AG, Paillard, Stanford Research, Systems Industries, Teletype, and Xerox.

Essentially, all systems use a stimulator or vibrator to break up a thin stream of ink into 50,000 to 66,000 virtually uniformly sized droplets per second. But each system has its own way of putting the droplets onto paper.

The A. B. Dick, IBM, and Recognition Equipment methods use a computer to charge the dots. The variably charged dots pass through deflection plates that deflect the drop according to its charge. Unnecessary drops (in nonimage areas) are uncharged and recirculated into the system.

In the Mead Dijit system, uncharged drops fall onto a moving web under the control of a computer.

The Bell & Howell system uses a superfine nozzle and high-stream velocity to create the droplets and thus needs no stimulator.

Printed characters turned out at high-speed operation are suitable for computerized letters (which can be personalized by a computer program), for addressing labels, for adding variable information to preprinted mailing pieces, for printing bar codes and batch numbers on packages, and for bank check encoding. Ink-jet printing is most effective when each piece in a run must be personalized.

The high quality achieved by the IBM 6640 for producing documents, letters, and envelopes is because of its slower speed. It forms characters at a rate of 92 per second, compared with 1,375 cps for the A. B. Dick Videojet. Of course, by office typing standards, 92 cps is fast.

As we move into the '80s, we may see more uses for ink-jet printing for computer printouts, facsimile recording, overprinting of business forms, printing on rough or curved or delicate surfaces, and some kinds of multicolor graphics. When and if the quality of ink-jet printing will make it competitive with conventional processes remains to be seen. At present, its high speed compromises



Glass wires. *Ultrapure glass fibers may serve as "wires" for future telecommunications systems now being engineered at Bell Laboratories. They would carry telephone calls and other messages, including digital information, in the form of pulsing laser beams. In the '80s many devices (copiers, printers, etc.) will boast of their fiber optics. Just what does this mean, and what is its significance to the user? In a copier, for example, a small wafer containing strands of glass fibers will replace the standard lens-and-mirror system. Each fiber within the wafer acts as a lens. Fiber optic systems are reliable, cost-effective, and cut overall energy costs by 20 percent.*

quality, and even the IBM system is essentially geared to quality reproduction of line copy rather than photographs. The resolution on the IBM model is 240 dots per inch. A. B. Dick's 200 dots per inch does not equal typewriter quality. Mead Dijit deposits 100 drops per inch at almost 300 times the speed of a good typist.

Four-color ink-jet printing is also a possibility for the '80s. Henry Freedman recently observed some research and development being done at IBM, and he reports, "It was separated and printed one color at a time with dry trapping onto a specially coated paper with IBM-formulated inks. Quality was surprisingly good, and printing times were said to be several minutes per color, with excellent register."

Technologically, of course, there is more to these systems than is described here. But this summary should make clear that the potential of the ink-jet system to become the fifth major printing process may be more a vision of the '90s than of the '80s.

ELECTROPHOTOGRAPHIC PRINTERS: XEROX 9700

This class of equipment has many futurists ecstatic about its being the coming process—perhaps in the late '80s. Its fantastic combination of technologies, versatility, speed and quality of output, and ability to be computer-directed certainly offers great promise. The more capable models are still high-priced. For a complete electronic printing system, the Xerox 9700, for example, costs $285,000 plus the optional interface or off-line magnetic tape input.

To understand what electrophotographic printers can do and something about how they do it, let's take a look at the Xerox 9700, which typifies digitally controlled electronic printing that uses laser and xerographic technology. Here are some operations that the Model 9700 automates:

*Files and generates forms or letterheads.

*Stores and generates logos.

*Stores and generates signatures for automatically signing letters.

*Offers a variety of shading options.

*Offers a range of type styles in sizes from 3 to 18 lines and 4 to 30 characters per inch. This approximates a typeface size range of 4 to 24 points. Characters are proportionately spaced. At first, available fonts were various weights of Univers and Press Roman with italic and condensed versions, but Xerox plans to offer a wider choice of type styles. By the mid-1980s type quality is expected to improve and be equal to that of such correspondence-quality printers as those of Diablo, Qume, and Wang.

Resolution of generated characters is 300 × 300 dots per inch. While graphic-arts quality for many typefaces would require a resolution of 1200 × 1200, when a suitable style is employed, correspondence quality can be achieved.

The Xerox 9700 prints executive-quality reports, each page a xerographic original, on plain 8½ × 11 paper at two pages per second or up to 18,000 lines per minute. A duplex version can print on both sides of the page. This duplex option costs $27,000. Production can continue while text or formats are changed, new jobs are entered, paper is loaded or output removed. This is truly nonstop productivity.

With its combination of computer, laser and xerographic technologies it allows images of practically unrestricted size, shape and orientation to be printed directly from digital information.

The Xerox 9700 can accept a wide range of paper grades from 16-pound bond up to 110-pound card stock, including pre-drilled, pre-perforated and colored papers, and in a few years a roll-fed version is expected to be available. It can mix papers in a report (as for covers and sectional dividers) and collate the pages of a report. It can customize each report to its recipient (blanking some portions in some reports—or changing some copy for each). This is an electronic/digitally controlled text modification feature.

SYSTEM OUTPUT

The primary output of the Xerox 9700 consists of printed reports. The number of copies of each page can be controlled either by the program or by the operator. In the case of multiple copies, the program or the operator can specify whether the copies will be printed in collated or uncollated fashion. Furthermore, the output can be distributed electronically and reproduced at remote sites, and the stored forms, formats, and information can be updated, corrected, or deleted.

HALFTONES

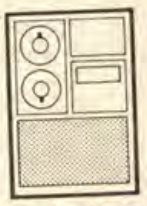
At present, being office- and report-oriented, the Xerox 9700 is not a halftone printer. But when and if the market requires an electronic printing system with such capability, the digitizing, storing, and outputting of halftones could be accomplished on it. Perhaps at that time a device of similar technology will also be freed of its 8½ × 11 limitations and offer finer-resolution output so as to handle both pictures and a better selection of typefaces. Other future enhancements might include multicolor output and printing on both sides of a sheet. In fact, in early '79, Xerox reported it was "planning a second machine with much higher fidelity" and that tests show "exceptional quality... almost equals fine lithography."

Some Xerox 9700 installations (as at Moore Business Forms, Inc.) offer color for logos or for emphasis of some copy, as well as inclusion of line art.

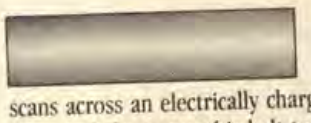
The Xerox Advanced Multi-Function Workstation, a terminal-equipped copier, inputs and edits text, sets type, and creates charts and graphs as well.

HOW DOES THE XEROX 9700 COMBINE TECHNOLOGIES?

The Xerox 9700 combines digital, laser, and Xerographic technologies as follows.



Computers:
Digital input from either an IBM System/370 or System/360 computer on-line or a 9-track magnetic tape drive unit off-line is read under program control and buffered on the Xerox 9700 disc unit. This input data is brought into a digital processor memory, together with previously stored digital information that will create a form image. The character dispatcher accepts the form and the input data, merges the two images, and sends them to the electronic image generator. Character fonts and forms are stored in the image generator memory as dot patterns; the image generator produces each character and form as electronic patterns that control a scanning laser beam.



Lasers:
The actual character image is formed by the laser beam, which scans across an electrically charged, lightbeam-sensitive belt. Because light causes this belt to lose its charge, a character is formed by momentarily interrupting the laser light as the beam scans across the belt, similar to the way a pattern is formed by the electron beam on a television screen. And because the narrow laser beam has extremely high resolution—300 × 300 dots to the inch—the Xerox 9700 produces output of outstanding quality directly from digital information.

WORD PROCESSING





Electrophotographic printing. *IBM's 3800 is a high-speed nonimpact laser printer. It offers three print sizes and can trim, burst and stack printed output on-line as well as individually address each copy. Shown here are the laser beams in action.*

Xerography: As the latent image of a printed page, in the form of a charged image on the belt, is moved past the dry ink developer, the charged areas on the belt attract the oppositely charged black particles of dry ink. This page image, in the form of charged toner particles, is transferred and fused to a sheet of paper that is then delivered to either of the two output bins or the sample tray. The entire process produces pages at a continuous rate of two per second.



Keyboard display unit: Operator control is exercised with the interactive text-editing unit. It provides for operator interaction with the Xerox 9700 system. The operator uses this CRT console to initiate and monitor jobs. Conversely, instructions to the operator can be generated within a job and transmitted via the CRT console. The keyboard is used to enter dynamic job changes such as the number of copies desired or to enter routing information to go with a particular report. The operator can also modify prestored job instructions or forms descriptors from the console.

ELECTROPHOTOGRAPHIC PRINTING: IBM 3800 PRINTING SUBSYSTEM

This high-speed, nonimpact printer combines electrophotographic and laser technologies to produce as many as 20,040 lines of type per minute. It can operate independently of a host computer, to provide users with additional productivity and flexibility in handling printed output and thus free the computer to perform other data processing tasks. Some features of this digitally controlled, laser/electrophotographic system are:

*Uses standard, single-pack continuous forms in any of 50 common sizes.

*Offers three different print sizes: 10-, 12-, and 15-pitch.

*Prints all copies with equal legibility (no carbons—each "copy" is an original).

*Trims, bursts, and stacks printed output on-line.

*Can individually address each copy of each item.

*Eliminates deleaving.

The laser device generates a print line much as the image on your TV tube is generated. The print lines are recorded on the photoconductive surface of a drum that is like the drum of an office copier. A powdery toner applied to the drum's surface adheres to areas that have been exposed by the laser. The toner-charged surface contacts the paper and transfers the image to it; it is then heat-fused to the paper.

OTHER INTELLIGENT COPIERS

These systems are known by a variety of names: plateless printers; nonimpact printers; intelligent copiers. Choose your own buzz word. These are still office-oriented rather than graphic arts-oriented systems. In addition to those mentioned or described above, there is the Wang Image Printer, described earlier in this section of Vision '80s. In Japan, such companies as Canon, Ricoh, and the Tokyo Shibaura Electric Co. are developing similar products. The latter firm's device, known as the Toshiba Electronic Line Copier, uses optical fibers and a television-style screen to print computer messages or other documents on plain paper.

The new Sperry Univac 0777, a nonimpact laser electrophotographic printer, is faster than the Xerox 9700 and prints 20,000 lines per minute. It actually prints page by page, rather than line by line. It can mix fonts, change line spacing, and generate custom fonts and graphics. The basic system, which costs $34,000, is scheduled for delivery in the second quarter of 1980. What we are seeing now is the beginning of a movement that by the mid-'80s may find every major copier manufacturer offering a similar device. *Graphic Communications World* estimates that by '85 there will be a 25 percent displacement of automated copier/duplicators by such "intelligent" systems.

There are more than 75 companies working on laser imaging and printers; by '85, Strategic Business Services predicts, up to 35,000 laser printers from 15 different vendors may be in use throughout the world.

A LOW-COST SYSTEM

Put simply, these low-cost systems permit you to type at a keyboard that has a memory and to type a document and have a copier print it. In contrast to such sophisticated and expensive systems as those described above, the Static-Typer (Static Systems Corporation) is a $2,000 device.



Essentially, the Static-Typer is a solid-state electronic typewriter (see Vision '80s section on Intelligent Electronic Typewriters) cable-connected to a liquid-crystal display that can be placed facedown on the flatbed of an electrostatic copier. But the Static-Typer is unusual in a number of respects:

*The typewriter uses no ribbon.

*It has no moving parts to wear out and is also silent.

*Because it interfaces with a standard copier, it produces multiple copies without carbon paper.

*The typewriter has a memory, whereby characters entered on the keyboard are encoded and stored.

*Memory capacity is 5,000 characters—about one page.

*A one-line LCD display (64 characters) on the keyboard permits text to be examined and corrected before printing. Scrolling permits the entire text to be reread before printing.

*Corrections that can be made on a page in the memory include backspace corrections, insertions, and deletions.

*At the push of a print button, copy for the page, stored in the memory, is reproduced line by line on the remote, flat, cable-connected 9 × 12 liquid-crystal imaging display unit. When the document appears in full, the LCD unit can be put over the exposure windows of a copier for multiple-copy production.

*Multiple keyboards can be interfaced with the same LCD display/flatbed copier station or with a telecommunications system. This feature eliminates the need for a facsimile unit to transmit typed documents to remote sites.

*Transmission time for a completed page, from keyboard to output by the copier, is 5 seconds.

*The LCD display is flat and glare-free and does not distort the image. Much more compact than a CRT, it is also easy to read in bright light.

*Letter-size characters are formed by a square dot-matrix display; the dots create the characters. Closely spaced crystal segments bleed together to improve the quality of image.

The 5 × 7 dot matrix offers 35 dots for the creation of each character. This is not graphic arts-quality resolution, but is considered adequate for many office uses. Furthermore, this matrix not only limits the type styles that can be successfully reproduced but prevents the use of lowercase letters with descenders, because these require at least a 9 × 7 matrix for successful reproduction. It is possible that future models will offer a 9 × 7, or better, dot matrix and will add more text-editing features than the introductory model offers.

*The LCD display can also expose its image to letter-size Polaroid film.

*By swinging the hinged LCD away from the copier bed, the copier may be used independently.

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From New Jersey, (201) 887-8000, extension 666.



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TYPESETTING

There will be at least as many new and significant typesetting developments in the '80s as there were in the '70s. Chief among those affecting what can be done and how we will do it are:

- More digital typesetting replacing phototypesetting, not only for newspapers and big publications but also in commercial and large in-house plants. Also, more direct-entry digital typesetters, such as the Linotype GmbH CRTronic, and, eventually, digital direct-entry dry typesetters such as the Omnitech/2000.

- More linkages of typesetters, either on-line or via software, to data bases, word processors, and other remote sites via electronic mail. Just as software programs can translate data base information for use on word processors, so can they also link typesetters to data bases. (This subject is covered elsewhere in Vision '80s, as was the linkage of word processors and typesetters via interfaces or disc compatible devices.)

- More systems being custom-configured for the user's need from a CPU plus typesetters and input, editing, and makeup terminals.

- More distributed typesetting (typesetters located in various departments within an organization), in addition to or in place of the central reproduction center. Typesetters' costs have come down, so that it now pays to install them where the need is.

More use of more sophisticated software for automating typographic refinements such as kerning, programs for hyphenation and justification, tabular work, contour typesetting or runarounds, indentions, and letterspacing or word spacing. There will be more special software programs such as those described in the section of Vision '80s dealing with text editing and electronic pagination.

DIGITAL TYPESETTERS

The trend to digital typesetting will bring with it some interesting ramifications. Digital typesetters will accommodate larger fonts. There may be a revival of interest in small caps, old-style figures, and more use of alternate and swash characters. These machines can also accept a large number of pi characters, modify (oblique, condense, expand) characters in a given font, and create and store special characters and logotypes.

Digital typesetters can also be linked to electronic page-makeup devices. This could enable the makeup station to call on the fonts stored in the typesetter so as to display a job in its real rather than a simulated typeface. At the close of the '70s this was possible with only a few typesetters such as the VideoComp 570 and the APS-5 working with an APS-View terminal.

It may also come to pass that, for lower-cost electronic paginators, fonts on discs (duplicating those available on the typesetter used in the system) could be fed into the paginator in order to display the real typeface.

Three comparatively low-cost digital typesetters, the Omnitech/2000, the Linotron 202, and the Alphatype CRS, reached the market at the close of the '70s and early in 1980 Compugraphic introduced its high-speed CG 8600. How digital typesetters differ from phototypesetters is explained later in this section of Vision '80s.

NEW EQUIPMENT BEGETS NEW PROCEDURES

In the '70s, most input or keyboarding of material to be typeset was done by professional typesetting personnel. With reporters, authors, executives, and copywriters, for example, equipped with word processors, it is expected that well before the mid-'80s more than half of all input will be done by these word originators. With the record and playback capabilities now offered even on low-cost direct-entry typesetters, the editing process as well is becoming an in-office operation. Not only in-office typesetters but word processors equipped with full-page displays and storage facilities will be able to edit the text and ready it for the typesetter, so that the job can be set in one pass. Revisions and resetting on the typesetter should become the exception rather than the rule.

Thus, word originators not only will produce the input for the typesetting operation but will do the actual editing on the system terminals. Electronics is "passing the buck" to the word originator.

And, as more word processors become full text editors, we may see more devices that can serve as either a word processor or a typesetter. If you are an office person, you'll call them word processors that can output type. At the same time we may see more slave typesetters geared only to outputting information input, edited, and made up on other terminals. The trend, then, will be in both directions—toward multifunctional devices in a single box and toward special-purpose devices—each fitting the needs of different parts of the market.

Is this too much to ask of the word orginator? It may not matter, because this is the way the wind is blowing. But the adjustment isn't necessarily as great as it may seem. With CRT displays, easy-to-use cursor controls, and programming and prompts that show the user just what is going on and facilitate interactive operation, the new procedures and tools really offer the word originator more control over the copy's processing than was possible in the good old days.

Not only will more type be input and edited in offices or in authors' homes, but it will be input directly as well on football fields or battlefields, in auditoriums, at the United Nations, at racetracks, or at any place in the world where news is being made. A reporter with a portable VDT-equipped typewriter types the story, which is recorded on a cassette. After the story is written, the reporter phones the home office, connects the phone to the typewriter, and transmits the recorded keystrokes to a receiving terminal of the typesetting system. In this way, the story is written directly into the typesetting system. A portable unit, weighing 27 pounds, that does this is now made by Teleram Communications Corporation.

PROMPTS

Life will be made easier for typographists and other machine operators as more terminals and systems employ **prompts**. Prompts are questions or instructions that appear on the terminal's display to advise of the status of the job or of what to do next. In many systems these are given in plain English, and short keyboarded answers (no codes) feed instructions to the system.

DEFAULT PARAMETERS

Some systems go beyond aiding the operator with prompts and supply not only the questions but also the answers or parameters for specifying the details of a format. If the operator accepts these specifications, overlooking or forgoing the option of changing them, they are considered **default parameters**. In such systems the parameters, including those changed by keyboard command, once finally accepted, self-code the system; the operator does no coding.

NEW KINDS OF PROOFS

That old standby, the paper proof (hard copy is today's buzz word for it), is giving way to an electronic proof. Word originators and editors are adjusting to new equipment and procedures for text input and editing, but probably the most difficult new function to get used to is the electronic proof. This adjustment is especially true for art directors and graphic designers. In newspaper and large publications operations, editors have their own terminals on which they can see and edit copy, instead of on paper. But hard-copy proofs are likely to remain important in the '80s, especially where it is necessary to show proofs for OKs to clients or executives who do not have their own terminals at hand.

And what about the art director or graphic designer? Of course, one can OK the size, cropping, and position of elements on a CRT and can read copy for errors. But, at the same time, there is no true graphic control of such things as type color, kerning, hanging punctuation, letterspacing, or even the overall typographic feel.

Most existing devices show a simulated typeface, so that even when character counts are correct, the graphic feel is simply not the same in the electronic proof.

But that, you may say, is coming to an end in the '80s, when more typesetting systems and their electronic pagination devices will show the real typefaces being used. This trend will help, but it will demand quite an adjustment, for example, to gauge type color and other typographic niceties on a CRT with type in glowing green phosphor, to mentally translate to how it will look in black ink on white paper—much less in a colored ink or on colored stock. Where graphic control is important, it may be a long time, if ever, before an electronic proof will replace a paper proof in giving a true preview of what the finished job will be like.





V-I-P grids. *These film negative grids, slightly reduced, show a typical font makeup. At left, Times Roman. At the right, a universal newspaper pi font.*

Like it or not, however, there will be an increasing number of situations in which OKs will have to be given on the basis of how a job looks on a video screen.

THE COMPUTER COMPOSITION MARKET

Computer composition is a booming market not only because the new devices—keyboards, text editors, electronic paginators, typesetters, and many others described in Vision '80s—function as and fuse into an integrated electronic/digital communications system, but also because the costs of so many key components in this system will drop even further in the '80s and come within reach of a broader market segment.

What a few years ago was cost-effective only to a large newspaper, and yesterday came within reach of smaller publishers and commercial services, will become available in the '80s to more and more in-office operations. The market will leap from a few thousand publications or commercial plants to hundreds of thousands, and eventually millions, of offices. Here are a few forecasts made by different industry analysts:

•Automated typesetters and copy processors will push the market for computer composition equipment past the $1 billion level by '82.

•By '85, over 90 percent of all not-metal typesetters will have been replaced by photo- or digital typesetters.

•The per-page cost of typesetting today, despite inflation, is the same as or a little less than it was in '60, thanks to a 75 percent saving in production costs due to new technology in the composing room.

•This market is expected to increase by an 11.1 percent annual rate during the next few years, with an even greater growth rate outside the United States.

•The position of suppliers offering both word processing and typesetting equipment is expected to be especially strong, since they will be able to offer integrated systems.

•Laser typesetters are also expected to flourish in the '80s. One forecaster, Frost & Sullivan, projects $120 million in sales for them in '87. They will also come down in cost and reach a wider market. A case in point is Mergenthaler's Omnitech/2000.

•1977 data show 40,000 phototypesetting units in the United States alone and project that there will be about 80,000 in '80.

•Confirming the swing to internal typesetting is a study made by *Folio* magazine. Even by 1977 it showed 33.9 percent of magazines in the study doing all or part of their typography in-house and 21 percent of the rest planning to do so soon. The most widely used devices included direct-entry typesetters, video editing terminals, keyboards, headline setters, and photostat equipment. By '85 it is anticipated that 60 percent of all matter to be typeset will be author- or customer-keyboarded.

•Synergy, prepress synergy, will be a key trend in the '80s. One device will replace many. For example, an editing terminal and a page-makeup terminal will be one. Platemaking and typesetting operations will be merged since information for both will be digital, manipulated electronically, and viewed on color CRTs. In this connection some progress has already been made. A direct-to-plate typesetter already on the market is the Omnitech/2000, and Autologic and 3M recently signed an agreement to develop a high-speed typesetting system to produce printing plates directly from digitally stored text and graphics.

KINDS OF TYPESETTERS

Input, storage, editing, and makeup have been discussed in previous sections of Vision '80s. Some typesetters perform all these functions, and some accept input from other devices but can store and edit as well as output copy. Still others are used only to output fully edited text, sometimes composed at prior terminals in the system. This section of Vision '80s will review the general classes of typesetters and list the machines on the market in each class of equipment.

In this postmetal era there are four basic categories of typesetters, based on (1) how characters are stored and (2) how they are generated. These categories are:

1. **Photo/Optic**

Storage of master characters is photographic, with the font kept on film grids, discs, drums, or strips, for example. Characters are projected optically for exposure to the film, paper, or other recording medium. The entire character is exposed as a unit. Most of today's typesetters fall into this category, and most store the font or characters as negative images. Depending on the specific machine, characters are enlarged or reduced, exposed, and positioned on the output medium, film or paper. Some machines offer a large number of sizes from one master image; others reproduce just a few sizes or only one size from the master. Some of these machines (the direct-entry phototypesetters) have come way down in cost, anywhere from less than $10,000 up to $20,000, placing them within reach of a much broader market segment.

Examples of Photo/Optic typesetters, with various models, include Compugraphic's CompuWriter and EditWriter; Mergenthaler's LinoComp, VIP, and Linoterm; the AlphaComp and AlphaSetter; Itek's Quadritek; AM International's Varityper Comp/Set family, including the CompEdit; Itek's Pacesetter; Berthold's Diatronic machines; the Monophoto machines; and the Harris Fototronic. There are others in a continually growing list.

2. **Photo/Scan**

Storage of master characters is photographic, as with Photo/Optic devices. Characters are scanned and generated piecemeal (at high speeds, much like a television picture), and the completed character is built up from dots or lines, depending on the generating mechanism. The generated characters are exposed by a digitized light source onto a cathode ray tube, where they are lined up and then exposed or generated onto the output medium, such as film, paper, or even a printing plate. Photo/Scan devices can operate at much higher speeds than Photo/Optic machines do. Positioned electronically, characters can therefore be variously modified (condensed, heavied, slanted, etc.) at the operator's command.

Some of these high-speed, versatile machines are now down to the $23,000-$44,000 price range. Some Photo/Scan typesetters are the Linotron 303 and the 505 (Mergenthaler Linotype Company) and the various models of Videosetter (Compugraphic).

3. **Digital/CRT/Scan**

The master characters are stored digitally but are generated much as they are with Photo/Scan devices. To store the characters in the machine, photographic masters are scanned, but there are no photographic masters in the machines themselves. Each font is a digitized record of the original characters. Extremely high operating speeds result. Such machines are used by newspapers and others where high speeds are essential and the economics of the operation can bear the cost of large storage capacity. Each character requires much digitized information. Original manufacturing of digitized fonts is still costly, since it involves digitizing, test outputting, compensating for imperfections, redigitizing, retesting, etc. Some machines can store hundreds of fonts, and in some each size is stored separately. The output faces can be modified much as they can with Photo/Scan devices. Some newer typesetters, such as the Linotron 202, reduce font storage costs by storing data only for the outlines of the characters and painting in the rest of the character when operating.

Some examples of Digital/CRT/Scan typesetters are Alphatype Corporation's CRS; the VideoComp (Information International); the APS machines (Autologic); the Fototronic CRT and 7400 (Harris Corporation); the Digiset 20T1, 40T10, 40T20 and 40T30 (Hell); the MGD Metroset; the Linotron 202, 404, and 606; Compugraphic's CG 8600; and Itek's Mark 8.

4. **Laser/Scan**

The digital information controls the on/off action of the laser beam as it raster-scans the output paper. No CRT is employed. Fonts, hyphenation and justification information, and even software composition programs are stored digitally. Monotype's Lasercomp and Mergenthaler's Omnitech/2000 are digital/laser typesetters.

DIRECT-ENTRY PHOTOTYPESETTING

Direct-entry, or direct-input, phototypesetters are those having input and output capabilities all contained in one device. These phototypesetters broke the cost barrier that had prevented in-office communications operations from setting their own type. As a group, they are low enough in cost and high enough in quality and capabilities to encourage many offices to do increasing amounts of typesetting internally and to typeset material formerly typewritten. These machines are comparatively easy for typists to learn to operate. The first models were not very versatile, but that has changed; today's direct-entry typesetters are very capable, indeed. Consider the following advantageous features:

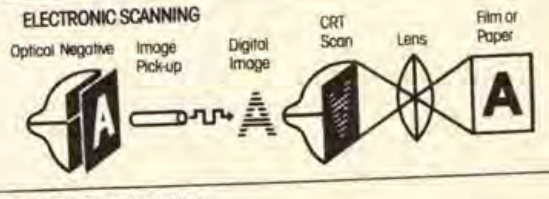
•Input is being separated from output, so that many so-called direct-entry machines no longer handle input and output in one unit. In fact, some are used as input/editing terminals to feed other typesetters. For example, EditWriter and EditWriter terminals can be used to prepare discs for the EditWriter 7900. The Model 7900 offers a sophisticated computerized hyphenation and justification program, a tabbing program, output speed of 50

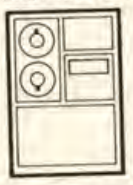
CATEGORY	CHARACTER STORAGE	CHARACTER GENERATION
1. Photo/Optic	PHOTOGRAPHIC	PHOTOGRAPHIC
2. Photo/Scan	PHOTOGRAPHIC	ELECTRONIC SCANNING
3. Digital/Scan	DIGITAL STORAGE	ELECTRONIC SCANNING
4. Laser/Scan	DIGITAL STORAGE	LASER SCANNING

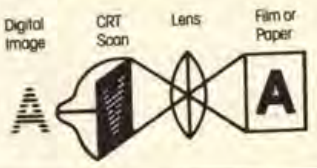


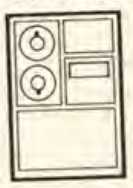














Basic categories of typesetters.

lines per minute, optional left/right column alignment, and automatic, floating, and typewriter-style tabs.

*The new machines, by featuring editing, correction, and update capabilities, are fast becoming word processors that output typography instead of typewritten copy.

*More and more units interface with word processors, and some are disc-compatible with word processors and require no special interface device. Word processor output becomes typesetter input.

*Speeds have been upped from 16-17 newspaper lines to 50 lines per minute—a significant increase for machines that can play back.

*On some machines one operator can simultaneously typeset one job while editing another.

*Since these machines can now run faster than an operator can keyboard them, many offer auxiliary input and/or editing stations to feed the more productive typesetting unit. With multiple, separate input, the equipment is no longer a true direct-entry system.

*Some models have full-page displays.

*Others, such as Berthold's FPS-2000 and Bobst's Varisetters, are particularly suited to the ruled-forms market. The EditWriter family has also introduced a ruling option.

*Some direct-entry typesetters have record/playback options so that you can record your keystrokes on a magnetic medium. This facilitates storing documents for later output or for recalling to the display for editing. The typesetter thus becomes an editing terminal, too.

*All this sounds as if most models are becoming no different from the more expensive commercial and newspaper units. Not so. These machines, while stepping up their speed, editing, storage, software packages, and in some cases makeup capabilities, only partially close the gap between their capabilities and those of higher-priced machines.

*On the other hand, the new generation of direct-entry machines, despite their tremendous technical advances, are still comparatively low-cost units. The advantages and value added far exceed the added cost and make them better buys than before for office and other low-cost markets.

*With all these capabilities for text editing, direct-entry phototypesetters are really word processors that output in typographic rather than typewritten form.

At first, the trend was to input type internally (i.e., in-house) and to edit and output it at a typographic service. While much work will continue to be handled this way, the trend in the '80s will be to edit and output directly an increasing amount of typesetting internally. As much as anything else, the improved front-end intelligence, storage, and editing capabilities of the low-cost, easy-to-operate direct-entry phototypesetters are responsible for this. Some editing features of the most satisfactory models include:

*Production speed of up to 50 lines per minute

*Up to 16 fonts on-line

*Up to 118 characters per font

*Point size range from 5½ to 74 points, and in one case up to 127½ points

*Up to 138 sizes in ½-point intervals

*Maximum line length of 70 picas

*Finest leading possible, 1/10 point

*Maximum leading, 999½ points

*Maximum reverse leading, 16 inches in ½-point increments

Not all these optimal characteristics are available on any one machine.

LOWER-COST DIGITAL TYPESETTERS

A major trend that will be increasingly important in the '80s is the development of relatively low-cost digital typesetters. Among the first on the market are Mergenthaler's Omnitech/2000 and Linotron 202, Alphatype Corporation's CRS, the APS-5 Micro, Compugraphic's CG 8600, and Itek's Mark 8. The Mark 8 sets a 100-pica line. This digital equipment is primarily aimed not at small office installations but at the small publications and commercial typesetting markets.

The CG 8600 sets over 650 8-point 11-pica lines per minute and outputs excellent quality type throughout its 4- to 118-point size range. Sizes are available in ½-point increments. Characters are crisp (no sawtooth edges) and are generated by 1,300 overlapping scan lines per inch. A 68-pica line is output on one model.

THE OMNITECH/2000

Indicative of where direct-entry typesetters in the $25,000-$35,000 range are going is Mergenthaler Linotype Company's Omnitech/2000. It stores and generates characters digitally, employs laser imaging and direct-to-paper electrographics, and its output is fully processed and dry. Floppy-disc-oriented, it can output complete pages and can expose paper duplicator plates.

It can set a maximum length of 66 picas and sizes up to 127½ points in ½-point increments. This is a digital typesetter without a CRT. The digital information controls the on-off flashing of the laser beam, which in turn directly (no selenium plate) exposes via raster scanning the electrostatic paper that is on a developing drum. Quality is very good. Software programs can be developed to facilitate tabular and page makeup. Master fonts can be read into the system's disc, which will hold about twenty fonts as well as the hyphenation and justification logic program and a customized exception-word dictionary. Speed of the Omnitech/2000 is about 120 lpm. It can set reverse type and horizontal and vertical rules of any weight from a fine 1/10 point up and has the editing capabilities of a sophisticated word processor. Type can also be forward- or back-slanted, condensed or expanded. There is also an optional daisy-wheel printer. Depending on the particular make or model, direct-entry phototypesetters have various capabilities for displaying and editing text, justification, word spacing and letterspacing, handling tabular matter, storing and using formats, and scrolling, as well as for off-line equipment and word processing interfaces. A detailed chart comparing all direct-entry phototypesetters in over 40 respects is part of the *Seybold Report* and is updated annually.

All this amounts to a tremendous package of capabilities for a typesetter that most offices can afford and a secretary can be trained to operate. Of course, the more expensive typesetters and systems used in commercial and publications plants are even more versatile, can operate at higher speeds, and require more extensively trained operators. Some, such as the VideoComp and Digiset can scan, digitize, and output line and continuous-tone art. Most digital typesetters can modify (condense, expand, or make oblique) stored fonts.

CRT AND LASER TYPESETTERS

In the Monotype Lasercomp, fonts are stored digitally and projected by a laser. The essential difference between a laser typesetter and other digital typesetters such as the APS-5, Digiset Linotron, or VideoComp is the use of a laser beam to write the output in a raster (horizontal) scan mode. Activated by externa



The Omnitech/2000. *This is a direct-entry laser typesetter that can output fully composed pages onto dry-processed paper or paper duplicator plates. For more details, see preceding page.*

signals, CRT beams, in digital typesetters, stroke vertically on the tube. The fine strokes are from 500 to 1,400 lines per inch in most systems, although Alphatype's CRS has a resolution of 5,300 lines per inch. In the Lasercomp and the Omnitech/2000 the laser beam writes horizontally and lays down each dot of the character image in a horizontal raster scan pattern. It writes directly on the output film or paper and does not use a CRT.

Like digital/CRT devices, digital/laser devices could generate halftones from scanned continuous-tone copy, but as yet none are doing so. The Lasercomp displays type in a fixed size so that a separate font has to be stored for each size of each typeface. The Lasercomp cannot expand or condense characters or make them oblique.

CRT and laser typesetters store master characters digitally and, building up a character from finely spaced dots or lines, scan and generate characters piecemeal. Advantages of CRT and laser typesetters include:

*High speed, as much as 3,000 lpm for some models.

*Greater reliability, since with fewer moving parts they tend to make fewer errors and require less maintenance.

*More available sizes: electronic sizing makes type available in every standard and nonstandard fractional size.

*Typeface modifications: since type can be sized independently either horizontally or vertically, within certain parameters type styles can be condensed or expanded.

*Type styles can also be slanted or made oblique.

*Characters can be positioned above or below a base line, so that any character can be positioned and sized to become a superior or inferior.

*A whole library of faces can be stored on-line, thereby speeding production and facilitating type-style mixing within a job.

*These machines require a minimum of operator attention. If they are on-line in a system, the operator's chief role is to feed and process film or paper.

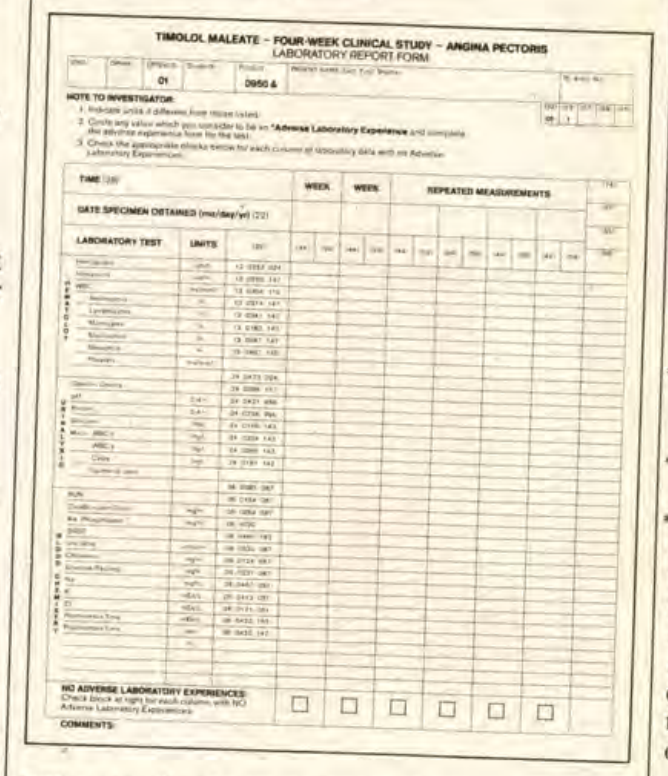
*By themselves or as part of a system, some CRT typesetters—notably Autologic's APS-5, Hell's Digiset models, Information International's VideoComp 570, and Mergenthaler's Linotron 606—can do most of the following: scan logotypes and line art, handle scanned continuous-tone art, generate output onto 16mm or 35mm microfilm, and operate in a system with a display screen to preview material before it is set. The Digiset 40T20 and 40T30 generate output additionally onto 105mm and 180mm microfiche. Hell offers a separate device, the Digigraph 40A30, to scan and digitize logotypes and line art. The new APS-5 Micro also features a hard-disc model that can store 200 fonts of type in a full size range, and an on-line RC processor.

FORMS COMPOSITION

Did you ever wish for precisely made-up forms quickly and without paste-up? Did you ever want rules finer, straighter, and more uniform than you ever seem to get? Well, help is on the way, for there are already several typesetters and systems that address themselves specifically to this special problem area. These include Berthold's Diatronic (models DC-3, DC-4, and the photo unit), Berthold's FPS-20003, Mergenthaler's Linotronic, and Discorp's Digiform Composition Device as well as a new software program for Compugraphic's AdVantage.

DIATRONIC

This direct entry-typesetter with special features for handling ruled forms is priced higher than other direct-entry machines, requires a professional operator, and is meant for commercial typesetting services or in-office installations with need of its special capabilities. One might also think of it (as well as the Linotronic) as a combined typesetter and area composition device. It can take off-line input (paper tape, magnetic cassettes, or discs) or on-line input from Berthold's area composition terminal, the ADS-3000, which has compatible coding. It has 300 tabular positions, in 1-mm increments. Used in conjunction with a Diasetter or an ADS-3000, it can format in 21 columns, has reverse leading capability, and can fine-lead in increments of 1/16 mm. It can draw vertical and horizontal rules in any position on a 12 × 12-inch sheet and set them at the same time it sets type; no separate stripping is needed.



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LABORATORY REPORT FORM

Furthermore, the rules are not built up of connected dashes but are "drawn" electronically to precise and uniform thickness, better than any pen could do. Rules may be set in any of 12 different weights. The Diatronic is also unusual in that its grid is stationary during exposure. This characteristic, plus its high-quality fonts, makes it a high-resolution, quality typesetter. Another Berthold forms system, the FPS-2000, is a phototypesetter, computer (two floppy-disc drives), and VDT editing terminal all in one unit. Within a 12 × 12-inch format, it can set vertical and horizontal rules in 20 different weights.

LINOTRONIC

This is a keyboard-controlled typesetter that, in addition to handling general composition, is especially suited to tabular material, ruled forms, and scientific material. It has special character layouts for math, chess, crossword puzzles, and chemical formulas. Other special features of the Linotronic include:

*Can set to millimeters or inches, didot or pica systems.

*An (x,y) coordinate system permits positioning text and rules anyplace on the page.

*Indices and second-order exponents can be automatically reduced by ⅓ before being exposed, then automatically positioned as superior or inferior figures.

*Film advance or reverse in 0.001-inch, ¼-point, or 0.01-mm increments.

*Film advance or reverse within the line.

*Tabular setting for up to 25 different column widths.

***Linotronic** math composition.*

At $\omega \equiv p\mu$ a kinetic instability of the surface excitations may be developed. Actually, neglecting the contribution of the beam to Re $L(p, \omega)$, we can derive the solution

$$\omega_p \simeq \frac{\omega_{pe}}{(1+\tilde{\varepsilon})}\left\{1+\frac{(3\tilde{\varepsilon})^{1/2}}{2}\frac{ps_e}{\omega_{pe}}\right\} \qquad (123)$$

$$\gamma_p \simeq -\left(\frac{2}{\pi}\right)^{1/2}\tilde{\varepsilon}^2 ps_e\left\{\frac{1}{|\varepsilon(k\omega)|^2_{\varepsilon=\sqrt{\varepsilon}}}+\left(\frac{n_b}{n_e}\right)\left(\frac{T_b}{T_e}\right)^{1/2}\frac{(1-p\cdot u/\omega)^{-1}}{|\varepsilon(k,\omega)|^2_{\omega=\sqrt{\varepsilon}}}\right\} \qquad (124)$$

It follows from this solution that $\gamma I>0$ (i.e. the solution is unstable) if the following conditions are satisfied

*A special sign generator for non-Latin faces such as Greek or Cyrillic.

*Floppy-disc storage for data, text, and formats.

*The Linomat, an input unit for the Linotronic, supplements the keyboard. It can take input from the Linotronic keyboard and, via cursor control and (x,y) coordinates, can position elements at the will of the operator. The operator can see what is being set and how it is being positioned, in order to check against the original as the job is in progress. Copyfitting can be checked and corrected, too. The Linomat can be an input unit independent of the keyboard and, with joystick control, can position all elements of the job.

*The standard unit uses a line font for setting horizontal and vertical rules. An option offers continuous-exposure rules in an infinite number of weights.

*Off-line input is accepted.

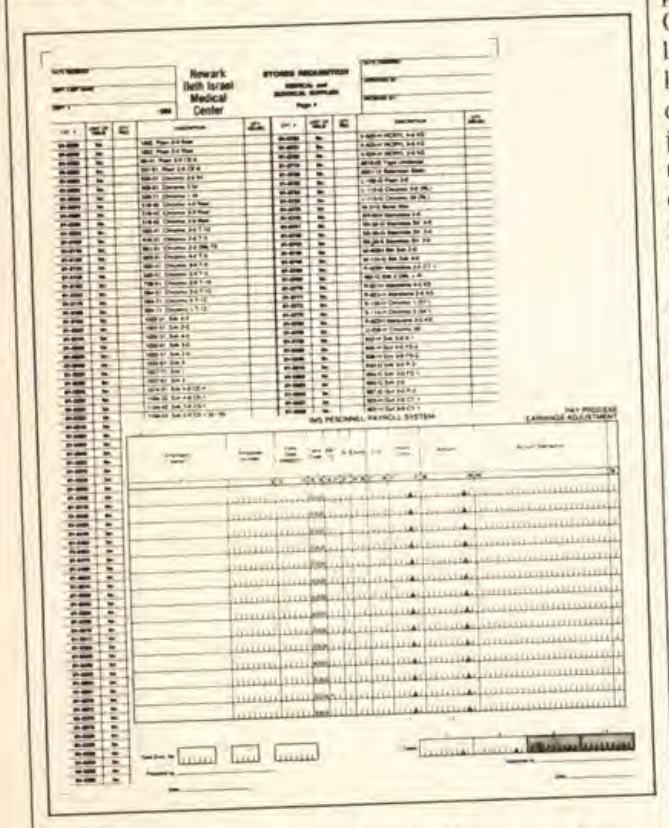
DIGIFORM

The Digiform Composition Device (DCD) is the makeup station of a system that includes an input terminal, a code converter, and

the DCD. Form work, though performed on the machine, requires many customized decisions. To program each form fully via codes could be tedious. The DCD, being an interactive terminal, not only executes code instructions received from the input via the code converter but also stops at times and, on its display, literally asks the operator what it should do next or tells the operator what to do, for instance, to insert a new disc or a ruling form or tint. (The DCD can set tints as well as draw rules.) When the operator has responded correctly, the DCD will proceed automatically until the job is finished or operator intervention is needed.

For operators who are not keyboard-oriented, for example, artists or graphic designers, the DCD system can be augmented with a tablet that simplifies input, makes it easy to locate (x,y) coordinates for positioning of elements, and has a schedule of commands for inserting instructions without keyboarding codes.

Digiform output. *The DCD (Digiform Composition Device) can draw rules or create tints and fully compose and output a form, and its contents, such as the one shown below. The full system includes a makeup station, input terminal, code converter, and the DCD, which is an interactive terminal. The DCD has a graphic tablet for users not keyboard oriented. It also employs prompts to ask the operator what it should do next or tell the operator what his or her next move should be.*



In addition to the three systems described here, some other typesetters capable of setting long lines (AM CompEdit, 70 picas; APS-5/100 or Linotron 606, 100 picas) can accommodate the wide-measure and rule-drawing needs of business forms. Some Bobst and Varisetter models have a ruling option for drawing horizontal or vertical rules in a range of four weights.

Forms composition is specialized work in a limited portion of the market, and devices specifically made for it are relatively expensive. However, for those who need them, they will become increasingly available in the '80s. [For detailed reports on ruled forms and tabular composition, see the *Seybold Report:* Vol. 7, No. 17 (Imlac 1550); Vol. 8, No. 10 (Digiform); and Vol. 8, No. 23, on current approaches to tabular composition, including the role of interactive makeup terminals, direct-entry typesetters, and word processors.]

SYSTEMS

In addition to the various classes of text typesetters reviewed above, there are typesetting systems, configurations of on-line CPUs, and input/editing/makeup/output devices. These are generally for the newspaper or large non-newspaper user or for commercial typesetting installations. (Manufacturers of such systems and a listing of the installations of each appear in the *Seybold Report*, Vol.7, No.24.)

PHOTO MATERIALS AND PROCESSING

Phototypesetters output their images onto light-sensitive film, paper, or paper plates. The film and paper come in either sheet or roll form. Whether the light is exposed through a negative film master or digitally projected onto a CRT as a series of dots, a positive image is formed on the light-sensitive medium. When a CRT image is created, it is projected through a lens onto the light-sensitive material. The film or paper is usually kept in a light-sensitive cassette. On exposing, it passes from the feeder cassette in front of the lens and into a receiving cassette. When a job is set and ready for processing, the roll (if a roll is being used) is cut off the feeder cassette. Then the receiving cassette can be removed and inserted in the processor. The film or paper is processed, and the emptied cassette can be returned to the typesetter.

Whether the phototypesetting output is on film, paper, or a paper plate, the material must have special properties. Emulsions must have enough contrast to produce, with minimal exposure time, characters of high density on a clear background. Characters must also have sharply defined edges.

Film must be flexible, tough, dimensionally stable, yet have a high degree of transparency. A thin support is desirable when it is necessary to expose through the base.

Whiteness and opacity are essential qualities of paper used for phototypesetting output. Although thin, the paper must be strong enough for the requirements of processing and paste-up. One should demand images that are dense and sharply defined, with uniform weight over all the copy.

PAPERS

Although film produces the best image, paper is more widely used, probably because of its similarity to repro proofs pulled from metal type and because paper is easier to proofread and to show to customers. Also, paper output can be pasted on boards for mechanicals, and corrections can be pasted over it.

There are two kinds of paper for photo processing on the market: stabilization paper and conventionally processed paper.

Stabilization paper is not permanent; the image will begin to fade in about six weeks, and sooner if exposed to sunlight. It is the least expensive output material and requires only a low-cost (about $600 to $800) processor. It is recommended for disposable galleys or mechanicals that will be used and not stored for reuse. If only a few jobs require long life, it is possible to fix, wash, and dry stabilization paper to make it permanent. While stabilization paper normally requires about five minutes to air-dry after processing, an optional drier can be used with the processor.

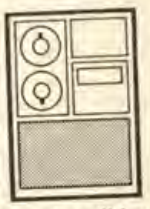
Kodak's RC (resin-coated) papers are conventionally processed: developed, fixed, washed, and dried. They are durable, storable for a long time, and use processing equipment costing from several thousand dollars up to $25,000. They are replacing older papers as phototypesetting output material because of their improved dimensional stability and a processing speed two to three times faster than that of non-resin-coated papers. In addition, the resin coating prevents moisture absorption and reduces fixing and washing time.

FILM

Besides producing the highest-quality image, film is more dimensionally stable than paper. It can be diazo-proofed for reading and can be precisely assembled on light-table grids. Negative film, contacted from the output film positive, is ready for platemaking; film can also, of course, be output as a negative. When a large number of proofs is required, low-cost diazos can be made from the film. Film also has the advantage of bypassing some production steps (from paper output you have to make film positives to expose to the plates) and can be produced either right- or wrong-reading. With the latter, you are ready to expose directly to a positive plate.

Processors require driers, either as separate units or as part of the processing system. Since the film output by this process will probably be used to make a printing plate, it should usually be made "emulsion side down," so that the image-carrying side of the film is in absolute contact with the emulsion of the receiving medium.

MORE ON DATA BASE CONVERSION



Many typographic services in the '80s will find a source of business in converting data stored in customers' data bases to typographic form. As you know, this requires a software/hardware combination customized to the peculiarities of each customer. In addition to custom-designed software, the typesetting service will have to adjust to new procedures; for example:

- The shop will not receive a conventional manuscript but will receive input in the form of such magnetic media as tapes or floppy or rigid discs.

- Programs will have to be written to translate the data on the tapes or discs so that it can be accepted and correctly output by the typesetter, although we will see more devices, like the AMtext™ 100 machines, which combine data processing and word processing functions and which can thus produce output from data bases that is more compatible with typesetters.

*Data base storage systems and word processing systems are supplied by many manufacturers, and there are no uniform standards among them. Therefore the typesetting service may have to devise different software adaptations for each customer or system served.

*The '80s obviously will be an era not only of electronic processing but of electronic manuscripts (on discs for data bases or on cassettes from dictation systems).

*To handle a volume of variously coded electronic manuscripts, the typographic service will probably have a large central computer with ample storage. Such equipment would not be economical for many of the shop's individual customers, but the shop, in serving many customers, can write it off by distributing the cost among numerous accounts.

To sum up the picture as it affects typographic services:

1. Shops must keep up with the new technologies in input, editing, makeup, and output and coordinate purchase decisions with what their own customers are buying.

2. Services must diversify to meet the changing needs of the customer base.

3. Shops must connect to their customers' data bases.

4. The word processing connection to customers' input/editing terminals must be secured.

TYPESETTING SERVICES IN THE '80s

There's much talk about the '80s being a paperless decade, one in which machines will replace designers and artists, and one in which the outside typesetting service will vanish as customers keyboard and set all their own type.

Nonsense. While paper will lose some of its share of the market to electronic mail and magnetic storage in the '80s, the actual volume of paper used in communications is likely to grow. And while the new technologies may replace clerical and administrative support staff, they are likely to increase the need for artists and designers who can exercise graphic judgment and taste that machines can only execute upon explicit command.

The same is true of typesetting services. There will be attrition, as always, and mergers and a trend toward larger shops. But typesetting services will not so much disappear as change their nature. Some have already become full-package, prepress services rather than just typesetting specialists. Others are running a chain of quick printers or have opened quick-printer branches in shopping centers, just as city-based retail stores do. In short, typesetting services will diversify in the '80s. Some kinds of work now done by services will be keyboarded, and even typeset, in offices. But much in-office typesetting will be work formerly output on a line printer or a typewriter or word processor.

Already some typographic services are changing their names to indicate the broader range of services offered. ABC Typesetters, for example, becomes ABC Graphic Services. Here are some of the things prepress services of the '80s will do:

*Set type, of course, and offer more extensive font libraries, more sophisticated editing terminals, and more versatile and higher-speed typesetters than most offices will install.

*Camera modification of type.

*Tie in to company data bases to convert stored information into attractive, readable output.

*Output from discs, tapes, cards, etc., supplied by the customer. An increasing amount of input will be done on word processor text editors and then sent outside for typesetting.

*Make halftone negatives or positives.

*Supply complete (type plus art) film flats ready for platemaking.

*Short-run printing and duplicating.

*Serve clients on rush jobs.

*Compose complex tabular data and/or simple text or data drawn from a customer's data base.

*Screen process printing.

*Make slides (b/w, color) and microfiche.

*Offer full audiovisual services.

*Process color and b/w transparencies.

*Make process color separations.

*Create special camera effects, such as a line conversion.

*Be a source of supply of paper, film, chemicals, tools, and artists' materials (not just transfer or cutout sheets, but all the tools and materials needed for an in-house typesetting department).

*Train operators for their clients' internal operations.

*Act as typographic consultants to administrative support personnel confronted with graphic arts responsibilities.

*Advise customers and help them purchase and install word processing systems. Since the customer is going to do more keyboarding anyway, shops serving in this consultant capacity are most likely to obtain the typesetting from word processor input.

*Make color keys and do color-proofing.

*Make stats and key lines and offer paste-up (manual or electronic) services.

*Offer graphic design services to those clients needing such help.

Please understand that this is not a blue-sky projection.

In the late '70s, not only were many typographic services offering many of the services listed above, but according to a survey made by the International Typographic Composition Association, nearly 33 percent of the respondents said they were offering the following products and/or services:

Advertising copy	File Maintenance
Animation	Four-color process
Brighttype	Graphic design
Color separations	Illustration
Dry-transfer lettering effects	Layout
Duplicate plates	Litho plates
Dylux proofs	Photography
Editing and writing	Photomechanicals
Engraving	Translation
Facsimile	Wedding invitations

The study showed that diversification in the late '70s was progressing especially in the areas of stats, key-line paste-up, film makeup, halftone reproduction, and color keys. All areas surveyed showed approximately 50 percent or more of the shops diversifying.

True, the trend to editorial-source composition has hurt many typesetting services. Not all are surviving. One estimate forecasts there will be fewer than 1,500 trade typesetters in the United States by '85, about half the existing number going into the '80s. The survivors will be those who diversify their services in line with the above list and in tune with their market's needs. Recent census data show typesetting industry receipts up 50 percent from '72 to '77. Computer-controlled phototypesetting accounted for much of this. But these figures are in current dollars and do not take inflation and price rises into account.

This poses a question for the small art service. Will it, too, disappear or dwindle? Will it be merged with a type shop that has become a diversified prepress service?

In spite of all the gloom-and-doom forecasts we hear, shops that make the right decisions with respect to these four major areas not only will survive but will prosper. Consider this: As word processors with full-page CRTs become more common in hundreds of thousands of offices, they will be capable of text input and editing that can then be typeset. Much of this will be material not formerly typeset, including documents put together from a data base. Because typesetting such material internally input and edited will be economical and because doing so will cut paper, filing, production, and distribution costs by 40 to 50 percent by cutting the space required by the text, the actual volume of work to be typeset should grow considerably. Some of this will be set internally, too, but not all of it. Here is another opportunity for type shops—to encourage customers to use word processor text editors to prepare text input and then leave the typesetting to pros with adequate typographic know-how, equipment, and typeface libraries.



LOOKING AHEAD

Some developments we may anticipate in the '80s are:

*Typesetters that not only set and format type but are also word processor text editors.

*Most word processor input stations will be telecommunication-connected to typesetters, thus eliminating not only interfaces but also magnetic media that presently are physically transported from input to output devices.

*Typesetters that will output (via hardware, software, or a combination of both) in page format instead of in galley form. This may be the most exciting direction of the '80s concerning typesetters. They will have super-capable front ends driving slave output typesetters. The front ends will, in one box, handle keyboarded or off-line input, all editing functions, and all the page makeup functions of an electronic pagination terminal. They will also contain the font library so the CRT will display actual type. The fully composed and OK'd page will self-code so that it outputs on the typesetter as a completed page with space left for pictures. Probably, later, middle- and low-cost front ends will also digitize the pictures and size, crop and position them along with the type as is presently done by only the more expensive typesetters. The output typesetters will be CRT-digital or CRT-laser devices also priced for a wide segment of the market.

*Typesetters that can "set," screen, crop, and position tone art, at prices meaningful to a broader market.

*More typesetters that can modify (condense, expand, make oblique) typefaces from a given master font.

*Portable input terminals (such as the Bobst Scrib).

*More typesetters responsive to software programs, together with a large library of software programs for them.

*More interactive programs (such as hyphenation and justification programs) that will display their work on the CRT and permit the operator to approve or change it before committing it to the typesetter.

*By the early '80s, 25 to 30 percent of the typesetters will be able to set at least a 60-pica line.

*More systems in which the typesetter itself is a "slave" and all editing/makeup decisions are made at the system's front end.

*More digital typesetters and electronic paginators at prices the commercial typesetter and large in-office department can afford.

*A considerable increase in the word processor/typesetter interface.

*Looking further down the road, dry typesetters (no photo-processing). Some are already on the market, including the EditWriter Dry and AM's Dryex option. The latter offers the choice of RC stabilization paper or dry output. In its present state of development, the type image in the dry (silver) process is not as sharp as it is on RC paper. Devices such as the Xerox 9700 and others will feature digital input of type and graphics and multiple-copy electrostatic output. This is a typesetter/platemaker/printer/collator all in one box.

*Less reliance on reverse leading and more reliance on software to accomplish page makeup.

*Software programs for proofreading, especially to identify and correct spelling errors. Work on this is now being done by Automark (developed by the Research Institute of the American Newspaper Publishers Association) at Bell Labs in Murray Hill, New Jersey, and in the Star Program developed by General Motors.

*More dispersed (as opposed to central) typesetting installations in office systems. The low cost and ease of operation make it feasible for any department with volume enough to support a typesetter to have its own equipment.

*High-speed automated display typesetters. VGC's Typositor 4000 is several times faster than conventional 2-inch film font machines. Instead of the filmstrip, it uses the VGC rectangular microfont and sets sizes from 24 to 96 points from it. Exposures are electronically controlled, and focusing is automatic.

*More satellite printing operations whereby large newspapers and magazines transmit their pages electronically to several printers at remote sites, both for speed and to cut distribution costs.

*More direct-to-plate technology through which the typesetter output will be exposed directly to the printing plate, probably by using lasers. Autologic and 3M, for example, are jointly developing a high-quality, high-speed typesetting system which will produce printing plates directly from digitally stored text and graphics. The Omnitech/2000 can do this now for paper plates.

THE NEW TYPOGRAPHY

The cumulative effect of adopting electronic/digital devices at every step of the communications process, from creation of art to multicopy distribution of the message, plus the changes in the kind of people who will be making decisions involving these devices, will affect typesetting and typography in three ways:

1. The volume of material typeset will greatly increase.

2. There will be a potential for considerably higher quality, as machines make it possible to execute designs more precisely. (One of many examples: More machines will put space between lines in 1/10-point increments, compared with today's more common ½-point increments.)

3. There will be a potential (perhaps an actuality for a while) for more poor-quality typography. The increased options machines will offer for letterspacing or word spacing, kerning, interline spacing, and almost every graphic decision now made by a good designer will, in many cases, be made by people not trained to exercise graphic design judgment and taste properly. Two general forces will tend to upgrade typographic quality in the '80s:

1. Machines and software will build a high floor under quality.

2. Management and communications staff personnel will become more aware of the essential connection between graphic quality and communications effectiveness.

Right now we are are in a phase where bottom-line thinking, a focus on cost-effectiveness, is the overriding factor in determining whether and how to automate an office or a communications operation.

The next phase, after running the gamut of building and updating and modifying systems, will be to evaluate the effectiveness of their output—communications effectiveness.

The third phase will be an appreciation of the crucial role of seemingly subtle graphic touches and of graphic freshness in enhancing a message's chance to be noticed, read, understood, remembered, and responded to favorably.

Typographers, art directors, and graphic designers who learn to use the new tools will find out they can work—put their ideas into graphic form on a CRT—as fast as they can think. They will be able to see all their alternate ideas almost instantly and be able to modify and choose among them in a fraction of the time it took in the '70s and earlier. Consequently, they will be able to test more ideas and refine the final one more quickly and more precisely.

Thus, designers will become at once more creative and more productive. As is true today, some designers will be generalists—concerned with understanding and exercising control throughout the digital/electronic processes from art/text origination through message distribution. Others will specialize at one or more steps in the process, such as specifying input and controlling it through the page makeup or typesetter output stages.

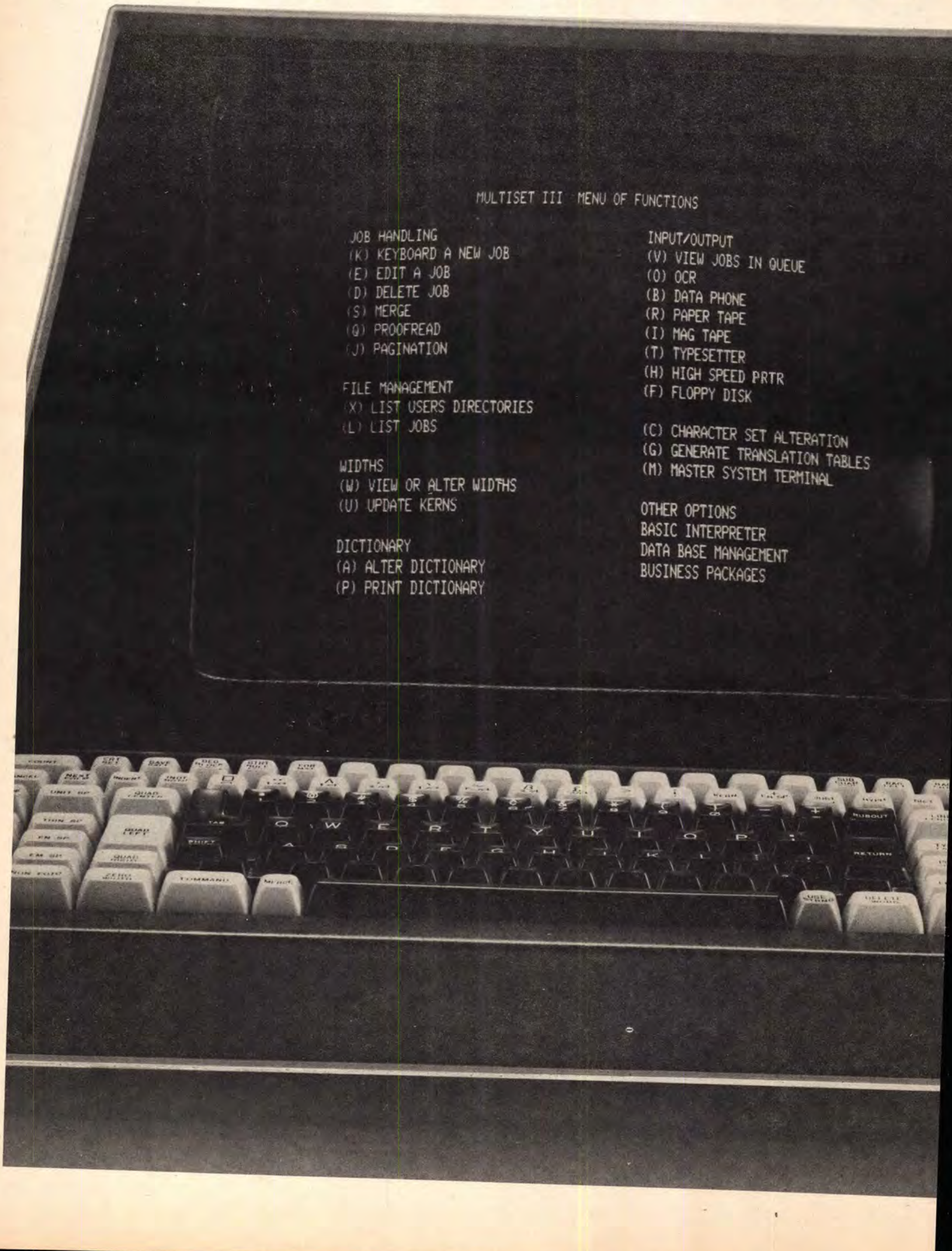
The generalists will control the total operation. Many will come from the ranks of management—from data processing, word processing, or administrative staffs. How many art directors or graphic designers may eventually sit atop the communications structure remains to be seen.

To the older generation of art directors, all this must be rather *déjà vu*. In the '20s and '30s, advertising concepts were developed by advertising managers or in the agency by management, account executives, or copywriters. Art directors mostly made layouts to execute other people's ideas. A major stimulus behind the establishment of art directors' clubs was to enhance the status and income of art directors by having them included in client conferences and as part of the team that developed the message concept. This seems like ancient history today, when many agencies are run by former art directors and the key communications role of graphics and graphic designers is so widely recognized and suitably rewarded.

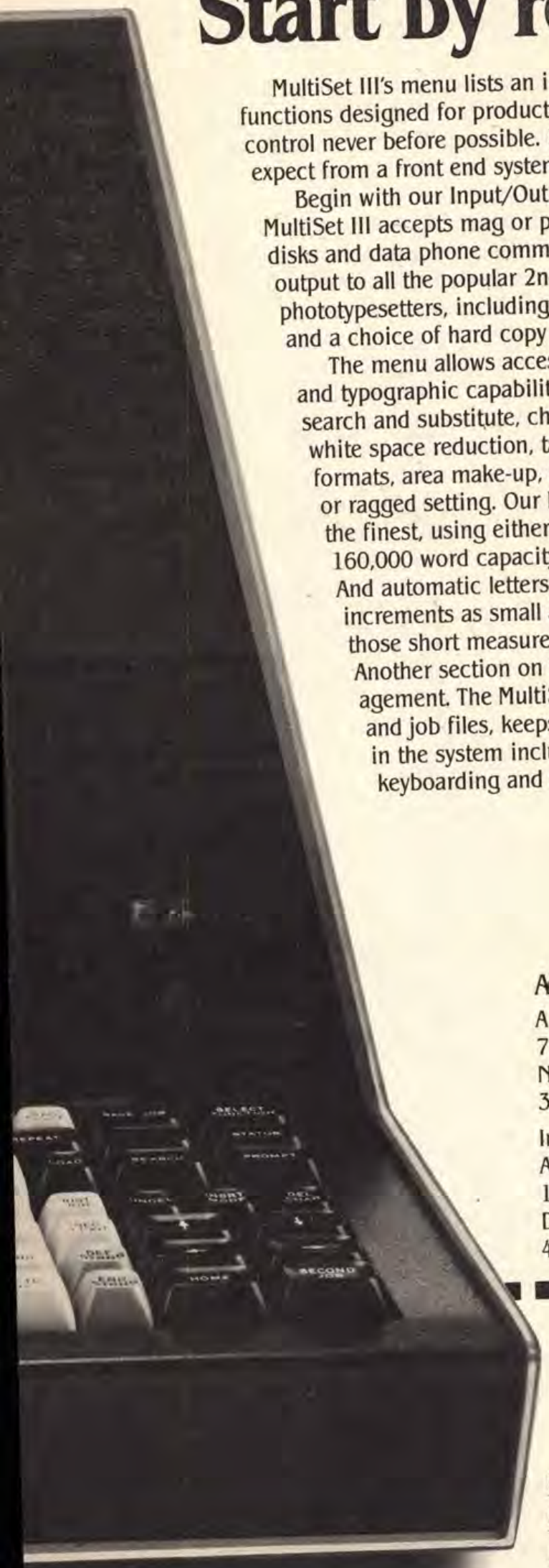
But the increase of communications material that will be produced internally in the '80s may cause a similar development to take place in the office. Here, as in advertising departments and agencies during the '30s, '40s, and '50s, is a new frontier, a new career path for the graphics person who is willing and able to become a generalist, willing and able to use graphic skills and sensitivities as the core of a fully rounded communications capability.

ILLUSTRATION BY ANDRZEJ DUDZINSKI

If you have an appetite for the



ultimate in typesetting control... Start by reading our menu:



MultiSet III's menu lists an impressive array of functions designed for productivity and typesetting control never before possible. It's everything you'd expect from a front end system and more!

Begin with our Input/Output functions. MultiSet III accepts mag or paper tape, OCR, floppy disks and data phone communications. We can output to all the popular 2nd and 3rd generation phototypesetters, including the Alphatype CRS, and a choice of hard copy printers.

The menu allows access to extensive editing and typographic capabilities such as multi-level search and substitute, character pair kerning, white space reduction, tabbing, indents, formats, area make-up, and automatic justified or ragged setting. Our H&J program is one of the finest, using either rules of logic or our 160,000 word capacity dictionary or both. And automatic letterspacing or kerning, in increments as small as 1/8 of a unit, solves those short measure problems.

Another section on the menu is File Management. The MultiSet III, using directories and job files, keeps track of all work in the system including the time spent keyboarding and editing.

And as the menu enables single key access to all major functions, there are no complex codes or mnemonics to remember. The simplicity of our system allows your operators to spend their time setting type, not programming.

But the menu is only the beginning. The basic MultiSet III, consisting of a minicomputer with 96K of memory, 80 megabyte hard disk, floppy disk drive and two 32K intelligent terminals is uniquely expandable. As your business grows, the system can grow with it. Have up to ten 32K terminals, up to four 80 or 300 megabyte disk drives and connect multiple typesetters to each CPU. Double your capacity by linking two MultiSet III's together. And the system is being updated continually with new typesetting, business and data base software such as pagination, proofreading, inventory control and a directory management program. All this plus AlphaKey's commitment to total system support will insure that the MultiSet III will be the most productive, versatile and cost efficient front end system on the market tomorrow as well as today.

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A Division Of Alphatype Corporation
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***Automatic Illustrated Documentation System (AIDS)** *is the most powerful pre-press production system for government, industrial, and business publishers of illustrated documents. (An illustrated document is any page that contains text and illustrations. Examples: magazines, tech manuals, catalogs, directories.) Every step of the composition/typesetting production cycle is electronically automated, from the entry of original manuscript and artwork to the production of plate-ready typeset pages on true-size phototypesetting film or paper . . . or on microforms.*

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3300 TEXT EDITING AND COMPOSITION SYSTEM
Inputs, updates, and composes text on an interactive basis.

2020 PAGE MAKEUP STATION
Positions and scales selected text and illustrations interactively for display as complete pages ready for typesetting.





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Performs system control and file management functions.

VideoComp 570 PAGESETTER™
Typesets full pages of text, line art, and halftones (65- to 133-line screens) on true-size phototypesetting film or paper, ready for platemaking and printing.



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COMp 80/2 UNIVERSAL PAGESETTER™
Produces same output as VideoComp 570, but will also record typeset pages on all standard NMA microforms; draws random vectors and records high-speed stroke fonts.

Compugraphic for the 1980's

In the late 1960's, after years of research and development, Compugraphic offered its first photocomposition system for sale and took the market by storm. Compugraphic engineers had toiled long and hard to produce a system that both met the quality standards of the marketplace and provided a cost effective alternative to more expensive systems which were already available but prohibitively priced.

Over the next decade Compugraphic and cost effective quality systems became synonymous. As the product lines and markets in which they were sold grew thoughout the 1970's, so did the Compugraphic type library; and the company's service and supplies capabilities. Today, Compugraphic photocomposing systems are sold to every Graphic Arts market worldwide. With 250 new releases this year, the Compugraphic type library has grown to over one thousand faces including the entire ITC text/display library. Our Accessories and Supplies Division, with its fourteen distribution centers, offers a wide range of pre-press products including photographic chemicals, processors, and cameras. An advanced computerized network links Compugraphic customers to service engineers for diagnostic and service related activities. This dynamic variety of services combine to maintain Compugraphic as a hands down leader in the phototypesetting field.

Take a minute to look at some of the products and services Compugraphic has ready for you as we all rush headlong into the 1980's.

Cg compugraphic

The proof is in

Times and technology change rapidly. The jargon often loses sight of what new developments are all about. Hardware, software, digital, laser, only mean something in terms of the end result they produce and the real test comes in the analysis of the end product. Compugraphic designs its products to the idea that the proof truly is in the printout.

We've done it. An even better EditWriter.

Inflation and the rising costs of materials have spawned several new retrofitable options to make the EditWriter series of phototypesetters even better. With the EditWriter **Preview,** you can see your ad or page with all its copy in final size and position—before you begin to typeset.

The EditWriter **Printer Interface** is a line printer which enables you to have—almost instantly— low-cost typewritten copy of any information in your EditWriter file.

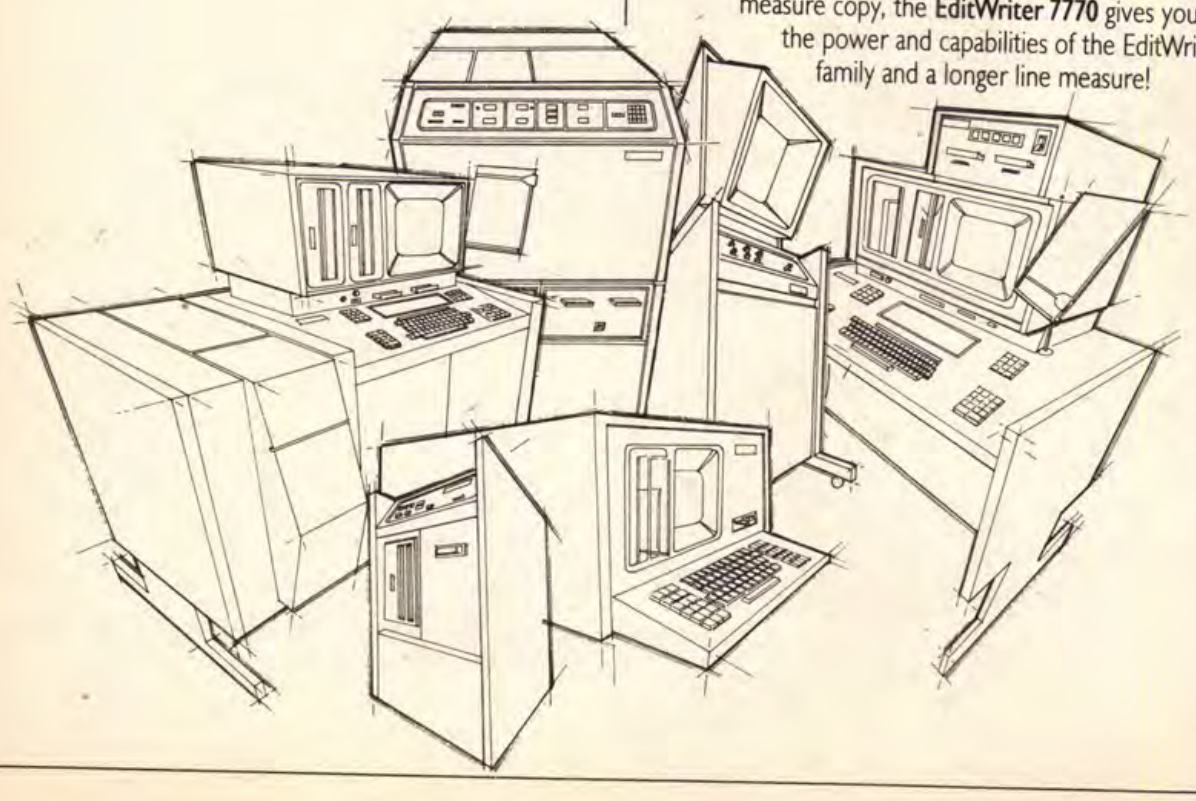
If you are currently accepting input from customers with word processors or computers, the **Intelligent Communications Interface (ICI)** gives you the capability of accepting information directly into your EditWriter without rekeyboarding.

The EditWriter **AutoKern** produces kerned and compensated output copy automatically.

The EditWriter **Ruling Option** simplifies the production of complex composition by eliminating manual ruling and minimizing paste-up.

The EditWriter's **Multi-Hyphenation Option** produces foreign language copy with accurate hyphenation points, and the EditWriter screen actually shows the accented characters as they appear.

For those who need to produce large forms or wide-measure copy, the **EditWriter 7770** gives you all the power and capabilities of the EditWriter family and a longer line measure!



A mini-publishing system. It grows with you.

The **MDT 350** is a key element in another popular configuration: the MDT 350 and the **TrendSetter.** The TrendSetter is a versatile and powerful output phototypesetter. With the MDT 350 terminal as an input device, this combination becomes a low-cost mini-publishing system.

Mini-disks can be prepared on any number of MDT 350 terminals, in a central newspaper office or at remote newspaper bureau locations, as each terminal is a self-contained module. The disks are then read directly by the TrendSetter to produce high-quality photocomposition at a speed of 50 lines per minute. As your grow, simply add more MDT's.



the printout!

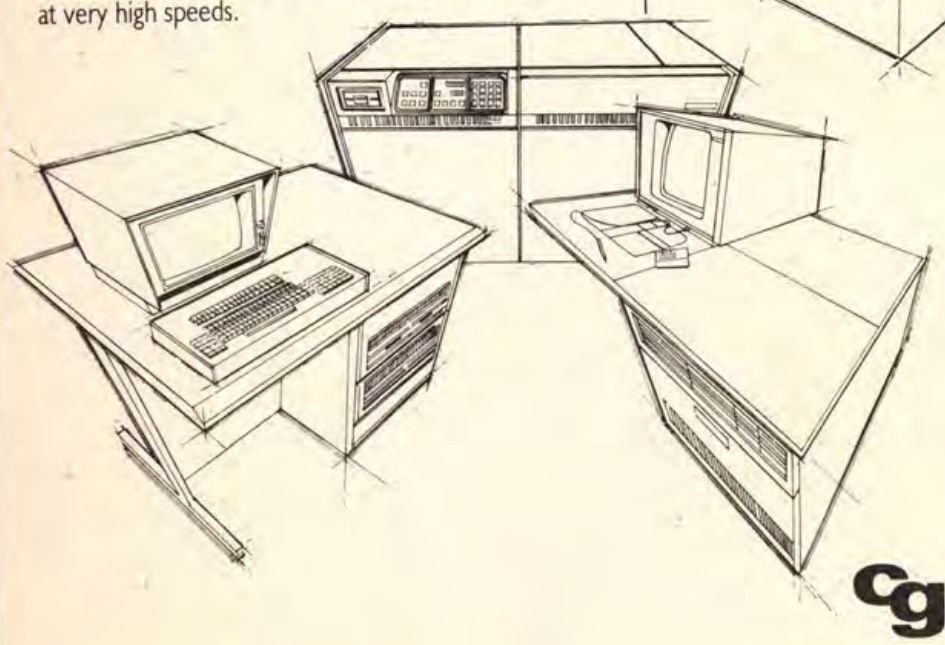
The Compugraphic 8600. Digitized type for everyone.

The newly introduced Compugraphic **8600** is a high speed, high quality digital phototypesetter that accepts input from many sources: front-end systems, display ad terminals, and stand-alone terminals to meet requirements for virtually any operation.

One of the most typographically sophisticated front ends you can select is the **Quadex** shared-logic composition system from Compugraphic. It offers powerful editing and composition flexibility and takes on the composition, editing, proofing and file management phases of the production cycle.

In the preparation of display advertising, nothing shows off the quality, speed, and versatility of the 8600 more spectacularly than the Compugraphic **AdVantage.** With this low-cost, high-quality, easy-to-use makeup system and the 8600 you can produce professional quality visual aids, forms and display ads from the sketchiest layout information—and fast.

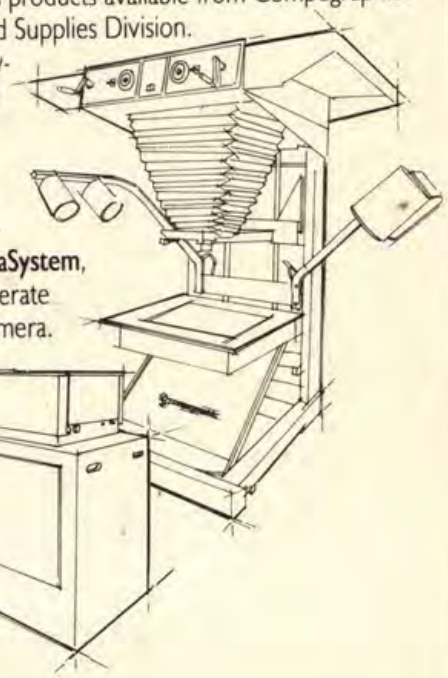
But the versatility of the 8600 is not just confined to use with sophisticated front-end systems. The 8600 can be used with inexpensive, noncounting terminals such as the Compugraphic **MDT 350** which produces input on 8600-compatible floppy mini disks. Whatever configuration you choose—simple or sophisticated—the end result is the same —quality text and display typography at very high speeds.



High density and long life. At half the price.

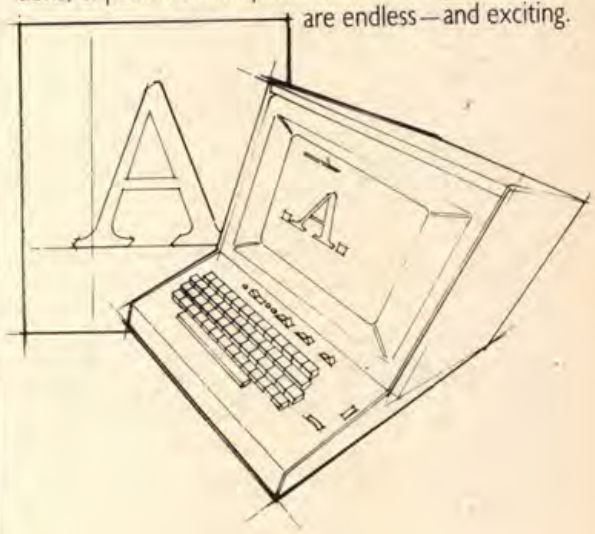
The revolutionary new **Permakwik** Processor is a compact three bath processor for both RC and PermaGraphic paper and film which produces high density, long life output at a price lower than other competitive systems. It requires no plumbing, is both easily cleaned and maintained and comes with a dryer attachment option. The Permakwik is just one of the many pre-press products available from Compugraphic's Accessories and Supplies Division.

We carry everything you need to go from concept to camera-ready mechanical, including **CameraSystem**, our easy-to-operate graphic arts camera.



Endless possibilities. Computer-aided type design.

Compugraphic's **type design facility** is one of the largest of its kind in the world. A staff of designers, artists and technicians produces up to two hundred and fifty new typefaces a year. A recent innovation, **computerized character generation**, has substantially increased the output of this facility. From the specifications for an artist's master alphabet, computer technology can now take that basic alphabet and run it through almost unlimited weight changes, condensations, expansions and special effects. The possibilities are endless—and exciting.



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Compugraphic Corporation, 80 Industrial Way, Wilmington, MA 01887, Telephone (617) 944-6555

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We hope you're intrigued with what Compugraphic has to offer. If you would like in-depth printed information on any of the many Compugraphic product lines, give Dianne Capps a call at

1-617-664-2412

Or, if you prefer, return the coupon we've provided below to Dianne Capps,
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90 Industrial Way
Wilmington, MA 01887

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- ☐ MDT 350 Mini Publishing Systems
- ☐ Compugraphic 8600 Digital CRT Phototypesetters
- ☐ Pre-press Accessories and Supplies
- ☐ Type

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Company_____

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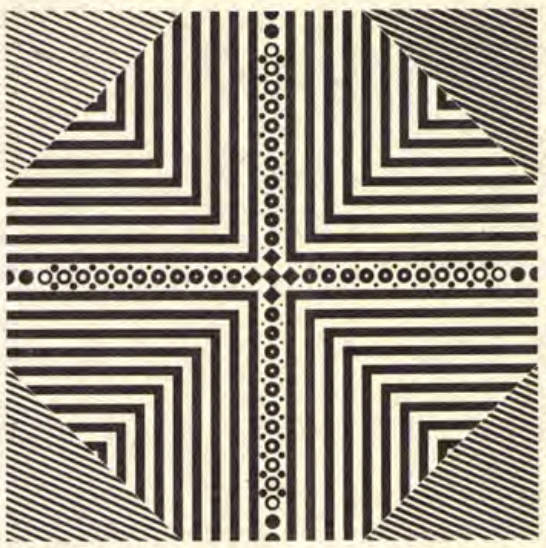
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the Bobst-Brunner test pattern



Bobstgraphic

Ensure constant quality control over your phototypesetting!

One of the basic tenets of the Bobst Graphic philosophy is quality – top quality. No wonder then that Bobst Graphic should be one of the first of the world's leading manufacturers of electronic phototypesetting equipment to tackle the problem of the variation of photo-set type that occur during exposure and developing.

Every conscientious typesetter hat this problem to face every day, especially when it comes to editing, correcting or up-dating a photo-set text.

Bobst Graphic provides you with a solution: by including the Bobst-Brunner test pattern on every matrix disc, Bobst Graphic supplies you with a simple and efficient means of keeping constant quality control over the texts you photo-typeset.

Maîtrisez la qualité des textes photocomposés!

Fidèle à sa politique de recherche d'une qualité optimale, Bobst Graphic est un des premiers constructeurs mondiaux d'équipements électroniques de photocomposition à s'être soucié du problème qu'entraîne la variation de la graisse des caractères durant l'exposition et le développement des textes photocomposés.

Cette difficulté, à laquelle tout typographe consciencieux se trouve journellement confronté, prend toute son importance lorsqu'il s'agit d'éditer un travail, de corriger ou de mettre à jour un ouvrage.

Bobst Graphic a solutionné ce problème en intégrant sur chacun de ses disques de caractères la mire de contrôle Bobst-Brunner, un dispositif simple et efficace assurant la maîtrise parfaite de la qualité de vos textes photocomposés.

Vorlagenkonforme Schriftbildstärken im Fotosatz

Als Hersteller von Fotosatzgeräten machte es sich die Bobst Graphic kompromisslos zum Ziel, nur Erzeugnisse für höchste Qualitätsansprüche zu bieten. Im Zuge dieser Entwicklung setzten wir uns auch als einer der ersten mit der Frage auseinander, wie man die Schriftbildstärke bei der Belichtung und Entwicklung von im Fotosatz verarbeiteten Texten besser in den Griff bekommen könnte.

Diesem Problem sieht sich jeder qualitätsbewusste Typograph immer wieder gegenüber, wenn es darum geht, umfangreiche Setzarbeiten, bzw. Satzkorrekturen oder -nachträge in gleichbleibender Qualität herzustellen.

Als Lösung bietet Ihnen die Bobst Graphic heute Schriftbildscheiben mit einem integrierten Bobst-Brunner-Probetestbild, die ein vorlagenkonformes Schriftbild gewährleisten.



Eurocat 120



Eurocat 150



Eurocat 160



Keyset 110



Mopas

Coupon

Please send me, without further obligation, your leaflets on:
Veuillez m'envoyer sans engagement la documentation suivante:
Bitte senden Sie uns ohne Verpflichtung folgende Unterlagen:

- ☐ Bobst-Brunner quality control
- ☐ Eurocat 120
- ☐ Eurocat 150
- ☐ Eurocat 160
- ☐ Mopas
- ☐ Keyset 110

Company/Entreprise/Firma

Street/Rue/Strasse

City/NPA Localité/PLZ Ort

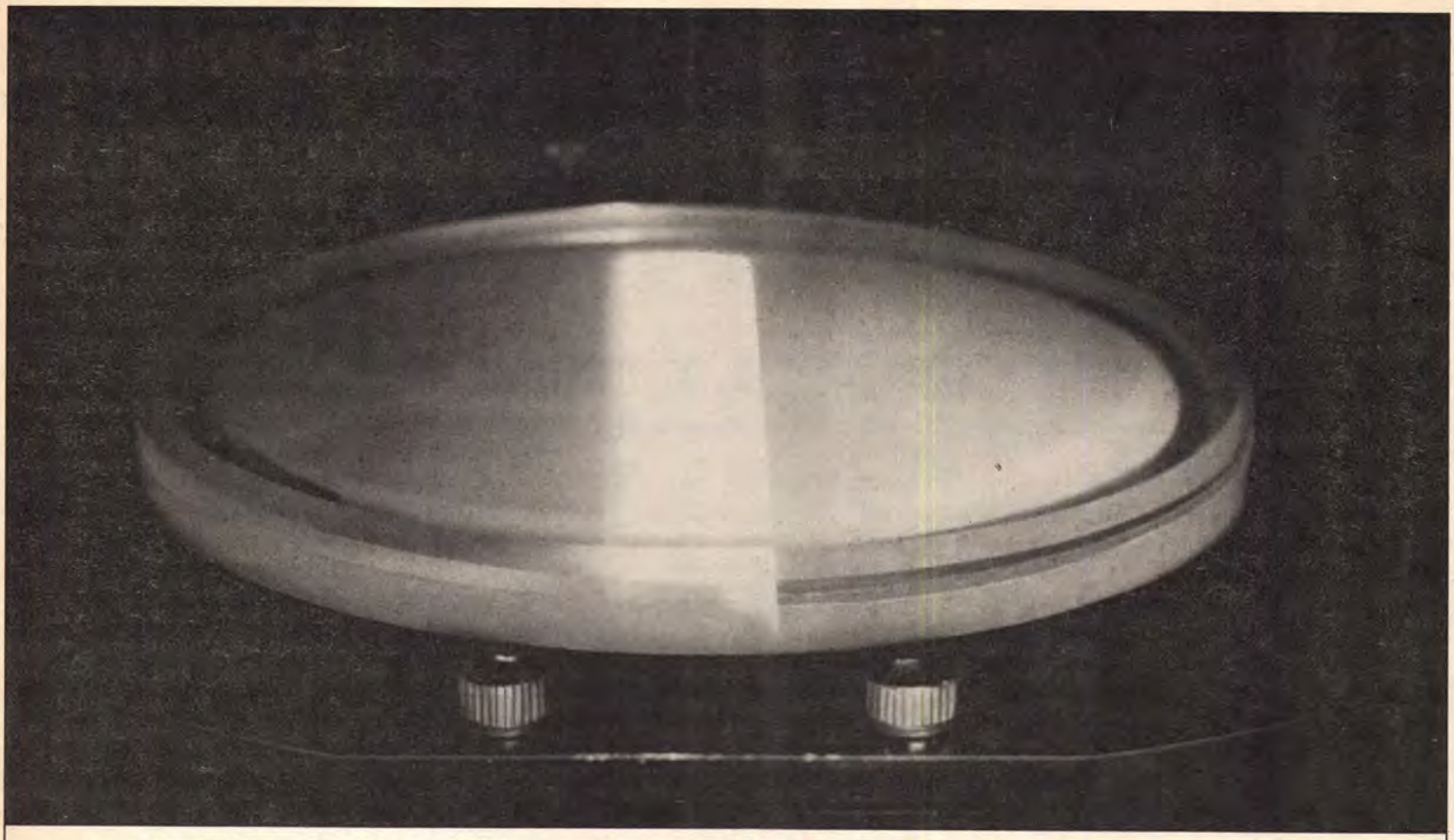
Phone/Tél./Tel.

Att./A l'att. de/z.H. von

Bobstgraphic
Photocomposition *Switzerland*

Division de Bobst SA
Tel. (021) 89 29 71

CH-1001 Lausanne
Telex 26 382 bgrap ch



NOW YOU CAN SET TYPE AT THE SPEED OF LIGHT

All phototypesetters use light to expose the characters. But your typical photomechanical typesetter can only be as fast—and as reliable—as its slowest moving parts.

In Autologic's APS-Micro 5, moving parts are replaced with electronic circuitry. Digitized characters are formed on a cathode ray tube ("CRT") within the typesetter (photo above), and beamed onto paper or film.

The result is unparalleled speed and reliability. The APS-Micro 5 sets 1250 lines per minute. That's twice as fast as any typesetter in its class, and ten times faster than a second generation machine. And you can forget about downtime. Modular circuitry and proven technology keep the APS-Micro 5 running with minimal operator attention or maintenance.

For the first time, the APS-Micro 5 puts Autologic technology within reach of firms that don't require the full capabilities of our APS-5, the industry's leading digital CRT typesetter. Now, the high speed and reliability of digital typesetting is an accessible alternative. APS-Micro 5 rental plans are also available.

Autologic, Inc., 1050 Rancho Conejo Blvd., Newbury Park, CA 91320. (213) 889-7400. A subsidiary of Volt Information Sciences, Inc.



APS-MICRO 5
DIGITAL CRT TYPESETTER BY AUTOLOGIC

Why a Comp/Edit phototypesetter is the best buy in the business.

To get all this power in any other typesetter, you'd have to pay twice as much.

A Comp/Edit system gives you 16 type faces and 138 sizes on-line.

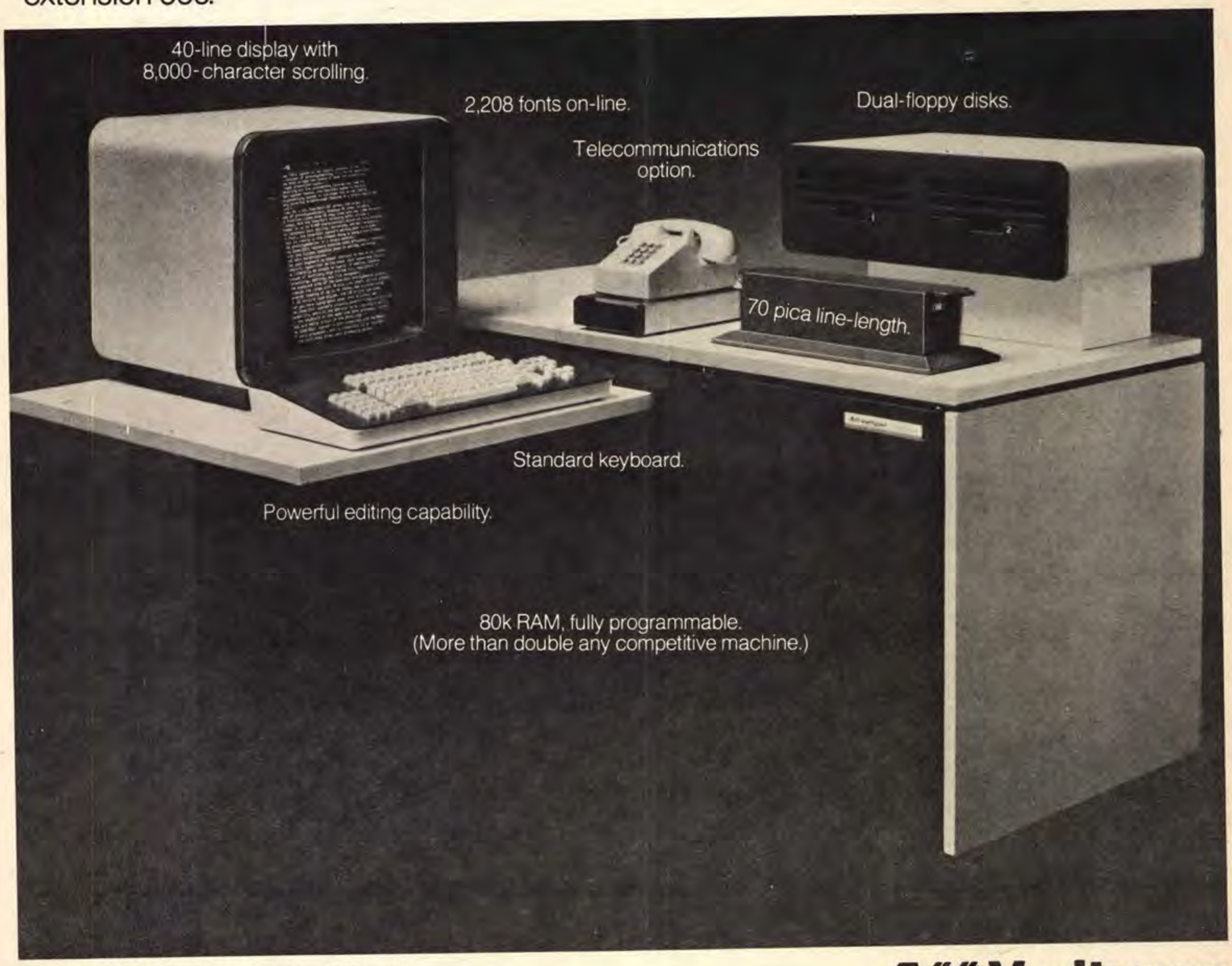
You get a 40-line display screen with an 8,000-character scrolling buffer. And editing power that's backed by 80K of memory, the biggest of any machine in its price range.

You'll cut down on time-consuming paste-up operations, too, because our 70-pica line length and 16-inch reverse leading let you do big jobs in one piece.

With all this power, the Comp/Edit system is easy-to-learn and easy-to-use. And it's backed by the largest service force in the industry.

We'd like to tell you more about how a Comp/Edit system can help your business. (We've only begun to describe all of its features.)

So call toll-free today, and we'll send you our new copyfitting calculator, absolutely free. Call (800) 631-8134, except in Alaska and Hawaii. From New Jersey, (201) 887-8000 extension 666.



This ad was entirely composed on the Comp/Edit system.

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AM Varityper
the Informationists.

TYPEFACES

A much broader market is becoming typeface style-conscious. This is true across the communication arts spectrum — in newspaper plants, in book and magazine publishing, in advertising and promotion departments and services (where it has long been recognized), and especially in the burgeoning in-office word processing and typesetting operations, where concern for type styles is often something new. In the office market, as new styles are introduced on typesetters, they will also become desirable (along with multicolumn formats) for correspondence and other office documents. At first, the chief reasons for this may be novelty and fashion; but sounder and long-range considerations are:

*Greater attention-getting power.

*Better readability.

*Better ability to organize material graphically and achieve emphasis.

*Better comprehension and retention of content: a study made by ITT shows that typeset copy is remembered longer and understood much better than the same copy is when typewritten.

*Copy compaction — saving perhaps 40 percent or more of filing space and materials, printing, and mailing costs.

*Typefaces can improve cost- and communications effectiveness.

TOMORROW'S KEYBOARDER

The typesetting input operator of the '80s increasingly will be neither a professional typesetter nor a secretary but a typographist. She or he will work in offices, in studios, or at home, as well as in publications, typesetting services, and printing operations. These typographists, along with professional typesetters, will function in a typesetting and typeface environment markedly different from that existing in all but the last several of the 500-plus years since Gutenberg developed movable type and the adjustable mold.

SOME TYPEFACE TRENDS TO WATCH FOR IN THE '80s ARE:

*More fonts with small caps and old-style figures.

*More fonts with superior and inferior figures.

*Digital typesetters teamed with a good front-end system will be able to automatically set, kern, and position fractions; automatically create small caps (setting the cap letterform to the size of the lowercase x-height, or about 70 percent of cap height); automatically set underscores to a commanded length; automatically set horizontal and vertical rules; automatically set and position inferior/superior characters; and make chosen type styles condensed, expanded, or oblique.

These extended machine capabilities, plus the enlarged fonts referred to above, will give designers new ways of achieving desired effects.

*Larger fonts, with more pi characters.

*Fonts designed to accommodate special characters and logos.

*More digitally generated images. Since such images are produced incrementally, a line or a dot at a time, the quality of such images may not always be as good as photographically exposed images. Digital image quality will depend on the number of data elements per inch, the number of data elements per em, and the size of the writing spot or writing beam. One should check the output of digital typesetters against one's quality requirements.

*More fonts supplemented with foreign accents, diacriticals, and special characters.

*Continued issuance of a full family of fonts (such as ITC Cheltenham or ITC Garamond) as experienced designers prefer to design in-family for text and display and less-experienced in-office designers do so to be safe. Full families will also offer a better range of weights, often including a choice of text weights.

*Continued demand for typefaces designed with large x-heights and close letterfit.

*A new typesetting mathematics — not just a conversion to metrics. Interline spacing (leading) of 1/10 point on some machines and spacing that can be determined and specified optically, rather than mathematically, on electronic paginators will become more common. Sizes will no longer be limited to such fixed steps as 6, 7, 8, 9, 10 points, etc.

*Ruled forms produced on typesetters drawing uniform and precise continuous horizontal or vertical rules of almost any thickness and feasible length.

*More sophisticated kerning and hyphenation/justification programs.

*More and better software programs for controlling typographic niceties such as letterfit; at the same time, more devices to permit operator intervention, so that skilled operators can exercise the taste and judgment a machine cannot apply to a customized situation.

*More typefaces issued with condensed versions, together with an increasing use of digital typesetters to condense letters as the need for getting more copy in less space grows. Of course, a point of diminishing returns will eventually be reached.

*More script typefaces for machine-setting, especially as phototypesetters and digital typesetters demonstrate their ability to connect characters, or to set them closer, and to cope with larger fonts containing the ligatures and alternate characters that give

More complete fonts. *Since digital typesetters can handle larger fonts than phototypesetters, we will see a resurgence of small caps, old-style figures, more foreign characters as well as special superior figures in many new fonts. This ITC Fenice Regular font indicates the scope of fonts to come.*

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890&1234567890$$¢£%
ĄÇĐĘŁØÆŒßąćđęłøäëœfi
(:,..!?•-“”’—/#*)[†‡§«»1234567890]

abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890

style and distinction to scripts and cursives. Some fonts will even feature special strokes for joining characters or adding flourishes to first or last letters of a word.

*More minus leading, such as a 10/9-point setting.

*Abundant ligatures.

*Finer unit systems to encourage better determination of character widths and make for better letterfit and better control of type color.

*More typeface modifications, such as creating from one master font such variations as inline, outline, shadow, contour, oblique, condensed, or expanded—each obtainable in various degrees and combinations. Some digital typesetters can do some of these things now. Special devices such as the Graphics Modifier (Byers Corporation) and the Type-Flex system (Snook Corporation) can also create a very large number of variations (inlines, outlines, shadows, contours, inline or outline shaded, contour shaded) from a single display face.

*The main effect of the new technologies however, will not be on typeface design as such but, because of lowered costs of offering new typefaces, will be an increase in the variety of styles available.

In addition to the classic styles, more distinctive styles and more fashion-oriented styles will be economically feasible. After all, today's photo font often pays for itself within a day or two, whereas it formerly took a year or more to absorb the heavy outlay for its equivalent in Lino or Mono mats, and before those mats were fully paid for some shops were ordering replacement mats. But even in the '80s, one of the things a typesetting service will offer is a larger library of fonts than any one customer might want to own.

*Electronic typewriters and word processors, especially those using proportional-spacing daisy wheels, will somewhat expand their font libraries by adding a few of the more popular typefaces. These will have to be redrawn to fit the machine's mechanical requirements. They will probably be small families: a roman, an italic, and a bold. These can be mixed on dual-font daisy wheels or dual-head printers.

*Almost all machines will be capable of minus letterspacing and minus leading.

*Typeface styles will also be added to the libraries of nonimpact printers: ink-jet, electrostatic, or digital-controlled laser devices. These machines may be commercially available at moderate prices in the '80s. They will be able to handle graphic-arts-quality typefaces, will take a large font and a full family, and in general are likely to be competitive with typesetters in medium and large installations in regard to capability, quality, and cost-effectiveness.

*There may be a trend toward larger text type sizes in publications. The forces promoting this are increased volume of information vs. the decreased amount of time most people have for reading. Of course, this ratio will stimulate more concise writing.

*Today's full families offer designers one compatible style in a wide range of carefully graduated weights. As a result, the distinction between text type styles and display faces is largely disappearing.

*As previously mentioned, some digital typesetters can handle **larger** fonts. However, they will be able to use **smaller** fonts if users will be satisfied with machine-created small caps, superior/inferior figures, fractions, condensed and expanded characters, and oblique characters instead of true italics.

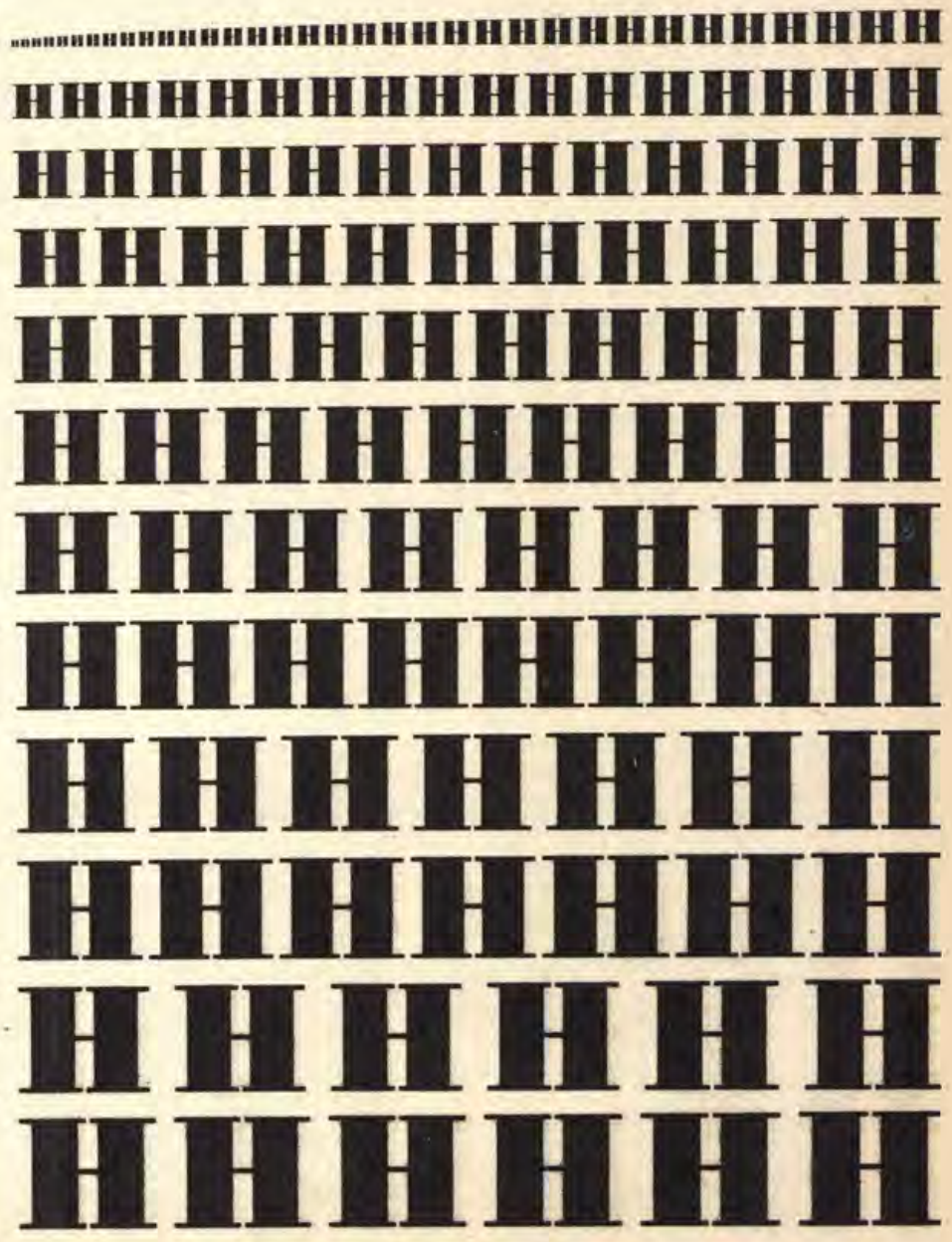
*Some people foresee more ragged-right setting in the '80s. This will come about, they assert, when publishers realize its aesthetic values and time- and cost-saving advantages, as well as its improved legibility when set properly.

*The designing of new typefaces and styles is also undergoing changes. A program such as that developed by Dr. Peter Karow (the Ikarus Program) of Hamburg, Germany, or by Professor Donald Knuth at Stanford University (the Metafont System) would enable a designer, using a software program and certain terminals or other devices, to design new typefaces.

*The Ikarus program, being used by some major font manufacturers, can create various weights and versions of a typeface relatively rapidly and easily by modifying two existing versions, preferably the lightest and the darkest. Metafont, on the other hand, enables a designer working at a terminal keyboard to create the original version as well as other weights. It is beyond the scope of Vision '80s to detail how such programs as Ikarus or Metafont work. They are mentioned here only to indicate that in the '80s we may see new typefaces developed more easily, more quickly, and more economically.

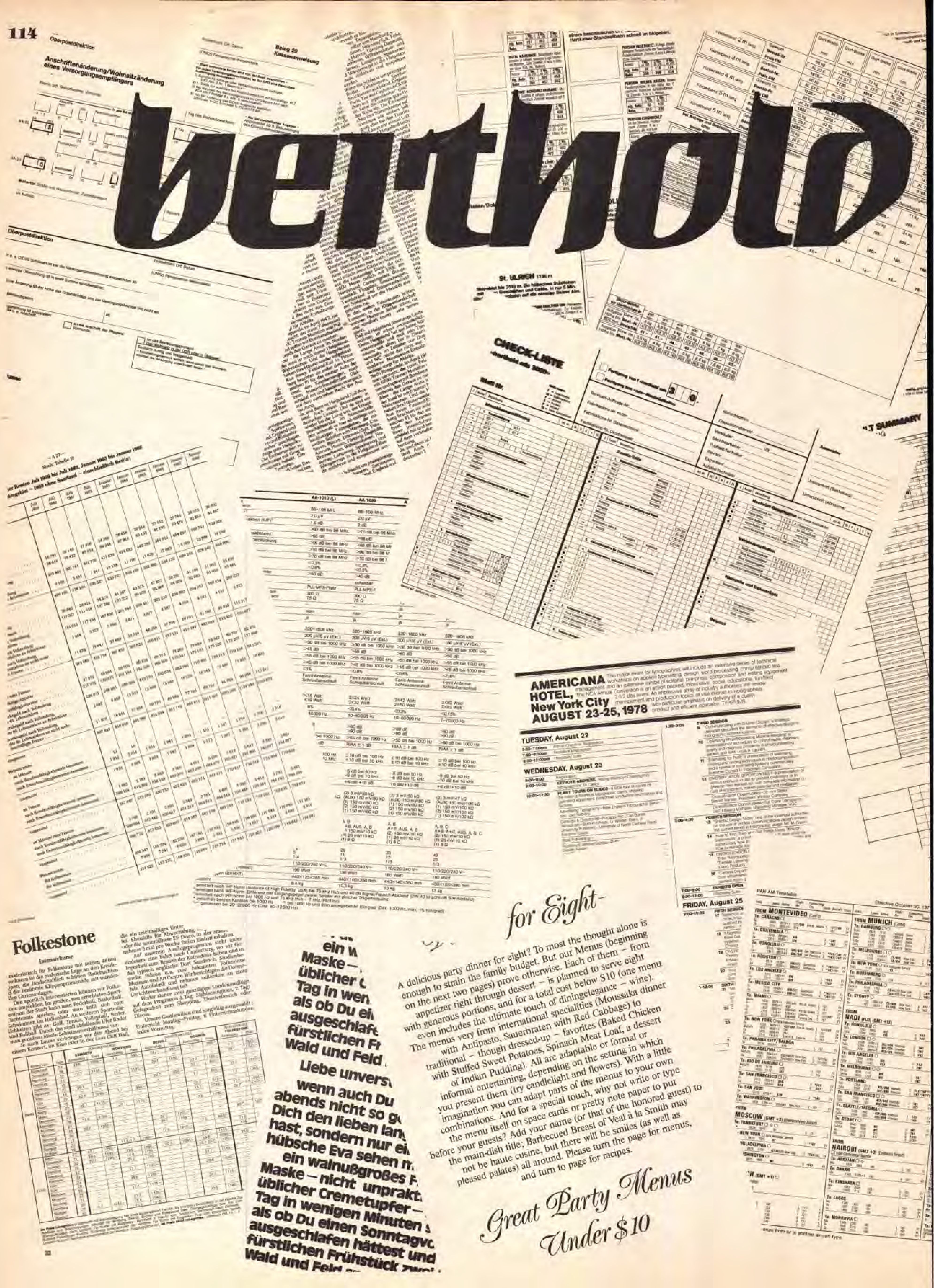
GRAPHIC ARTS FONT SCANNERS

A number of major font manufacturers are now using font scanners to convert typeface art into digital information. One such device is offered by Optronics International, Inc. Their complete line of type/font and logo scanners comes in sizes from 10 x 10 inches to 24 x 24 inches. The systems are available in either single or multi-channel models along with speed and resolution variations.



A new typesetting mathematics. *These 136 different sizes of a Poster Bodoni capital H were set in 32 seconds on a Linotron 202. They include every ½-point and full-point size from 4½ to 72 points. All sizes are automatically base-aligned and were set from one master font digitization. Input was paper tape. Setting time could have been reduced to about 24 seconds had the input device been on-line to the typesetter.*

The new typesetting mathematics will not only involve more half and full sizes than heretofore but will eventually convert sizes to the metric system, provide for finer line spacing (now 1/10 point increments on some machines) and make possible optically selected sizes that may be as mathematically off beat as 9 7/32 points.


berthold
Anschriftenänderung/Wohnsitzänderung eines Versorgungsempfängers
Oberpostdirektion
Beleg 20
Kassenanweisung
St. ULRICH
CHECK-LISTE
AMERICANA HOTEL, New York City AUGUST 23-25, 1978
TUESDAY, August 22
WEDNESDAY, August 23
FRIDAY, August 25
THIRD SESSION
FOURTH SESSION
PAN AM Timetable
FROM MONTEVIDEO
FROM MUNICH
MOSCOW
NAIROBI
Folkestone
Intensivkurse
ein w
Maske –
üblicher C
Tag in wen
als ob Du ei
ausgeschlafe
fürstlichen Fr
Wald und Feld
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ein walnußgroßes F
Maske – nicht unprakt
üblicher Cremetupfer –
Tag in wenigen Minuten s
als ob Du einen Sonntagv
ausgeschlafen hättest und
fürstlichen Frühstück zwei
Wald und Feld
for Eight–
A delicious party dinner for eight? To most the thought alone is enough to strain the family budget. But our Menus (beginning on the next two pages) prove otherwise. Each of them – from appetizer right through dessert – is planned to serve eight with generous portions, and for a total cost below $10 (one menu even includes the ultimate touch of diningelegance – wine). The menus very from international specialities (Moussaka dinner with Antipasto, Sauerbraten with Red Cabbage) to traditional – though dressed-up – favorites (Baked Chicken with Stuffed Sweet Potatoes, Spinach Meat Loaf, a dessert of Indian Pudding). All are adaptable or formal or informal entertaining, depending on the setting in which you present them (try candlelight and flowers). With a little imagination you can adapt parts of the menus to your own combinations. And for a special touch, why not write or type the menu itself on space cards or pretty note paper to put before your guests? Add your name (or that of the honored guest) to the main-dish title; Barbecued Breast of Veal à la Smith may not be haute cusine, but there will be smiles (as well as pleased palates) all around. Please turn the page for menus, and turn to page for racipes.
Great Party Menus
Under $10

ADS 3000

Mehr Amerika
NEUE PREISE

2.98	Reis fit 500-g-Packung	statt 2.89 jetzt nur	2.23
5.28	Span. Pfirsiche HKl. 1	je 1-kg-Schale	2.98
28	Griech. Orangen HKl. 2	je 1-kg-Schale	3.79
98	Schlagrahm 0,2-Ltr.-Becher	statt -.89 jetzt nur	-.69
	Einkochtopf emailliert	Stück	24.95
500 g 3.28	Wandfarbe wischbeständig	12-kg-Eimer	
100 g -.98	Wiener Becher Schoko-Spezialitäten	125-g-Becher	-.
je 100 g -.89	Gelier-Zucker	1-kg-Beutel	2.6
je 100 g -.89	Südzucker	2,5-kg-Beutel	3.6
1 kg 7.90	Überkinger Sonderangebot	12/0,7 ltr.	3.95
2.05	EKU Hell	20/0,5 ltr.	9.95

Donnerstag Frankfurt – New York

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VORAUSSCHAU WINTER 75/76

Obligatorische Zusatzflüge bei ABC-Flügen

WICHTIG BEI ABC-FLÜGEN:

PAN AM.
Clipper Cargo

CAUTION – CARBONS DESIGNED FOR TYPEWRITER ▶ HOLD HERE ◀ AND PULL FROM BOTTOM TO REMOVE CARBONS

GÜTE UND SCHLECHTE BUCHSTABEN

unsurpassed
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equipment

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Fritz Eichbauer – Bauhelfer

Technische Assistentin

Digiset-Schriften

Das Angebot an digitalen Schriften für den Digiset umfaßt nahezu 460 Schriftprogramme oder 170 Schriftschnitte in bis zu 5 Größenbereichen. Dahinter steht – hier nicht sichtbar – ein großzügiger Ausbau mit einem Zeichenvorrat bis zu 500, in Extremfällen sogar bis zu 900 Zeichen je Schnitt und Größenbereich. Einschließlich vieler Sonderzeichen stehen jedem Digiset-Kunden rund 110000 digitale Zeichen zur Auswahl.
Die digitale Schriftbibliothek für den Digiset wurde in 15jährigem Schriftschaffen mit großer Sorgfalt und künstlerischem Engagement für den Lichtsatz entworfen. Sie enthält so berühmte Traditionsschriften wie Baskerville, Bodoni, Clarendon und Garamond als auch beliebte Lizenzschriften wie Bembo, Century-Schoolbook, Futura, Gill, Palatino, ITC Souvenir, Times und Univers.
Schriftkünstler wie Hermann Zapf und Gerard Unger schufen eine neue Generation von Digiset-Schriften. Nach der Marconi, Edison, Demos und Praxis sind weitere Schriften in Arbeit. Unser Designerteam, künstlerisch unterstützt durch den Schweizer Typografen Max Caflisch, hat die Napoleon und Monanti entwickelt. In Anlehnung an traditionelle Schriftformen entstanden Schriften wie Holsatia, Digi-Antiqua, Digi-Grotesk, Digi-Fraktur, Angro, Heraldus und Kapitellia.
Dank abgestimmter Digitalstruktur können die angebotenen Schriften für alle Digiset-Modelle geliefert werden. Das Angebot wird laufend erweitert und auf die Wünsche einer ständig wachsenden Zahl von Digiset-Kunden abgestimmt.

Digiset type faces

The range of digital typefaces for Digiset typesetters comprise almost 460 fount programs or approximately 170 weights in up to 5 size ranges. What you cannot see here is that this is backed up by a generous selection with a character set of up to 500, in extreme cases even up to 900, characters per weight and size range. If the numerous special characters are included, this means that Digiset users are offered a selection of some 110,000 digital characters. The library of digital typefaces for Digiset has been developed for CRT typesetting with the greatest artistic devotion and care over 15 years of typeface creation. The range includes such famous, traditional typefaces as Baskerville, Bodoni, Clarendon and Garamond, as well as such popular typefaces produced under licence, such as Bembo, Century-Schoolbook, Futura, Gill, Palatino, ITC Souvenir, Times and Univers.
Typographical artists such as Hermann Zapf and Gerard Unger created a new generation of Digiset typefaces. Following Marconi, Edison, Demos and Praxis, new typefaces are now being developed. Our own team of designers, with the Swiss typographer Max Caflisch acting as artistic consultant, developed the Napoleon and Monanti typefaces. Typefaces such as Holsatia, Digi-Antiqua, Digi-Grotesk, Digi-Fraktur, Angro, Heraldus and Kapitellia were designed on the basis of traditional types.
The specially adapted digital structure means that the typefaces offered by Hell can be supplied for use on all Digiset models. The range of typefaces is being expanded all the time and adapted to the wishes of an ever-increasing number of Digiset users.

Akzidenz-Grotesk schmalmager
Akzidenz-Grotesk schmalhalbfett
Akzidenz-Grotesk schmalfett
Aldus normal
Aldus kursiv
Aster normal
Aster halbfett
Aster kursiv
Baskerville mager
Baskerville halbfett
Baskerville kursiv
Baskerville halbfett kursiv
Bembo mager
Bembo fett
Bembo kursiv
Bodoni mager
Bodoni Buch
Bodoni halbfett
Bodoni fett
Bodoni extrafett
Bodoni kursiv
Bodoni Buch kursiv
Bodoni halbfett kursiv
Bodoni fett kursiv
Bodoni extrafett kursiv
Candida mager
Candida halbfett
Century Schoolbook mager
Century Schoolbook kursiv
Clarendon normal
Clarendon fett

Delia mager
Delia fett
Demos normal
Demos halbfett
Demos kursiv
Digi-Antiqua mager
Digi-Antiqua schmalmager
Digi-Antiqua halbfett
Digi-Antiqua kursiv
Digi-Fraktur
Digi-Grotesk Serie N mager
Digi-Grotesk Serie N fett
Digi-Grotesk Serie N schmalfett
Digi-Grotesk Serie S mager
Digi-Grotesk Serie S halbfett
Edison Text
Edison halbfett
Edison kursiv
Edison halbfett kursiv
Folio Buch
Folio halbfett
Folio dreiviertelfett
Futura Buch
Futura dreiviertelfett
Garamond mager
Garamond normal
Garamond halbfett
Garamond kursiv
Garamond halbfett kursiv
Garamont mager
Garamont halbfett

Garamont kursiv
Gill mager
Gill normal
Gill halbfett
Gill fett
Ελληνικά τέμπορα
Ελληνικά τέμπορα
Heraldus fett
Holsatia mager
Holsatia normal
Holsatia halbfett
Holsatia fett
Holsatia schmalfett
Холсатиа нормальный
Холсатиа попчжирный
Impressum mager
Impressum halbfett
Impressum kursiv
Impressum halbfett kursiv
Marconi Text
Marconi halbfett
Marconi kursiv
Marconi halbfett kursiv
Monanti normal
Monanti halbfett
Napoleon mager
Napoleon normal
Napoleon halbfett
Napoleon fett
Nikis mager
Nikis halbfett

Nikis kursiv
Nikis halbfett kursiv
OCR-B
Olympia mager
Olympia halbfett
Palatino mager
Palatino halbfett
Palatino kursiv
Praxis normal
Praxis fett
Schreibmaschinenschrift
Tempora mager
Tempora dreiviertelfett
Tempora kursiv
Times mager
Times fett
Times kursiv
Times fett kursiv
Таимс тонкий
Таимс жирный
Trump-Mediäval normal
Trump-Mediäval halbfett
Trump-Mediäval kursiv
Univers mager 45
Univers schmalmager 47
Univers normal 55
Univers schmalnormal 57
Univers halbfett 65
Univers schmalhalbfett 67
Univers fett 75
Univers breitfett 83

HELL

Dr.-Ing. Rudolf Hell GmbH
Postfach 6229
D-2300 Kiel 14
Telefon: (0431) 20011
Telex: 0292858
Telefax: Gr. 2 (0431) 2001447

Why would anyone need 68½ point Tiffany Heavy?

You might think you'll never need 68½-point Tiffany Heavy or, 59-point Lubalin Graph Bold. But for perfectly fitted copy, it could make all the difference. That's why our Comp/Set and Comp/Edit phototypesetters were designed to give you more type sizes on-line than any comparably-priced systems.

The Comp/Set system gives you 70 sizes and the Comp/Edit system offers 138. All the way from 5½ to 74 points.

So you can get the exact size you need to make every job look perfect.

And you get typographic niceties like white space control and kerning to make your type fit and look good. But that's just the beginning.

To hear the full story, call us today toll-free. We'll send you our free copyfitting calculator, a valuable tool for type specifying. Call (800) 631-8134, except in Alaska and Hawaii. From New Jersey (201) 887-8000, extension 666.

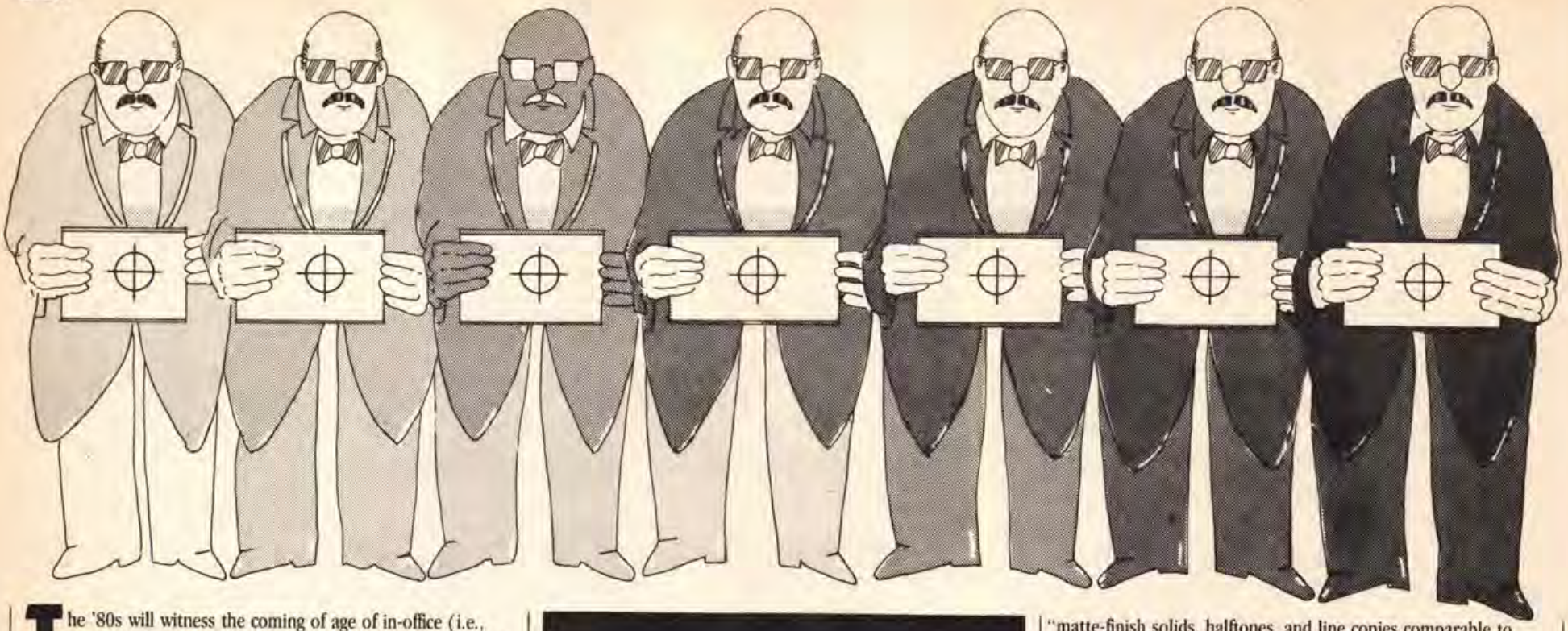
Remember, next time you need 68½-point Tiffany Heavy, we can give it to you. Why settle for less?



This ad was entirely composed on the Comp/Edit system.

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REPRODUCTION

The '80s will witness the coming of age of in-office (i.e., "in-plant") printing. Just as much keyboarding, text editing, and typesetting will be done internally in the '80s, so will an increasing volume of production and printing of multiple copies. This is due to a combination of forces:

•Equipment costs and ease of operation of platemakers, copiers, duplicating machines, printing presses, and binding and finishing equipment are offering a new combination of cost-effectiveness and capabilities to in-plant operations.

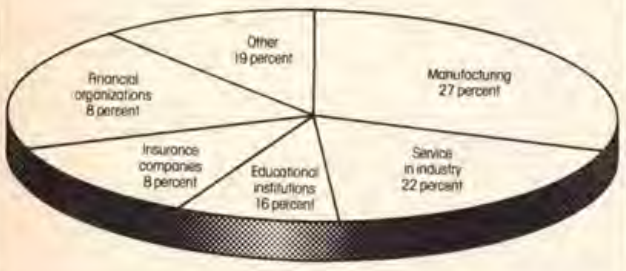
•As the entire communications process reviewed in Vision '80s —from dictation and creation of art to ultimate document distribution—becomes digital/electronic, the technologies for producing multiple copies become part of a unified digital/electronic system.

Consider these facts:

•At the beginning of the '70s, there were about 25,000 in-plant operations; today there are 83,000.

•Virtually all the Fortune 500 companies have in-plant facilities that include art services, typesetting, platemaking, printing, binding, and distribution systems.

•Where are these in-plant operations?



•In-plant printing operations are merging with the whole gamut of in-office operations—being electronically linked to data bases, satellite transmission systems, nonimpact printing stations, text-editing and typesetting departments, micrographic installations, and duplicating and copying units. They are an integral part of the whole system of manipulating digitized information. In contrast to outside services, they offer faster turnaround, better security, and, when properly installed and operated, cost-effectiveness.

•Where does this leave the commercial printer? He will still handle the large and varied forms, the colorwork, the very long runs, and many kinds of specialty printing. For the foreseeable future—although its volume will increase dramatically—in-plant work will mostly be short-run, black-and-white, 8½ × 11 format, typographically simple, involve frequent updates of tabular matter and catalogs and other stored-for-reuse material, and handle the tight-security documents and jobs with almost immediate turnaround requirements.

•What about in-plant equipment? It ranges from simple copying machines to large presses. With their ability to reproduce and collate fairly large runs of multiple-page documents, copiers and office duplicators have become virtually presses now. Most significantly, the increased sophistication of the equipment permits them to operate rapidly and reliably when run by lower-paid operators of lesser skill than is the case with commercial printers. The machines themselves accomplish what the craftsmen used to do. In-plant printers use offset presses, including web presses and those taking sheets larger than 11 × 17. Some 97 percent print by offset; 49 percent use large electrostatic copiers; 12 percent use letterpress; and 5 percent use silk screen.

•The heart of the in-plant operation in the '80s will be its computer. Through the computer, digitized information can be input, edited, paginated, typeset, and transmitted to a multiple-copy output station. All kinds of documents can be so handled, including computer-generated maps and engineering drawings and the whole gamut of printed literature: catalogs, newsletters, price lists, research reports, employee handbooks, promotional booklets, etc.

•These will be reproduced differently in different plants. In some, bypassing film or paper copies, a typesetter will output made-up pages directly to a press plate. In others, bypassing plates, made-up pages will be electrodigitally transmitted to an electrostatic or ink-jet printer. This is nonimpact, plateless printing. And in still other situations, even the typesetting operation as a separate step will be bypassed. Some of these technologies were reviewed in Vision '80s' look at nonimpact printers in the section on Word Processing.

•General directions for the '80s include more narrow web presses, dry-processing typesetters (no film or chemicals), more computer-controlled laser-based imaging systems, and wider use of ink-jet and electrostatic duplicators and electronic scanners.

COPIERS

Some trends in copiers that can be expected are:

•More two-side copiers like the Xerox 9400 and the AM 4975E. The Model 9400 illustrates how the little office copier has grown up. It can handle up to 200 originals with unattended operation. It can reduce copy size, and its sophisticated electronics include a self-diagnosis and alert program for malfunctions. It can hold 2,500 sheets measuring from 8½ × 10 to 8½ × 14. An auxiliary tray can hold 400 sheets of a different size, accessed by pushing a button. A copier like this is really an electrostatic press. It can output two impressions per second (7,200 per hour) and has integral sorters for limitless collating. The AM 4975E is an easy-to-operate office machine that automatically duplicates at 34,000 impressions per hour (8½ × 11, both sides of the paper).

•Improved output quality. The Xerox 9500 copier/duplicator is a high-volume, high-speed unit that claims to produce "matte-finish solids, halftones, and line copies comparable to high-quality offset reproduction."

•More electrostatic color copiers.

•Copiers equipped with electronic copy quality controls.

•More multifunction devices, combining input, editing, makeup, and multicopy reproduction capabilities in one box.

•More linking of WP text editors to central filing, reproduction, and distribution facilities, so that the editor can be used most of the time for editing.

•In larger offices, a growth of central copy centers with large equipment, abetted by smaller convenience copiers at administrative support (AS) stations throughout the organization.

In addition to servicing the short-run needs of these AS stations, such convenience copiers can serve as backup for the central copying operation.

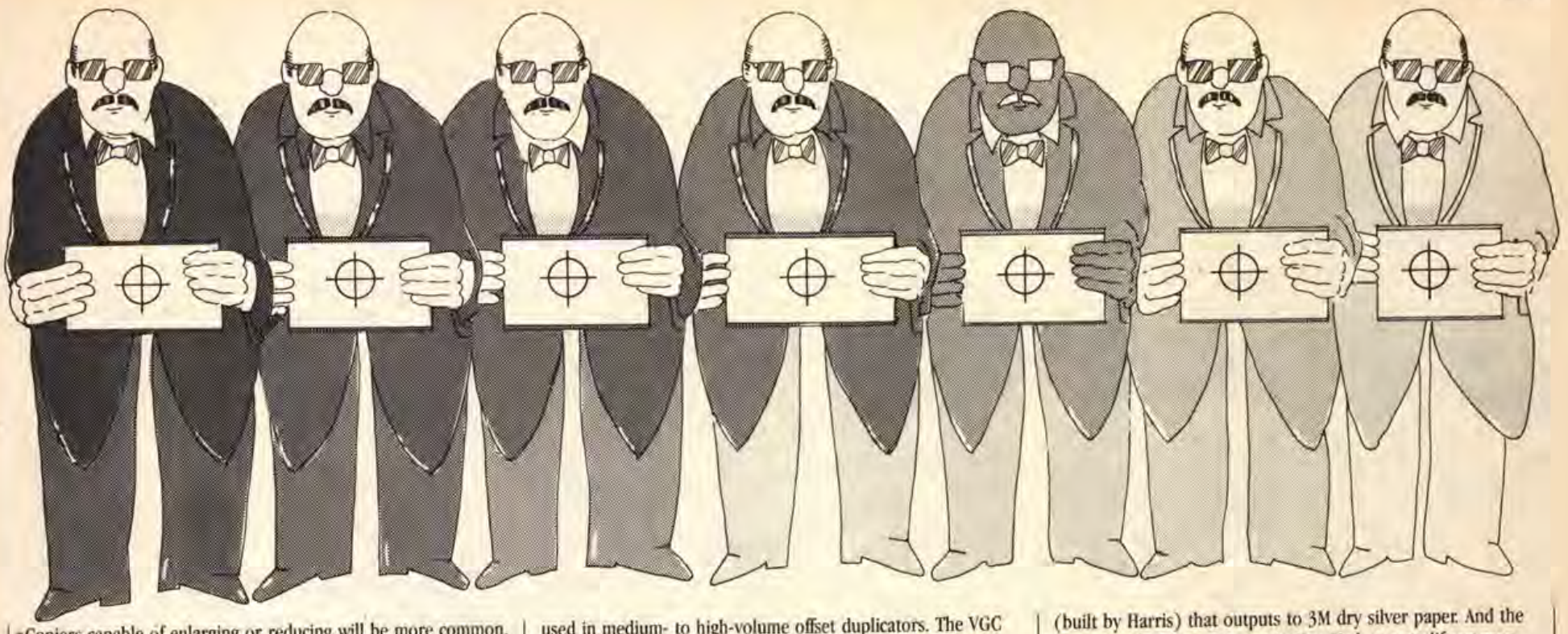
•Copiers are increasingly available to meet special needs and are available with optional accessories. For example, there are plain-paper and coated-paper copiers, and thermal, liquid, or dry and roll-fed or sheet-fed models. Some accept transparencies and books; some can produce transparencies and offset masters.

They come in various size ranges, run at different speeds, and are geared to short or long runs. Accessories include automatic feeders, collators, and staplers. In the '80s, possibly more will be able to operate on-line to input/editing stations.

Copy quality upgraded. *The Xerox 9500 produces two-sided copies, matte-finish solids, halftones and line copy and claims to be comparable to high-quality offset printing.*



ILLUSTRATION BY JUREK WAJDOWICZ



•Copiers capable of enlarging or reducing will be more common. For example, an enhancement to the Xerox 9400 permits one to dial several settings, ranging from 61.5 percent to 102 percent of the original size. And the Xerox 2080 printer permits reductions of large drawings, for example, to less than half the original size and enlargements to nearly 50 percent up. The Xerox 8200 offers three modes of reduction and features on-line stapling.

•Fiber optics copiers are coming of age. Examples are the 3M Model VQC, the Minolta Electrographic™ 301, and the Xerox 2600. The typewriter-size VQC, for example, replaces lenses, mirrors, baffles, high-energy lamps, reflectors, and coding coils with microscopic glass rods that carry concentrated light to the fiber optics bar. Using two 15-watt fluorescent bulbs, the bar focuses the image onto the copy paper. Dry powder is cold-fused to the paper to form the image. Fiber optics copiers are smaller, lighter, and require less maintenance than conventional electrostatic copiers, and they achieve improved, more uniform resolution. They cost less initially than copiers using conventional optics with comparable features and are also less expensive to operate.

Combining these advantages with the capabilities that large models can have, one can easily envision them playing a major role as in-office printing presses in the '80s.

•There will be wider use of intelligent-copier/laser-printer devices, such as the Xerox 9700 and others reviewed in the section of Vision '80s dealing with nonimpact printers.

PLATEMAKING

In the printing industry and in internal reproduction centers, there is and will continue to be a drive to cut the cost of prepress operations, including platemaking. New technologies will help reduce labor and material costs by automating many operations and eliminating the need for much photographic film, paper, and chemicals.

More direct copy-to-plate systems will bypass intermediate film exposure and processing steps. As we move through the '80s, we can expect:

•Costs of scanners and photocomposer technology will fall within the budgets of midsize plants.

•A decreasing availability of skilled craftsmen will give impetus to the development of automated systems.

•Laser platemakers may also be available within reach of in-plant budgets in the late '80s, and commercial platemakers by the mid-80s. Today, they are still mostly used by newspapers.

•Platemaking speeds are already stepped up. The ECRM 8400 Autokon electronic camera used at the *Christian Science Monitor* exposes and processes a halftone, from continuous-tone original to processed screened halftone film, in 2 to 3 minutes —compared with the 15 minutes required by conventional technology.

•The VGC Platemaker 200 will deliver Rapilith offset plates at the rate of three per minute with push-button ease. These plates are used in medium- to high-volume offset duplicators. The VGC Platemaker 200 has autofocus, a digital timer, and a digital plate-length indicator.

•High-speed economy platemaking systems, such as the 3M model, deliver dry paper offset plates for short-run work in 20 seconds. EOCOM makes offset plates in 5 minutes.

•In commercial installations, color scanners are being used increasingly as their costs come down.

•More electronic reproduction systems will in one device automate makeup, halftone creation, and platemaking, such as do those being developed by Crosfield and Dr.-Ing. Rudolf Hell.

Hell's Chromacom system accomplishes color page mounting and retouching. With the HDP system the data output is carried directly onto the gravure cylinder using a Helio-Klischograph engraving machine.

•At the user end, the trend will be to supply the printer (whether internal or a commercial service) with one-piece camera-ready copy.

•Silverless film will possibly become a commercial reality. Impetus for its development is being intensified by the worldwide shortage and costliness of silver. In research and development stages, some such film is said to compete with conventional film in speed and surpass it in resolution and gray scale.

•Full automation of the steps needed to convert original artwork into ready-to-engrave color films is imminent. The laser-oriented Response 230 color separation system (developed in Israel by Sci-Tex Corporation Ltd.) can electronically color-correct, make copy changes, and enlarge or reduce any element in the art. All changes can be reviewed immediately. The color-correction technique employed is referred to as "electronic airbrushing."

•A trend toward digital storage of picture information on a disc will be prevalent.

•Picture information stored on a disc will be able to be called up for monitoring on a CRT, where it can be positioned, edited, and combined with other picture or type elements to create a full page ready to output.

•Such a fully composed page could then be exposed directly onto offset plates or gravure cylinders.

•The picture or full-page data could be sent to remote sites for platemaking and printing.

•Newspapers of the late '80s or early '90s may be printed by plateless imaging, have demographically/geographically variable information for various circulation segments, and be process-color-printed throughout. Though some of these capabilities may not be fully commercial until the mid-'80s, and even then at seven-figure prices, they will be accessible in the immediate future at least for large publishing and printing operations.

•Photographic prints will be able to be made at remote locations. The Associated Press, for example, already uses a facsimile device (built by Harris) that outputs to 3M dry silver paper. And the "electronic darkroom" set up in New York can modify or crop pictures digitally, using a CRT display so that the operator can see what has been accomplished.

Vision '80s is not a summary of the current state of the art in communications technologies; its focus is on the near future. The major platemaking developments that one should keep an eye on as we move through the '80s center around computer control of platemaking steps, electro-optical scanning, and the application of laser technology to scanning and platemaking.

AUTOMATED PAGE IMPOSITION

Computer-controlled camera techniques now facilitate production of one-piece film flats for a multipage press form from stored format parameters. The computer program promises to position pages on the film flat more precisely and more rapidly. Decreases in production time and in positioning errors should contribute to reduced costs as well.

PROJECTION PLATEMAKING

As noted above, microprojection techniques compatible with automated imposition equipment will cut costs in producing paper or metal plates. Equipment such as this has built-in precision and quality controls, almost like having a built-in craftsman, thus enabling comparatively unskilled operators to produce quality results. Obviously, this guaranteed performance is true of many of the technologies reviewed in Vision '80s.

ELECTRONIC PREVIEWERS, SCANNERS, AND COLOR CORRECTORS

As electro-optical and laser scanners become more common in the '80s, so will electronic previewers. The best-known scanners and color-correction monitors are the Chromagraph and Chromaskop (made by Dr.-Ing. Rudolf Hell in West Germany), the Linoscan 3040 (made by Linotype-Paul), the Separation Previewer and Scanner Previewer (both made by Hazeltine Corporation in the United States), Dai Nippon's line of scanners, and Optronics International's P-4500.

Electronic scanners accurately simulate color on a video display screen before plates are made. This feature, which enables color corrections to be made before the plates are made, is analogous to using electronic paginators in typesetting systems to preview a layout before committing it to typesetter output.

These electronic preproofing devices do more than merely separate the process colors from original art or transparencies. They simulate all subsequent reproduction steps, so that one can see how the reproduction will be affected by the following considerations:

•Filters and the process of color separation.

•Color correction.

•Paper color and characteristics.

•Ink properties.

One original, many faces. *Autokon's dials put contract/density, sharpness, size, crop, screen and tone control at one's fingertips.*



*Press, plate, and speed of printing.

*Characteristics of the picture tube used in the viewer.

The operator, that is, one who can exercise skill and judgment, can then program desired compensations at a console, as well as sizing and cropping. As with electronic paginators, the process is interactive. One can see the changes as they are made and can also simultaneously see the original and compare the adjusted picture to it. What happens, in effect, is that the first image on the CRT will represent the sum of all the distortions that the reproduction process will produce. When the image is corrected to the operator's satisfaction, the computer in the device calculates what corrections are necessary in producing the separations to compensate for the anticipated distortions. This digital information is then sent to the scanner, where it modifies the scanning results and produces corrected output. Some scanners can operate either on- or off-line to platemakers.

Essentially, after the corrections are indicated, a previewer electronically color-separates red, green, and blue ("additive" color primaries) from the original and sets up signals corresponding to them. The computer converts the signals into the "subtractive" primaries of yellow, magenta, and cyan used in printing and also alters their strengths to allow for creation of signals for producing the black plate. These four sets of signals (each is a stream of signals corresponding to the scan lines followed by the device) are connected to red, green, and blue drive signals for the electron guns of the monitor CRT. Thus the system, while creating corrected signals of subtractive colors for output, also re-creates from them additive color signals to permit monitor viewing of the recorded corrections.

ELECTRONIC SCANNING

Whether or not a color previewer is used, color art can be scanned, corrected, and separated by electro-optical or laser scanners. In conventional camera-film platemaking, the entire original is exposed at once; with scanning techniques, the original is converted point by point. The scanning light moves across the original in a regular raster scan (horizontal lines). The scanned light reflected from the original goes through three filters to set up light paths. Each path at any point corresponds in intensity to the corresponding scanned point in the original. Color separation and correction procedures are essentially as described above in the discussion of color viewers.

The information output of a color scanner can be used to produce color-corrected film separations. It can be electromagnetically stored for later use, as well as be used to drive a digital typesetter capable of "setting" pictures just as it sets type. And it can be telecommunicated to a remote site for any of the above uses.

Conventional light sources are generally used for scanning the original art, although a number of scanners now use laser beams for this purpose. But for recording the color separation information, laser beams are now more widely used. One reason for this choice is that the different colors of different laser beams are difficult to use to scan colored originals with fidelity. But in the recording mode the laser beams are dealing with separations that, although they represent colors, are actually black-and-white.

THE CHROMAGRAPH DC300

An example of a laser scanner is the DC300 offered in the United States by HCM Corporation. The DC300 is the only scanner that uses laser light and digital electronic dot generation. This means you can use low-cost, wide-latitude, rapid-access film and chemistry, which virtually eliminates film processing variables. This feature claims to save 50 percent in comparison with the cost of lith film. The patented electronic halftone screening gives fine image resolution and eliminates the problems that plague contact screen users, such as expensive screen inventories, dust, dirt, scratches, cleaning, wear, and screen replacement. With the DC300 you can select eight different sets.

SOME REPROGRAPHICS DIRECTIONS

Progress in reprographics in the '80s will include:



More automation in platemaking to eliminate, or at least simplify, film stripping will take place. One approach will be to replace same-size negatives or positives for exposure to plates with microfilm images. These can be projected by an automated/programmed device to size, position, and effect multiple exposures of the image to the plate. As a result, both high film costs and labor costs are bypassed and production is speeded.

*Water-developed offset plates will simplify processing in the commercial and in-office markets. They are expected to be of good quality and possibly a little more costly than conventional plates. The first to reach the market is 3M's Hydrolith. It uses a proprietary photosensitive polymeric resin and is presently suited to medium runs (40,000-60,000 impressions).

*Full-page electronic composition, including screened halftones in position, will be more common and be achieved at lower cost with smaller-sized equipment.

*Lasers will be used more commonly in electronic transmission of data, typesetting, and platemaking.

*There will be more remote-site printing of widely distributed material. Wire or satellite transmission of data from an editorial/composition department to a printer strategically located to minimize distribution costs will be more common.

*Propelled by rising costs, we will use more non-silver-based plates and materials. For example, ATF-Davidson in '80 introduced the Marathoner, a high-quality electrostatic paper plate that is water- and stretch-resistant and maintains its quality level for over 70,000 impressions.

*Color scanners and electronic color-preview and color-correction devices will be more widely used.

*There will be stepped-up use of nonimpact printing technologies, such as ink-jet or electrostatic methods.

WHY LASERS? WHAT ARE THEY?

Laser devices promise to cut plate preparation time and costs significantly. Moreover, material costs and processing time are either bypassed or reduced. Multiple plates can be made simultaneously (even at several remote locations), and page imposition can be automated when this technology is used.

A laser is an intense beam of light. Because it is so very intense, a very fine beam can be very powerful. The word "laser" is an acronym for **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation. The amplification of the light results from converting several frequencies of light to one common or coherent frequency.

Since there are many possible combinations of light frequencies, there are many kinds of lasers. Lasers can be created from many different solids, liquids, or gases. Different lasers have different properties. A crucial property of lasers for graphic arts applications is their ability to emit coherent light. Normally light is "incoherent": it is emitted in random directions, at random frequencies. Coherent light is characterized by parallel light waves of identical or close frequencies all going in the same direction. The result is a focused beam rather than diffused light; that is why the narrow laser beam packs so much power.

WHAT A LASER CAMERA PLATEMAKER CAN MEAN TO AN ART DEPARTMENT

Consider these points made in a recent advertisement for ECRM, Inc.'s 8400 Autokon. Among the features this electronic process camera offers:

*Requires no special skill to operate.










*Can be installed anywhere (it needs no darkroom).

*Screens (65, 85, l00, etc.) can be selected with the turn of a dial.

*Artists or editors can create special effects from continuous-tone photo. For example: posterization, duotones, reverses, and special screen effects can literally be tuned in by the artist/operator.

*Whole ads (or elements of them, including type) can be resized, reproportioned, and electronically modified just as if you had thousands of anamorphic or squeeze lenses at your fingertips. (An anamorphic lens, which produces different magnification of the images in each of two perpendicular directions, can create controlled distorted images.)

*Scan/output either line or continuous-tone copy. Alter dot sizes (correct tone values) to compensate beforehand for variances to come at a later production stage (such as in paper, inks, or presswork).

NOT ALL LASER PLATEMAKERS ARE ALIKE

Some laser platemakers presently are something less than that. Essentially, they scan copy and simultaneously expose sensitized film, paper, or plates. Processing is conventional but can be automated; in some systems it comes in the same box as the laser scanner/exposure device, and then the whole unit is truly a platemaker. Some devices that can scan only line copy produce halftones by scanning prescreened pictures which are often in position on a line mechanical.

Dial a halftone. *ECRM's Autokon is an electronic process camera. Simple dial controls activate a high-resolution laser scanner and select tone range, screen, and other characteristics of the output screened image. Future Autokons will serve as inexpensive graphics digitizers interfaced to pagination systems.*



LASERS FOR PLATEMAKERS

Most laser platemakers produce laser beams from gases. A helium-neon gas in the red area of the spectrum is preferred for scanning (reading) because it is inexpensive, uses little electricity (2 milliwatts), and is in a usable part of the spectrum. For exposing the plate (writing), argon (ultraviolet) is used because it has the power (15 to 40 watts) to expose plates properly and rapidly. However, argon lasers are rather expensive to operate, and press plates used for laser recording are at present relatively expensive, too.

The gas, in either case, is in a sealed chamber. When excited by electric current, it discharges a strong beam of coherent light. The discharges of both the scanning laser and the exposure laser are synchronized and computer-controlled, so that when a spot on the original is being scanned it is simultaneously being exposed to the plate. Laser platemakers have various resolutions and speeds and differ in detail, but in principle they scan/expose horizontal lines (raster scan) alternately left to right, right to left. A scanning resolution of 1,000 means the beam will scan 1,000 horizontal lines to the vertical inch. It also means that for each horizontal inch 1,000 decisions will be made concerning whether it should be on or off. Of course, the black/white nature of each scanned spot determines this choice. (For each device, for tone copy, prescreened halftones are scanned.) The exposure beam, or writing spot, is superfine—sometimes 2.5 mils in diameter. The read/write operations can take place within a single box or can be at remote locations connected by telecommunications. This capability permits the art or editorial department to scan copy in one location and output it at a printing plant across the country.

How fast can lasers operate? Lasers are used for laser printers and laser typesetters as well as for platemakers, and they can operate very rapidly indeed. Pulsed laser light turns on/off more than 1½ million times a second.

CONTINUOUS-TONE SCANNERS

The operator of an Autokon, for example, can dial the size wanted for the maximum (shadow) and minimum (highlight) dot. This is done on the basis of a densitometer analysis of the copy. Establishing these two basic settings also determines the dot sizes that will represent all the in-between tones in the original copy.

In essence, the laser platemaker converts gray values in the original copy to appropriately sized halftone dots. It does so by:

*Scanning the original in horizontal lines (perhaps 1,000 or more to the inch).

*Converting its reading of gray values into bits of digital information.

*Modulating the digital information as per dial instructions (establishing screen, tone range, etc.).

*Outputting the corrected data via a laser beam as a series of dots of various sizes that represent the gray values of the original and are of the selected screen fineness.

*The entire operation—scan, digitize, modify, and output/expose—is synchronous and simultaneous. At the instant a speck of copy is scanned, its gray value is an approximately sized halftone dot being exposed on the film, paper, or sensitized plate. The ECRM Autokon outputs onto film or paper. Such electronic cameras do not need the expensive-to-use argon lasers for output. Of course, exposing the film separations to a plate and processing the plate are separate operations.

HIGH-SPEED PLATEMAKING

Newspaper offset plates can be exposed in about 2 to 5 minutes; smaller black-and-white plates can be exposed in a minute; letterpress plates of the same size may require 10 to 20 minutes of exposure time. The exposed plate is conventionally processed. A large color scanner, such as the PDI Color Scanner System, produces a complete set of color-corrected separations up to 20 × 24 inches in less than 25 minutes.

Linotype-Paul's LinoScan 3040, a lower-cost scanner, can size copy from 70 percent up to 1,000 percent. Separations can be continuous-tone or contact-screened. Though designed and priced for the medium- or small-sized printer or trade platemaker, LinoScan 3040 offers these substantial features:

*Color transparency analysis by prism.

*Enlarging and reducing capabilities.

*Wide color-correction ability.

*Contrast reduction.

*Push-button controls.

*Shadow compression.

*Right- or wrong-reading separations.

*Variable midtone points.

*Highlight contrast.

*Graduation compensation.

*Undercolor removal.

*Unsharp masking.

*Black correction.

*Anamorphic enlargement.

*Direct screening or continuous tone.

The DS-SG-60l Scanograph can handle 11 × 14-inch copy and output 14 × 20-inch film. It can make a set of 8 × 10-inch color-corrected separations from a 35mm transparency in 30 minutes.

The P-4500 and other models of single- or multi-pass color separation systems are available from Optronics International.

These systems provide digitally based individual color files containing manual color correction if desired by the user. These systems are designed for use as a high-quality input device for digital color systems, or for use where local color correction is not necessary.

LASERITE

Laserite® (manufactured by EOCOM) combines laser and electronic technologies to create a unique one-step paste-up to plate system. Laserite systems may be used in a master/slave configuration, allowing a single operator to load a paste-up in either Laserite and expose two plates simultaneously to double output at one location, or in a satellite facsimile configuration, enabling the newspaper to create the paste-up at one location and, via various communications links, transmit this data to be imaged onto a plate at a remote location. In some instances this is done simultaneously at two widely separated locations from a single paste-up at a central location. Automatic plate processors in the Laserite platemakers complete the platemaking operation and deliver press-ready plates. Each Laserite model contains a unique electronic processing method for improving the appearance of halftones.

Laserite input can he paste-up (including prescreened tone copy), paper proofs, film positives or negatives, computer-stored data, or magnetic tapes. Laserites can output a variety of litho or letterpress plates, as well as photographic film or paper. They can also output digitally into a computer storage base or onto magnetic tape.

The Laserite system achieves significant economies in manpower, prepress expenses, and time expended.

LASER SCANNER FILM

A deterring factòr in the development of laser scanners has been the lack of a film or paper with sensitivity and speed to match that of an argon laser device. Now, Eastman Kodak's 2567 film claims to do that. Another film, the KC emulsion (Coulter Information Systems), has a nonsilver photosensitive coating and excellent sensitivity across the visible light spectrum. Some see it as an excellent coating (for film or plates) for laser exposures.

ELECTRONIC COLOR STRIPPING

The proliferation of color scanners (about half of all color separations currently being made in the United States are done by a scanner) and their increased speed and lowered costs has swamped skilled-labor-intensive stripping departments. The result is a trend toward fully computerized electronic stripping. One set of four-color films could handle a large number of different images on a page. Such systems are expected to be operating in 1980. Manufacturers can be expected to supply interfaces for their scanning and stripping units. The next steps include electronic color proofing units and master consoles to operate groups of scanners and their interfaced stripping and proofing units. It should be noted that although color scanning is rapidly taking over in the United States, it was accepted even earlier in Europe and Japan. About 2,500 scanners are in use worldwide. About 600 to 650 of these are in the United States.

TYPESETTER PLATEMAKERS

CRT and laser typesetters (digital typesetters that use laser beams rather than conventional light to create images on photographic paper, film, or plates) also can store in their memories a wide variety of digital information, as for text, formats, and line or halftone illustrations. All this material can be formatted or composed and output via the computer-controlled laser. In different ways, this is now being done by such typesetters as the Videocomp 570 (Information International, Inc.), the Hell Digisets, and the Autologic APS-5. Peripheral devices (such as keyboards, editors, scanners, and paginators) working on-line or interfaced with some models of these devices make the typesetters the output unit of a complete prepress production system, which sets type, edits, makes screened separations from art, composes complete pages, and outputs onto film, paper, or sensitized plates.

Information International also offers Infocolor™ Infocolor is an upgrade to the company's Automatic Illustrated Documentation System (AIDS) which enables the system to digitize, transmit, and record the four-color separations of photographs in final page position with text and other illustrations. Infocolor provides the hitherto missing full-color capability sought by many Information International customers.

The Monotype Lasercomp has the potential of storing and outputting pictures as well as type, but the present models only output type.

IN-OFFICE PLATEMAKERS

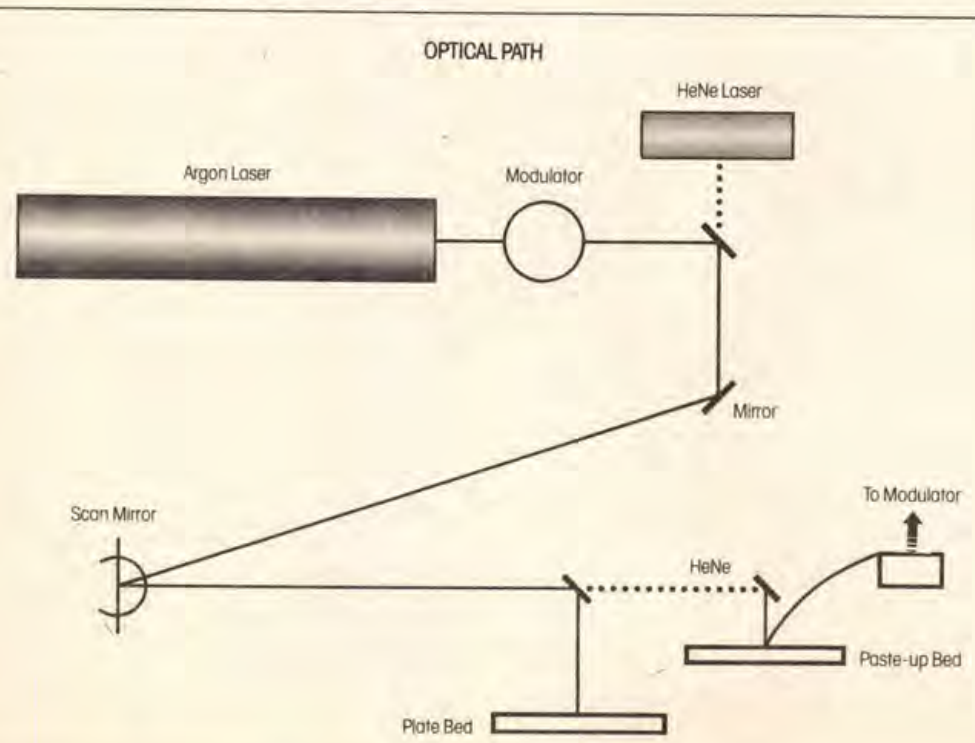
There are numerous low-cost platemakers available for small and medium-sized in-office reproduction centers. These are easy to operate (by regular office personnel) and produce plates in a range of sizes and for a variety of run volumes. Various models produce paper, plastic, or metal plates. Some boast of "paste-up to press in two minutes." Using prescreened halftone copy, these can produce full-page press-ready plates easily, quickly, and inexpensively in an office or a small commercial plant, or for a quick-service printer.

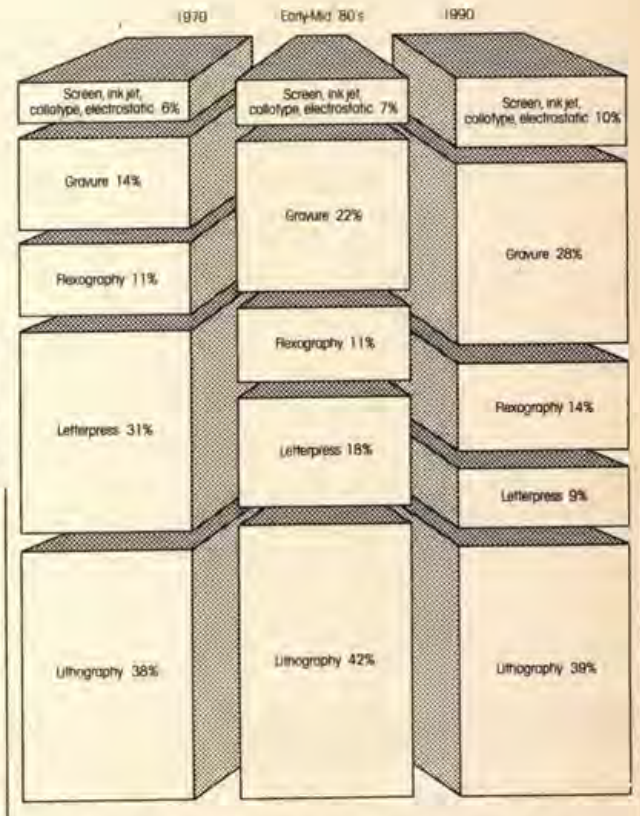
In sum, the '80s will bring us platemaking progress in all fields—newspaper, commercial, in-office. Plates will be made better, more rapidly, more easily, and at lower cost. Of course, all these virtues may not show up in any one system. And much platemaking will be electrodigitally coordinated with the whole chain of electrodigital devices and systems described throughout Vision '80s.

INTERNAL PRINTING AND DUPLICATING

In 1980 in the United States, by various estimates, there are 100,000 to 150,000 in-plant (or in-office) reproduction centers. In the early '70s there were about 68,000 such operations; yet, this almost doubling within a decade does not give the whole

An electronic paste-up-to-plate system. *This is the optical path of a high-speed laser platemaker. Copy is scanned and press-ready offset or letterpress plates are completed in minutes. With units at different locations, paste-up could be in New York, and be facsimilied via satellite to Los Angeles, where the second unit would produce the press plate.*





Printing process market shares. *If the oracles are right, letterpress is rapidly dwindling, offset's growth will peak by the mid-'80s, and gravure will grow steadily through the '80s and '90s.*

growth picture. In-office shops have grown larger and have installed more and bigger equipment, too. There are also more in-house web-fed offset presses and more internal text-editing, typesetting, and platemaking operations.

The number of in-office reproduction centers is already much greater than the number of commercial printing and typographic services, and **the gap will continue to grow** in the coming decade. Perhaps more significantly, the variety, sophistication, and capacity of such equipment will make many in-office installations more like an electronic printing plant than a duplicating center. Integrated into a system, such an in-office operation could have the capability of keyboarding or scanning and setting its own type, making up pages on film with all type and screened halftones in position, making press plates, printing, folding, binding, collating, inserting, addressing, and mailing.

Other developments affecting in-office reproduction operations in the '80s include:

- Picture and design generation will improve in quality and be more suited to in-office operations. By the early '80s, emulsion speeds will increase and daylight-loading sheet-film magazines and roll-film cassettes will become more common. Also, electronic analysis of highlight-to-shadow densities will be computer-calculated to set exposure requirements automatically for separations and halftones, and the tone quality of such nonsilver imaging as diazo and other dye formation systems will improve and be more usable for contact printing, especially for in-house operations.

- Duplicator and copier sales are expected to grow faster than sales of commercial printing presses, as duplicators become more automated and reproduction quality for both types of equipment rises.

- Duplicators that can print on both sides of a sheet in one pass through the press will be more common by the early '80s. This and other improvements will make duplicators competitive with small offset presses.

- Electronic copy quality controls on duplicators will assure quality output, while at the same time lowering operator skill requirements.

- For a detailed comparison of the many spirit, stencil, and offset duplicators on the market, listed by manufacturer, see the publication *Office Product News*. A complete listing of printing presses suited to in-plant needs appears in the December '79 issue of *Reproductions Review & Methods*.

- Couple this general trend with where in-office typesetting and platemaking capabilities will be by the early or mid-'80s, and the dimensions and implications of how graphic arts operations and decisions are moving back into the editor's, designer's, or publisher's office become more understandable and significant.

- Folding, collating, and binding equipment can be expected to expand greatly for the in-office market, too.

- Low-cost, easy to operate, compact, and with high capability, in-office bindery equipment completes the production chain of in-office input/editing stations, paginators, typesetters, platemakers, and printing units. Likewise, for more commercial printing plants, folding and signature handling are becoming pressroom operations, as they have long been for magazine and newspaper printers. Even sheet-fed presses will have instant-drying inks (infrared, ultraviolet, etc.), so that they can be coupled with in-line folders.

- The trend is also toward more size standardization, with fewer standard sizes, partly because in-office page or area makeup is likely to be done more by office personnel than by skilled artists and technicians or by a studio or printing plant. Standardizing on fewer sizes is also getting a push from the Postal Service. Automated presorters of 2nd and 3rd class mail and of most 1st class mail penalize odd sizes and shapes—odd, that is, for the requirements of mechanical sorters. Letters not conforming to postal requirements regarding size and weight are subject to penalties.

- Computers are penetrating every aspect of business. If you want to determine the cost of shipping via UPS, UPS Blue Label, or USPS, just put your parcel on the Parcelmatic II (Pitney Bowes) and press the tape request button. The digital rate display compares the shipping rates. Select the shipping mode and a moistened tape with the correct postage comes out!
Today's in-plant operation usually handles low-profit-margin work: short runs, typographically simple and often black-and-white work, updates of stored data or catalog material, confidential internal communications, and fast-turnaround jobs. The in-plant shop manager is often also the buyer of externally produced printing.

At the turn of the decade, the typical in-plant shop had about 20 employees and produced about 1,000,000 impressions annually (85 percent b/w).

As the internal shop becomes an integral part of the automated office and its network of data bases, terminals, and electronic mail facilities, one can expect it to grow in personnel size, in equipment sophistication, in run volumes and total impressions produced, and in the complexity of copy processed. Just how much all this will affect the commercial printing market is still guesswork. In a world of expanding communications volume, where many internally produced documents may now be typeset and printed for the first time, it is possible that the eventual impact of in-office printing growth on commercial printers may be less than some experts anticipate.

PRINTING IN THE '80s

Forecasters of what the printing industry should be like in the '80s make these major points:

- An 8 percent annual dollar growth is anticipated. (Some analysts overlook the fact that this growth rate may not even keep up with the inflation rate.)

- Profit margins will not likely rise (taking inflation into account).

- The major segments of the printing industry, in order of dollar volume, will continue to be: 1) commercial; 2) newspapers; 3) business forms; 4) book printing/publishing.

- What about in-plant? As noted earlier, various guesses put its growth, from the present 80,000+ plants, to some 100,000-150,000 by the mid-'80s. Another source reports that the real growth rate for the in-plant market is ten times that for commercial printing.

- In addition to the technical trends already mentioned (electronic scanning, laser platemaking, digital typesetting, electronic pagination, satellite communications, etc.), significant improvements in the area of ink drying are anticipated—by ultraviolet (UV), infrared (IR), or electron-beam curing. High-speed drying would remove a bottleneck from higher-speed printing. Web offset, with mini-webs, is expected to be more economical and more widely used in all areas of printing, including in-plant.

There will also be increased use of computers to control color matching for printers and ink manufacturers—computers that can take into account the nature of the copy to be reproduced and the paper and process to be used. Such systems that are already in use can, via telecommunications hookup, analyze and control color at remote sites. Such systems can either be, and are, in-house or be offered as a time-sharing service. Like so many of the technologies and devices discussed in Vision '80s, these are new tools, valuable new controls that can help the art director or graphic designer get the effect wanted. Just as the designer doesn't have to know how to operate a typesetter to get the typographic effects desired (you need only know what it can do), a designer need only know that these tools exist, where they are, and what they can do.

BINDING AND FINISHING

Technical progress in the areas of binding and finishing is not so spectacular as it has been—and is foreseen—in the other areas reviewed in Vision '80s. New and improved models and methods reach the market, of course, and equipment compatible with in-office duplicators and presses is available. Since no major cost or technological breakthroughs are foreseen in these areas for the immediate future, they will not be reviewed in detail here.

Suffice it to say that new binding and finishing equipment is faster, more flexible, and better coordinated with the rest of the reproduction center equipment. The Norfin finisher, for example, which can work on-line with a duplicator, collates, jogs, and binds in a single automatic operation. A Pitney Bowes collator that can be programmed also has on-line stitching and folding. Further, all sorts of equipment stitchers, cutters, folders, and collators are becoming automated and are being priced and designed for the in-office market.



ELECTRONIC MAIL

Sending words and pictures around the world instantly, electronically, is not a dream of the future; it is a present-day reality that is expected to be very common by 1985. It will offer artists, editors, writers, and all other word and image originators, whatever their title, many ways to transmit text and graphics. This section of Vision '80s will focus on the major systems that will be in use within a few years.

WHY SHOULD AN ARTIST OR A DESIGNER CARE ABOUT ELECTRONIC MAIL?

For several reasons. Some systems will be digital—and thus compatible, or at least interfaceable, with any or all of the electronic/digital devices reviewed in Vision '80s. These include digital word/image originators, input devices, electronic filing systems, text editors, paginators, word processors or typesetters, and electronic printers and copiers.

The transmission system itself can affect the quality of art as received. Some systems, with editing terminals or electronic paginators at either end, will facilitate instantaneous editing or altering of a layout or piece of art at a remote site, as well as make possible instant OKs or revisions from thousands of miles away.

Furthermore, electronic mail is one more way of speeding up production and demanding faster, more irrevocable decisions. The transmitted signals may expose a press plate across the country; or they may show how a picture is to be sized or cropped and ask for an OK; or they may display on communication color previewers how an art director in New York thinks the color picture should look, then permit a client in Chicago to adjust his/her viewer by way of saying, "No, it should have a little more blue, like this."

In conjunction with this new capability, the art director, designer, or whoever is concerned with reproduction quality should know such things as the effect of speed of transmission on reproduction quality. With facsimile transmission, for example, easy-to-read typewritten documents might be sent at high speed. Charts, diagrams, math/science formulas, or tables of finely printed data may require medium speed to be received intelligibly, and technical drawings, illustrations, and photographs might require slow transmission on a high-resolution system. Electronic mail (EM) systems, although not designed as an art director/graphic designer's tool, will assuredly be one.

WHY EM?

Increasing numbers of people concerned with moving data, text, or pictures from one place to another are asking, "What's the point in gaining hours in message creation and production time and then losing days in delivery time?" The need for affordable speed is real.

WHAT KINDS OF EM ARE THERE?

There are now a number of ways to send messages electronically:

1. Communicating text editors

2. Computer-based message systems (CBMS)

3. Facsimile (fax)

4. Telex

5. Mailgrams

6. Faxgrams

7. Telegrams

Among these, in Vision '80s, we are concerned primarily with the first three.

COMMUNICATING TEXT EDITORS (CWPs)

Word processors and typesetters that have communication ports can be connected via cable or, for long-distance telecommunications, via modems and phone lines. Although this kind of point-to-point or terminal-to-terminal connection facilitates client-vendor, reporter-editor, or editorial office-printer communications for example, the number of points that can be connected with this method are relatively few and do not constitute a true network or electronic mail system, analogous to the postal service, the telephone system, or a telegram or mailgram service that can interconnect thousands or millions of points.

However, CWPs can communicate (on-line, via portable media such as discs, via radio signals, or via networks) to TWX or telex machines, other CWPs, CPUs, an EM system, data banks, typesetters, pagination terminals, and executive terminals, for example, as well as to a variety of printers, including intelligent copiers.

The CWP represents the wave of the early '80s. Although the 1978 CWP installed base in the United States was 385,000 and is expected to approach 500,000 in 1980, the number of these actually using their communicating power is still quite small, perhaps under 50,000. By 1982, that number is expected to pass 250,000.

Besides being a form of EM, CWPs can be used for many purposes. They can, for example, enter data or take output from the data bank, and can output to typesetters for which they have done the keyboarding.

Today's CWPs mostly use the asynchronous mode. This means that two bits are needed to signal the start and end of a character, and one bit—known as the **parity**—is required for transmission reasons, leaving seven bits to describe a character such as a letter or number or punctuation mark. In the future, more CWPs will be synchronous and will eliminate the start-stop bits, thereby saving 20 percent of the transmission time.

EM technology is full of buzz words such as "mode" (asynchronous and synchronous are defined above). Explanations of a few key terms are:

- **Protocol**. Procedure or sequence of signal exchanges that controls the transmission between devices. Since protocol varies from manufacturer to manufacturer, interfaces are often needed to enable CWPs to communicate.

- **Emulation**. A CWP can be modified so that, when it communicates, it does so in the language of the CWP to which it is talking, by emulating the receiver's protocol and codes. Don't worry about how this works—just believe it.

- **Codes**. The pattern and number of bits the different devices use to represent characters. There are several codes in use. To link machines using different codes, an interface or emulator must be used. As explained later in this section of Vision '80s, networks can serve to interface otherwise incompatible devices.

- **WP Coding**. The combination of codes that convert signals created by the keyboarder in order to control the WP's printing and editing functions. WP coding is proprietary to the vendor and differs from vendor to vendor.

- **Modem**. A modem (modulate/demodulate) converts digital signals at the input end to the analog signals required by a network. At the receiving end, another modem converts analog signals to digital signals for the receiving system. Digital networks, expected to be common in the mid-1980s, will not require such modems. Digital transmission is also faster in that fewer bits are required for sending the same information.

- **ASC II**. A widely used code (but not an IBM code) that uses ten bits per character or byte. Seven describe the character, one is a parity bit, and the other two delineate the beginning and end of the character. When its baud (bits transmitted per second) is 1,200, it is moving at 120 cps. At this rate, a 50-page document of 1,500 characters per page would take ten minutes to transmit.

This is asynchronous, analog transmission. Future synchronous mode, digital networks will speed things up significantly. ASC II's use of seven bits to define a character enables it to define 128 different characters. Since about 30 of these are needed for commands, the usable font consists of about 96 characters. The synchronous IBM code, EBCDIC, which uses eight bits to describe a character, is thus able to handle 256 different characters and copes with more commands and a larger font.

ILLUSTRATION BY ANDRZEJ DUDZINSKI

CBMS

While facsimile transceivers excel at transmitting already created documents, including tone art and photographs, there is often a need to transmit information that is to be keyboarded. For CBMS, keyboarded messages are digitally recorded and can be:

- Edited on a CRT text-editing terminal.
- Proofed on paper for author, client, or other OKs.
- Created from or augmented by text or data or picture information stored in the system memory or a data base.
- Electronically filed.
- Electronically transmitted in digital form to any one or a number of addresses (receiving devices) via telephone lines or satellite-augmented networks.
- Received by logging on the system from almost any electronic terminal. The receiver can read the message on a CRT, electronically file it, resend it to others, edit it, return it to the sender, or print it on a number of devices, including line printers, daisy-wheel printers, or nonimpact (ink-jet or electrophotographic) devices.
- Unlike terminal-to-terminal or point-to-point communications, in a true EM system messages are addressed to individuals rather than to a terminal.
- The addressee may have access to his/her own terminal or may receive the message from any nearby terminal.
- And unlike point-to-point connections, the sending and receiving terminal need not be simultaneously ready. The transmitted message can be queued and delivered when the receiving terminal is free.

HOW MUCH, HOW SOON?

EM will be accepted in stages. We already have internal electronic mail systems in many large offices in which like machines can communicate to each other. Also, with interfaces, different kinds of equipment can transfer information among them on-line or via magnetic media, as discussed throughout Vision '80s. By the end of the coming decade, rooftop antennas, satellites, and fiber optic cables will make EM universal, cheaper than first class mail, and bring it right into the home as well as virtually every office. This will reduce the need for people to "go to work." With EM, the work can go to the people—to an executive at home (and "home" may be a Caribbean island). Full and instant communication will exist between branch and main office, from an executive's home to a staffer's home, or to a customer or a vendor at or in office or plant. And, as noted elsewhere, layouts, art, mechanicals, text, colors, etc., can be transmitted for discussion, approval, modification, filing, or production.

WHAT'S THE HITCH?

Because present costs remain high, optical films are limited to uses where traffic volume justifies their cost. Optical fibers are expensive to make and to install. The glass used for the fibers must be thousands of times more transparent than the glass in your windows at home. As noted above, the cost of making and installing optical fibers is expected to drop and their carrying capacity to grow, so that by the mid-1980s they will be common and communications costs will drop dramatically.

And now, a word of caution. The explosive growth potential for fiber optics harnessed to WP or typesetter text editors is there, but its realization may be further in the future than some forecasters believe. Some feel the technical breakthrough that will make it economically feasible won't come until the '90s. However, General Telephone and Electronics Company, AT&T, and the New York Telephone Company all launched fiber optic installations in '79, and it is estimated that about 50 such links are now operating or soon will be. Others on the bandwagon currently developing semiconductor laser devices and/or glass fiber cable systems are RCA Labs, Optical Information Systems (Exxon Enterprises), General Optronics, and Hitachi.

But when it does come, this cost-down, performance-up breakthrough will be analogous to what we are now witnessing in the computer and computer-dependent equipment field, where the tiny, relatively low-cost chips and bubbles are driving down the costs of processors, memories, and a wide variety of terminals.

Semiconductor lasers are used in these optical telephone systems and telephone networks to convert the input audio waves into on-off pulses because the digital signals require finer bits to transmit messages than would corresponding analog signals. At the receiving end, a decoder converts the on-off pulses back to audio waves.

Other forces expected to help drive down the costs of fiber optic systems in the next few years are:

- Mass production of lasers will cause a dramatic drop in their price. A laser that costs $1,000 today is expected to cost $20 in the late '80s. In addition to the several American and European manufacturers of lasers, Hitachi and other Japanese suppliers will compete in this market.
- A new coding process to automate the production and printing of Yellow Pages developed at Bell Telephone Laboratories will cut computerization costs by reducing, by at least 50 percent, the encoded information that must be stored or transmitted to operate phototypesetters and other devices.
- Facsimile compressors now make it possible to transmit pictures (a 96-lines-per-inch resolution page) in 25 seconds. Without compressors, the same picture took six minutes to transmit. The same device can interface or make compatible different facsimile machines.
- Furthermore, as more telephone companies replace electromechanical equipment with digital toll switches, phone line costs should at least stabilize.

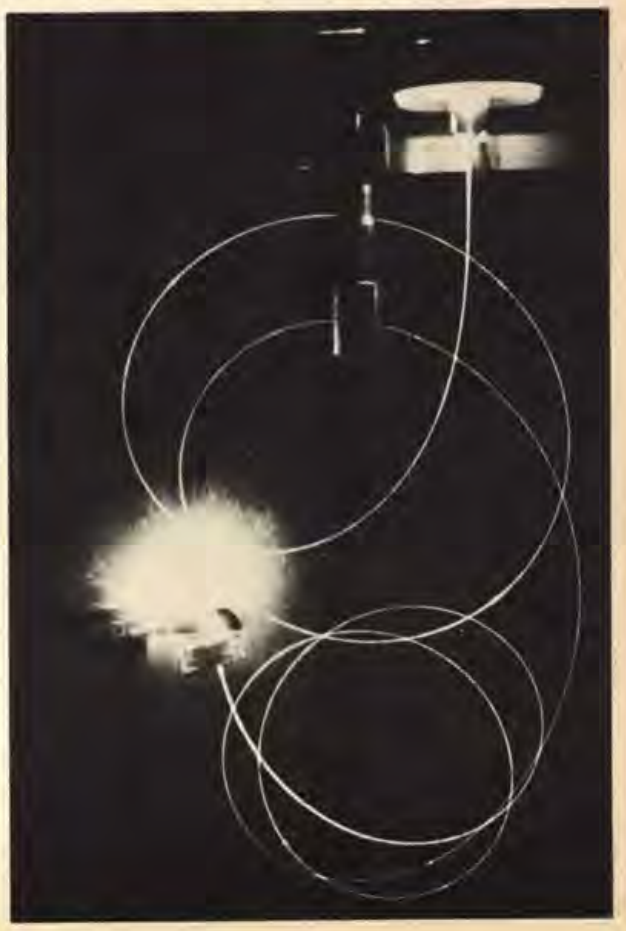
These, then, are some major developments in the '80s that are expected to slowly but surely bring the advantages of electronic mail systems within reach of a wider and wider market. The basic technologies for sending words and pictures around the world are not new. The news is that the cost of doing so, especially the cost of transmission, is expected to drop dramatically.

COST DOWNTREND IN THE '80s WILL ACCELERATE EM's ACCEPTANCE

The trend to such universal EM, though slow now, will accelerate if transmission costs drop as drastically as is anticipated. Fiber optic systems for wide bandwidth distribution of data, words, and images will be in common use in the United States by about '82. They can carry much more information than existing electronic cables, at about half the cost. A drop in the cost of connectors and the development of higher-speed fax (facsimile) as well as of more satellite systems and networks should also bring transmission costs closer to what a large part of the market can afford. Fiber optic cables also are much less bulky, have greatly reduced noise susceptibility compared with coaxial cables, are not affected by electromagnetic fields or radio interference, and do not emit radiation. These advantages significantly reduce bit error rates in transmission.

Fiber optic cables are essentially a form of light-wave communications in which sound pulses are generated by a laser beam the size of a grain of salt through a highly transparent glass thread, which is much finer than a human hair. This conversion of sound waves to light waves accounts for much of the efficiency of light-wave communications—light waves being between 20,000 and 200,000 times higher in frequency than the microwaves used for sound transmission. At the receiving end, of course, the light waves are converted to sound waves.

Light waves transmit sound. *This Bell System uses lasers and optical fibers to increase message capacity and reliability*





These new fiber optic cables are so efficient that one glass fiber 0.05 inch thick can carry 672 one-way telephone conversations. (Moreover, it is expected to be improved steadily so as to come closer to its theoretical limit of 500,000.) A conventional copper cable 3 inches in diameter contains 1,800 individual wires and can carry only 900 conversations. Thus, in current practice, the fiber optic cable can already carry 448 times as many messages as a copper cable of the same diameter. As technological improvements permit the optical fiber to approach its potential capacity, this difference will widen significantly. Furthermore, optical signals can run for miles without reamplification, but today's electronic signals must be reamplified every 3,000 to 6,000 feet.

WHERE ARE WE HEADING?

*Toward a hybrid electronic mail terminal that can send/receive in both word processing and facsimile modes.

*Toward higher postage rates and lower electronic transmission costs. A study by *Data Communications* Magazine shows that, at present phone rates for calls in a 400-mile radius, moving 375 pages a day in batches of five pages per call for 22 working days a month would cost no more than the 17-cents per-letter rate that is forecast for the early '80s. Weekend transmission would give EM a cost edge over regular mail, and this does not take into account the above-reported developments that could cut EM transmission costs considerably. In some high-volume situations, EM is already cheaper. Of course, EM has the added advantage of immediacy, which might even justify some cost premium.

*Where is the United States Postal Service going? Since early '75 it has been studying EM, trying to decide whether to ignore or embrace it—and if so, how. At first it seemed as if USPS was reacting too slowly and too negatively to EM's challenge. EM is coming inescapably, some postal officials began to reason, and if USPS doesn't do something about it, some 17 billion pieces of mail could be diverted from USPS to EM services by '85. That would definitely hurt the existing system. By early '78, a bill (H.R. 7700) was introduced to permit USPS to do some research and development in the area of EM. At the same time, the Postal Service indicated it would establish a prototype EM system "in conjunction with a partner."

Meanwhile, as USPS was slowly getting interested in EM, opposition to a USPS role in its emergence developed. President Carter, the Justice Department, a committee representing the computer/communications industry, retailer groups, and others such as AT&T, ITT, Exxon, Xerox, and IBM who feel government competition will be unfair to private services all opposed USPS entry into EM. The National Association of Letter Carriers favors adoption of EM for USPS, fearing that USPS (and their jobs) can't survive without it.

It would seem that, when the decision concerning the USPS role is finally made, many considerations besides what is best for the communications business will influence the eventual decision. In early '78, it was reported that USPS and Comsat (Communications Satellite Corporation) would test an instantaneous facsimile system (Intelpost) between postal stations in the United States and overseas. Late that same year, it was announced that some tests had started which, if successful, could mean a substantial USPS EM system by '81. In October '79, the FCC denied USPS permission to beam messages overseas. USPS is appealing this ruling in the Federal courts. Postmaster General Bolger said (based on an RCA Corporation study made for USPS) that even today, given sufficient volume, such mail could be delivered for 10 or 11 cents, compared with the present 15-cent first class rate.

Early in '79 the FCC put a hold on the USPS tests but later in the year permitted tests in 25 cities through '83. ECOM (**E**lectronic **C**omputer-**O**riented **M**ail, akin to the better-known Mailgram) was planned as a USPS-Western Union Corporation service to large companies. Then Congressional opposition to a USPS role developed. USPS/WU had aimed to put ECOM into service by late '79, but '80 or later seems a more realistic date. Western Union is out of the picture but other companies such as RCA and/or ITT may participate in ECOM. In January '80 the White House modified its negative stand and urged USPS to proceed with its EM tests.

A large debate is on the horizon between those who feel that modernization of current services and cost-cutting should come first and those who feel that if USPS loses the EM market it will be at a crippling disadvantage and the remaining traffic at USPS will face continuing upward price spirals.

Meanwhile, the FCC will battle to keep jurisdiction over wire communications rates. In fact, the FCC has ruled to itself the right to regulate ECOM. In October '79 USPS contested FCC jurisdiction in the United States Court of Appeals. Pending the decision, despite rain, snow, and gloom of night and whether or not ECOM becomes operational, USPS is moving into EM in other ways. For example, it is already sending pages by facsimile in 12 seconds in a test run. As long as it is designated a testing stage, the USPS effort cannot be stymied by the FCC. Development of EM is conceived of by some in three generations, or phases:

1. Message is transmitted electronically between communication centers, but local delivery at each end is by hand. Example: a telegram.

2. Message arrives at transmitting station electronically, but is hand-delivered by the receiving station. Example: ECOM.

3. Both sender and recipient have electronic devices immediately at hand.

The Postal Service today is trying to get into the second generation but disclaims any interest in the third. Industry and communications giants fear that once ECOM is well established, USPS will get into third generation services eventually. Whether or not USPS gets further into the EM act, AT&T, SBS, Xerox, and others will. At this writing, it appears that these three giants and perhaps just a few others will battle for dominance in the EM industry. Here's where the leaders stand now.

AT&T



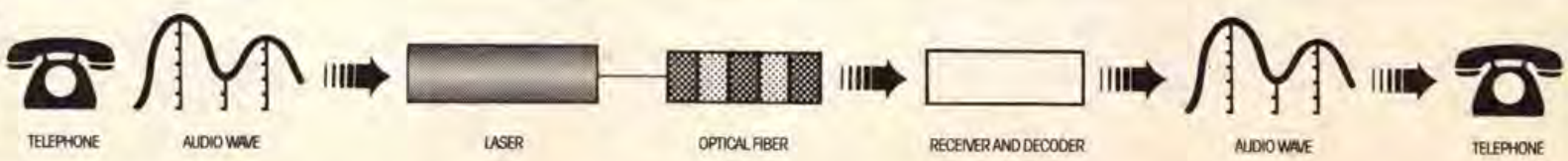
AT&T's Advanced Communication System (ACS), also known as the Bell Data Network, was considered the fastest-growing segment in the data communications marketplace until hardware development problems slowed it down. ACS, which offers an "intelligent" and cost-effective network to large-volume users, now serves about 750 of the largest companies in the United States. These account for about 80 percent of all present-day data communications. It is also available to, and economical for, another 4,000 companies that account for most of the rest of the traffic. ACS is a land-based (nonsatellite) system. However, in October '79, the FCC lifted restrictions on AT&T's use of its satellites to offer private-line business services; but in mid-November, because of software development problems, AT&T announced an indefinite delay for introducing ACS.

ACS offers a communications network to both data and word processing and typesetting operations that can back up some private networks, replace others that may be too costly to continue, and open up communications facilities to many companies unable to afford developing one of their own. There is still some question about government regulations in this area, concerning just what the various networks may be permitted to carry: data, information (words), graphics, or whatever combination of these. Congress is presently involved in rewriting the Communications Act of 1934. How this revision will affect AT&T, Bell, and ACS remains to be seen. One change in government regulations hoped for by AT&T would permit the Bell operating companies to sell terminals. This, coupled with legislative and regulatory changes that would put IBM in the network business, would pit these two giant companies against each other in both the equipment and the transmission markets.

Such an EM network could, of course, carry not only DP and WP information but digitized graphics as well. ACS will, in effect, interface computers and terminals of different manufacturers.

The ACS software requires further development before ACS will be fully operational, according to an AT&T statement made to the FCC in early '79. Expectations are that it will be a reality by '82-'83.

The optical telephone system. *Input audio frequency wave is sampled 8,000 times a second. At each sampling, wave height is translated into on-off laser pulses. At receiving end of optical fiber, pulses are decoded and translated into audio waves.*





Through a looking glass. *A Bell Labs engineer exhibits a tiny sold-state laser perched atop a specially designed mount. Such lasers, used in Bell System lightwave communications systems, now have average projected lifetimes of one million hours—about 100 years—at normal room temperature according to Bell Labs accelerated-aging test results. The combination of optical fibers, conversion of sound waves to lightwaves, high-speed/ durable/ reliable lasers and new hardware and software expected in the near future will link technologies as well as terminals at remote sites and convert the promise of the "Office of The Future" into a reality. As costs come down, we will have a truly universal electronic mail system that can send digital information (data, text, graphics, voice) anywhere economically and instantly.*

SBS

Satellite Business Systems is a consortium of IBM Corporation, Comsat General Corporation, and Aetna Life and Casualty Company. It aims to have its system commercially available by January 1, 1981. If it misses that target date, the cause may well be legal or regulatory obstacles rather than technological shortcomings. The FCC, though it is looking into possible antitrust violations in the IBM-Comsat connection, indicated in '79 that it would allow launching of the SBS satellite on schedule. Nevertheless, the SBS consortium is being scrutinized by the Justice Department.

SBS will not be a public network, in the sense of serving everyone. Serving intracompany domestic needs for only the largest companies, it will complement the private networks set up by many companies and offer point-to-point channels for the period of time that a job requires. Using small earth stations located at a company's premises, it will provide voice, data, facsimile, and teleconference networks for its customers.

The Xerox Telecommunications Network, by means of digital transmission, will link digital computer/office products. A network such as XTEN, by increasing the communications potential of many terminals and devices, will add greatly to their usefulness and therefore to their cost effectiveness. The XTEN network, which aims to be operative in the early '80s (assuming it receives the FCC's blessing), is meant to serve the 100,000 businesses in the United States with assets over $1 million. It would serve the 50 most populous metropolitan areas. XTEN thus aims to be feasible for many firms too small to use the SBS or ACS networks.

By utilizing microwave radio techniques as well as satellites, it seeks to serve a broader market than is practicable for some other public and private networks.

While XTEN will be capable of voice as well as digital transmission, it is expected to concentrate on transmitting such business information as coded text, computer data, and digital facsimile (digitized graphics). Such communications networks will reduce not only the burden of paper mail and its handling and filing but should also reduce the volume and cost of phone calls, facilitate teleconferences (discussed below), and provide real-time (instant) linkage among WP and typesetting terminals and systems—for instance, from a type shop to a client, or a client to a printer, or an art director to a sales promotion manager in another office or another city.

Networks such as XTEN, SBS, or ACS will also link electrostatic copiers and/or electrophotographic printers. To further Xerox Corporation's aim of developing a network in order to add value to its copiers and printers, the company acquired WUI (Western Union International, Inc.) and thus gained access to its telex facilities, leased channels, and cablegram, data communications and satellite services. (**Note:** WUI is **not** the same as Western Union Corporation, the parent of Western Union Telegraph.)

At this writing, XTEN has received FCC permission to utilize a little-used portion of the upper radio spectrum for its network. Although XTEN may not have exclusive use of this portion of the radio spectrum, this puts the Xerox network into a three-way competition with the AT&T and IBM networks. XTEN, in addition to using this 10-GHz microwave band, would be available for dial-in or leased-line access, putting it in direct competition with such other narrow-band services as Telenet and Tymnet as well as ACS. Telenet and Tymnet, by the way, are expected to thrive while ACS delays its entrance into the market. Although the service of each would be somewhat different and reach different market segments, their combined effect will be a massive convergence of communications and automated electronic office and graphic arts technologies. XTEN, which would serve a larger market than any other existing or presently announced network, would truly bring the entire automated office into the EM era. A typical message would flow as follows:

1. From the customer's electronic terminal, the digitized message (words, data, graphics) goes to a Xerox-supplied interface,

2. Then to a rooftop antenna, where it would be beamed

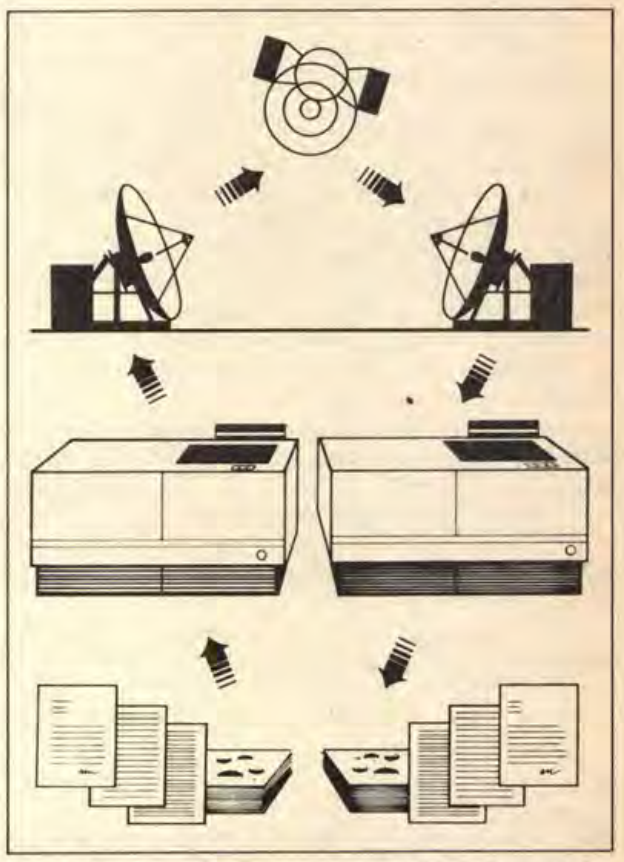
3. To a microwave substation (a message collection center), and then be transmitted

4. To a municipal earth station for transmission

5. To a satellite and then down

6. To another earth station, where the above-described path would be reversed for subsequent retrieval by the intended recipient.

The significance of this message flow is that, unlike the other networks, it bypasses AT&T local as well as long-distance lines. Networks that must rely on phone company lines for the local connections at both ends may have to live with rising rates for local services as AT&T tries to compensate for losing some of its own long-distance business.



Copies by satellite. *The high-speed, computerized copier system being produced by AM International, Inc. for SBS will "read" text or graphics and transmit them via satellite to distant stations. On command, material is reproduced at the rate of up to 60 pages a minute. Images and text will be high-quality duplications of the originals.*



Subminute fax. *The dex® 5100 digital facsimile transceiver from Burroughs Graphic Sciences communicates a full page of text or graphics in as little as 20 seconds. Besides very fast transmission speed, it provides such time and labor saving features as automatic document feed, automatic dialing from an internal electronic telephone directory, simultaneous send-and-receive capability, and compatibility with high-speed analog facsimile machines. The basic dex® 5100 meets standards proposed by CCITT, the international organization which recommends technical standards for facsimile communication.*

ETHERNET

An intraoffice EM system, Ethernet was introduced by Xerox Corporation in mid-December '79. It links various kinds of electronic devices within an office, including the Xerox 860, a combined WP/DP terminal and office information system. Eventually, Ethernet will accommodate equipment made by other companies. It is scheduled for availability in late '80. It will link such office equipment as facsimile machines, copiers, and printers and later will tie into the external XTEN network.

DEXNET

One of a number of facsimile networks, Dexnet is a high-speed (the buzz word is "subminute"), worldwide **facsimile** network that is a service of Graphic Sciences, Inc., a subsidiary of Burroughs Corporation. Dexnet terminals can send or receive full-page documents, at speeds ranging from 20 seconds to three minutes, to or from other Dexnet facsimile units or any fax machines that adhere to CCITT facsimile standards anywhere in the world. The overall system links digital and high-speed analog facsimile systems via satellites into a system as easy to use as a telephone or a teletype. Via facsimile it is easy to transmit such graphic documents as financial charts, systems diagrams, signatures on documents, mechanical drawings, photographs, and a variety of other complex business forms and documents. A nice thing about fax is that it is error-free — no faulty transmission of misspelled words or incorrect statistics. Dexnet can be a high-resolution system, with its resolution adjustable to copy requirements.

Because of its speed, accuracy, and easy operation, facsimile equipment has become a major carrier of electronic mail. It converts text, photographs, and graphics into electronic impulses which are transmitted over telephone lines. At the receiving end, the impulses can be converted back into a facsimile of the original.

Facsimile functions anywhere that telephone lines or satellite communications reach, and delays due to distance are eliminated. An urgent memo can be sent across town or across the ocean with equal speed. All elements of a message, including signatures, are reproduced. Facsimile machines can be operated by anyone, without special training. Some transceivers handle analog signals. The top of the dex® line, the dex® Model 5100, cuts transmission time and cost by handling digital signals and can also communicate with analog transceivers.

The Dexnet network is made available to users of dex® facsimile systems. The many different dex® systems are geared to a variety of users, depending on the nature, urgency, quality requirements, and volume of copy to be transmitted. As wide-communications channels, satellites, and optical cables come into greater use and line costs decrease, lower costs can be expected to spur increased facsimile usage.

FAXPAK

Faxpak, a network recently introduced by ITT, enables a facsimile machine of one manufacturer to talk to other makes. A Qwip can talk to a Xerox or a Graphic Sciences machine, for example. Faxpak makes everybody's facsimile machine compatible with everybody else's. There are no hook-in costs, just usage rates as low as 20 cents a minute (daytime)

OTHER PUBLIC EM NETWORKS

These include the ITT Compak, the GTE Telenet, the Tymshare ACT and Tymnet, and other networks offered by Western Union, S.P. Communications, MCI, Scientific Time Share, AmSat, and General Electric Time Sharing.

As EM devices and networks proliferate, there may be a resurgence of OCRs used to read documents and convert them to digital form. Information stored in electronic files (text or graphics) and data bases need only be called up and put onto a transmission system. Laser and nonimpact printers such as the Xerox 9700 and the IBM 6640 ink-jet printer also can output for facsimile transmission. Hard-copy output from these devices or from WP printers, typesetters, or scanners, or digital output from any of these, is transmittable. There may also be a proliferation of software packages, such as Wang's Mailway, to link office equipment (computers, word processors, data processors, etc.) in an electronic data communications network.

NETWORKS AS INTERFACES

Because they will be linking many incompatible devices — devices with different protocols, codes, and electrical standards — networks will in effect be a kind of universal interface for word and data processors and all sorts of communicating devices. The software or system for interfacing various terminals will either be put into the hardware terminals by vendors or be incorporated as a service by intelligent networks. Small-volume users may prefer to use intelligent networks, while large-scale users may prefer to own their own interfaces and pay only for message transmission services.



Facsimile compatibility. *Graphic Sciences new dex® 1100 series of facsimile communicators are believed to be the most compatible and cost-effective facsimile machines for electronic mail applications. A built-in microcontroller allows the dex® 1100 machines to communicate with other dex equipment in the AM Mode, with AM machines engineered to meet CCITT standards, with FM facsimile equipment, and with the new dex® 1500 digital transceiver. Transmission speeds from two to six minutes, and vertical resolutions from 62 to 96 lines per inch, provide the range of communications speed and copy quality which users require.*



CAPACITY

Will today's satellites have enough channels and capacity for tomorrow's load? No. There will be more satellites in the future, and their launching cost will be reduced by the advent of the space shuttle.

QUALITY/SPEED/COST

Quality is judged in various ways in EM systems. One system establishes levels according to the smallest type size that can be received legibly, albeit fuzzily. Others hold to a standard of crispness of type. Some systems cope only with capital letters, but others offer a full character set. Still others transmit logos, signatures, or tone art. More complex copy (such as tone art) and higher quality standards require more bits per page transmitted. The more bits necessary, the slower the transmission and the higher the cost.

PRINTOUTS

While electronic terminal displays at the receiving end may suffice for many purposes, there will still be considerable need for hard-copy printouts. It is likely that high-speed, digitally controllable, ink-jet printers will be merged with the facsimile system to satisfy this need. Copiers may be required at the receiving end if distribution of multiple paper copies is required (where personnel involved do not have their own screens or terminals). The printout could also be produced on a WP text editor or a typesetter. A link to a computer would enable one to call up from a remote site a stored name/address file and to print it as needed.

USPS ROLE IN 1985

Whether or not USPS develops its own EM system, by the mid-'80s it should at least be equipped to receive and transmit electronic signals from post office to post office and to convert them to hard copy for local delivery by letter carriers. This would be an improved version of today's Mailgram service.

HOW WIDESPREAD WILL EM BE BY THE MID-'80s?

A Quantum Science study estimates that terminals with EM capabilities will be in use in 54 percent of the nation's large and medium-sized offices by the mid-'80s.

HOW FAX WORKS

Facsimile utilizes the scanning method for hard-copy communication; it is the only electronic mail equipment to do so at present. Dark areas on a page—be they words or drawings or photographic halftones—are translated into a series of electronic impulses, of various amplitudes and frequencies. These impulses are sent via communications link, usually telephone lines, to a receiving machine. The receiving unit converts the electronic signals into electrical charges that are applied to the sheet of specially coated paper. The charges cause an electrochemical reaction with the coating on the paper, "burning off" portions of the top white coating so as to produce a facsimile copy of the original document.

FACSIMILE PAPERS

Like facsimile equipment itself, the paper used in this equipment has been undergoing continual improvement. Until recently, many facsimile machines utilized zinc-oxide-coated paper, which can emit an unpleasant odor and smoke during use. These shortcomings are particularly apparent in equipment without effective filtering mechanisms.

SOME FAX TRANSCEIVERS

There are many makes and models of facsimile transceivers. Some of the major devices and their manufacturers are: Xerox Telecopier (Xerox Corporation); Qwip Systems (Exxon Enterprises); Panafax, Mufax, Pagefax, and other models (Muirhead, Inc.); dex 5100 and other models (Graphic Sciences, Inc.); Rapidfac (Rapidfac Corporation); Rapinet (Rapicom Inc.); Data/fax Division (Stewart-Warner); Quick Fax (RCA); Faxpak (ITT); Express 9600 (IBM), and the Model 9600 (3M), an automatic dialing, subminute device (8½ × 11 letter in 20 seconds).

CURRENT FAX CAPABILITIES

Some facsimile systems offer finer resolution, lower cost, or faster operation than others. It is not the purpose of Vision '80s to judge systems qualitatively, but to explain the capabilities and potentialities of the process. Here are some things fax can do with data, words, or pictures:

- Send and receive exact copies of documents to and from just about anywhere.
- Receive transmissions unattended, such as at night or on weekends.
- Take advantage of low night telephone rates by storing messages and then forwarding them during low-rate periods.
- Transmit to numerous locations sequentially.
- Automatically hold or queue messages to busy receivers until the receiver is ready.
- Within minutes, send a proof for OK to a remote location, then receive the OK or a copy marked with desired corrections.
- Send/receive an 8½ × 11 page in two minutes. Some high-speed digital devices, such as the dex Model 5100, can do this in 20 seconds. By skipping the white spaces between lines, a new analog device, the Xerox 485, can transmit such a page in one minute. Other units, using laser beams for scanning and recording, can transmit a full newspaper page in one minute.
- Utilize WATS lines.
- Adjust transmission speeds to match the speed of other units and to offer the option of high quality at slower speed or else high-speed (lower-cost) transmission where fine resolution is not essential. At slow speed (six minutes for an 8½ × 11-inch document), resolution can be 125 lines per inch and can cope even with 5-point type.
- Permit, via interfaces being developed, incompatible sending and receiving devices to communicate with each other. The Rapinet system is one that does this already. It uses ordinary telephone lines to link formerly incompatible units anywhere in the world for subminute digital facsimile transmission.
- Copy and layout sent to a local typesetting service via facsimile can be typeset and the repro proof delivered all in the same day. Revisions made during the day, after the copy has left, can be sent to the shop instantly and incorporated immediately.
- Transmit in full color.
- Interconnect digital technologies with analog facsimile units.
- Specialized units have been developed for weather recording and transmission of charts, pictures, or documents. There are also portable transmitters and message scramblers.
- Transmit documents at a rate of 250 wpm without need for transcription (compared with 75 wpm for Telex systems).
- Interface with computers and WP, typesetting, and laser platemaking systems.
- Double as a copier, to produce multiple copies at the receiving device.
- Automatically dial a number of revisions according to a previously prepared program.

FAX IN THE '80s

Some developments in the facsimile area that we can anticipate in the near future are:

- **Verbal mail.** Collecting messages until an economical batch is ready to send; digitizing them for transmission.
- **Prioritizing.** Keying urgent messages so that they will go out immediately and keying others for transmission at nonpeak, lower-cost hours.
- **One system** for either voice or data transmission.
- **Compatibility** of sending and receiving equipment. Most present-day machines can talk only to other machines of the same manufacturer, so that much of today's EM is not so much a network as point-to-point communication. By the mid-1980s, more networks and more compatible terminals will reduce, if not resolve, this problem. Already, for example, the dex 1100 Series can communicate with nearly every fax currently in use, both analog and digital, and is CCITT compatible with units likely to be offered in the future.
- **More digital** facsimile transmission (subminute high-speed). In addition to Graphic Sciences, the following firms are active in this field, some still in the research and development stage: Xerox, Rapicom, 3M, Panafax, Southern Pacific Communications, Nippon Electric, Mitsubishi, Sharp, and others. Also, IBM scientists are developing a data compression technique to reduce the data that must be transmitted to represent a unit of information.

DISTRIBUTION/ELECTRONIC MAIL

Picturephone® Graphics Station. *Has a zoom lens camera to show documents, slides, opaque artwork, transparencies and viewgraphs as well as smaller 3-dimensional items.*



Electronic blackboard. *Sketches, equations or other graphics can be transmitted via this Bell System device. It also transmits handwriting over ordinary telephone lines for instant display on a video monitor at distant locations.*



•**Decentralization** of communications capability throughout an organization, as communications centers will be replaced or supplemented by communicating terminals in various departments.

•**The "Age of Instant Information"** (as Dal Berry, president of Graphic Sciences, Inc. refers to it) should be with us by the mid- to late '80s. That's the rooftop antenna-to-satellite and the optical-fiber phone-line phase reviewed previously in this survey.

Forecasters say that it will then cost less to send a full-page document instantly and electronically than by conventional mail.

•**Interfaces** will link facsimile machines with the gamut of electronic terminals—whether the form is written words and numbers, voice messages, or graphics.

•**Collating and multiplying.** At the receiving end, automatic equipment will collate multiple-page documents and produce multiple copies of them. These will likely be output by nonimpact printers harnessed to the EM system.

•**Finer resolution.** There are possibilities of 1,000-line fax transceivers in the near future. Such fine resolution could transmit much artwork and most typefaces with considerable fidelity.

•**Facsimile picture resolution.** Fax systems hold a unique position among EM systems because of their ability to transmit graphics; but at the close of the '70s, only the Harris Laserfax 600, the Litton Pressfax, the Muirhead Pagefax, and the Stewart-Warner FR models provided resolution finer than 285 lines per inch. The Pressfax, a laser/photographic device, has a resolution of 1,200 lines per inch, but takes 20 minutes to transmit a page. The Pagefax, at 400 lines per inch, takes one minute to send a page.

ANALOG AND DIGITAL SYSTEMS

The scanning process converts images into electrical signals for transmission. The signals and transmission system can be either analog or digital.

Most current facsimile systems are analog: that is, the electrical waves are physically analogous to sound waves, light waves or water waves. (The term "analog" comes from "analogous.") The analog electrical system not only consists of on and off states but includes all the in-between variations.

Digital systems, on the other hand, convert the scanned material into combinations of only on or off electrical states. To interpret each character (such as the letter A) or tone value, there is a specific on-off character combination. In one code system (ASC II), for example, the capital letter A is represented by the following on-off (or "zero-one") signal combination: 01000001.

COMMUNICATING COPIERS

A computerized copier system that can send exact copies of up to 3,600 pages an hour to distant stations via satellite is being developed by AM International for Satellite Business Systems (SBS). That is one page (1½ million bits) per second, of typewriter quality. This system, which will function as a large-scale EM system for business and government, will be 120 times faster than the most common facsimile devices and will upgrade image quality to compare favorably with original typewritten information. It will also transmit tone art and photographs of reproduction quality. It will combine computer control, digital laser scanning techniques, and nonimpact printing technology. Multiple-page documents will be printed sequentially in their entirety, instead of in separate-page stacks that require collating.

This system will handle letters, charts, graphs, photographs, and all forms of written and printed communications, and multiple copies of a document can be made at the receiving location.

TELECONFERENCES

A chief value of the teleconference is saving travel time and money. There are three categories of teleconferences: video, audio, and computer. Teleconferencing involves sending voice, pictures, or digital messages to one or more remote sites. Meeting rooms, auditoriums, offices, or even offices-at-home are equipped with the necessary audio/visual/computer facilities, and communication can be two-way. Advance briefing information is often distributed to attendees.

Some conferences can be so computer-controlled as to record people joining or leaving at different locations. The computer can also store a record of the full conference—talks, floor comments, visuals—so that someone who cannot attend or who attends only part can call up on a terminal any parts missed or even privately review the conference in full or in part.

COMPUTER CONFERENCING

One kind of electronic conferencing is the computer conference, which is in essence a digitally written form of a conference telephone call. Some possible features of a computer conference, in addition to those noted above, are:

•**Whispering.** This feature permits private exchanges among selected conference members at various sites and also keeps such exchanges out of the conference record.

•**Printout.** Paper records can be made and distributed when required.

•**Customized time.** Different individuals may join the conference at their convenience; not everyone need be in it together. Just as you can now record a football game or a concert from the home TV for later viewing, you can record a conference, then "attend" it at your convenience and even add your own thoughts to it for transmission to the others participating.

•**Reduced first class mail load.** The appeal of this faster communication method is expected to cut deeply into first class mail for such business communications. Some estimates see digital messages replacing 80 percent of such letters by the late '80s.

•**Declining costs.** Terminals that cost $2,000 a few years ago are now under $1,000 and are expected to drop to the $300-$500 range within a year or two. Time-sharing facilities for the computers, which cost about $25 per hour in the late '70s, are expected to drop to as little as $1 an hour in the early '80s. And, thanks to packet networks (which offer low rates for high-volume users regardless of transmission distances), the cost of the phone lines and of fiber optics is expected to drop, too. One system already sends the equivalent of 50 business letters anywhere in the United States, virtually instantly, for only $1.25.

Another force for future cost reduction is computerized speech. Computerized voice processors already can reduce the cost of leased lines by 50 percent and make a computer system accessible by phone anywhere, at any time. Voice encoders reduce the number of bits needed to about 25 percent. This not only reduces



Bell System's Portable Conference Telephone Set.

Picturephone® Conference Easel. *Unit provides a place to write with marker pen on a large pad of paper, to show and explain large charts and graphs, or to work with chalk on an erasable board.*

Picturephone® Meeting Service. *Available in Atlanta, Boston, Chicago, Dallas, Detroit, Los Angeles, New York City, Philadelphia, Pittsburgh, Sacramento, San Francisco and Washington, D.C. The four-year market trial of this service will continue to mid-June, 1981.*





costs and speeds communication but also frees the remaining capacity of transmission lines to handle other messages.

•**Many choices of systems.** A range of systems, from simple to sophisticated, is emerging to meet the needs of small and large companies. As the '80s open, there are almost 40 teleconferencing systems in operation.

While video and audio systems conferences have been justified by such large users as NASA, Dow Chemical, and Bank of America because of the trips they replace, computer-based conferences essentially add flexibility and coverage to the more widely usable conference phone call.

At the moment, the audio conference seems to have the brightest future, since it is easy and economical to set up and to use. The effectiveness of video teleconferences is considered only marginally greater, while its cost is presently much higher than that for audio only. It would seem most recommendable when transmission and discussion of graphic material is required.

THE PICTUREPHONE

In '27 Babe Ruth hit his 60 home runs, Lindbergh flew the Atlantic, we had a full eclipse of the sun, and the Picturephone was announced. It was to be a 5 × 6-inch screen showing the face of the other communicating party. In '64 some commercial Picturephone service among three cities actually started, but it hardly bloomed. It was too expensive, and only 45 customers subscribed to it.

But now Bell has dusted off the idea, and we have Picturephone Meeting Service, in which the phone is linked to a normal 23-inch TV monitor. A Bell System room can be set up for meetings and showings of slides, graphs, videotapes, or hard copy or up to six participants can be shown in the linkup. You can work at an easel or erasable board in one city and be seen in another. You can show and discuss new advertising layouts or copy changes. You can demonstrate equipment. And hard copies of material appearing on the monitor can be produced in seconds.

This system is well adapted to a two-city intracompany sales meeting. In its early stages, the service is presently used by a small number of customers in New York, Washington, Chicago, San Francisco, Los Angeles, and Atlanta.

THE TELEPHONE IN THE '80s

The ordinary telephone, by itself or in conjunction with other devices, is likely to become a very uncommon instrument in the '80s. Here are some things the phone may be able to do:

•Wake you up automatically.

•Turn lights, air conditioning (or heat), TV, security systems, etc. on or off at preset times.

•Lock or unlock doors.

•Automatically transmit staff memos.

•At your command (e.g., from office to home), start the dinner cooking or turn on the clothes washer.

•Validate credit cards, such as at self-service gas stations.

•Record your vote.

•Read utility meters.

•Deliver mail to your house. (No more postman to be frightened by Dagwood's dog!)

•Relay requested repair or first aid information from a data bank.

•Dial people by name.

•With a CRT, display merchandise and prices, thus becoming a shop-from-home device.

•Mobile and cordless, be carried in your pocket.

•With call finders, reach you wherever you are, whether at the beach or climbing the Alps.

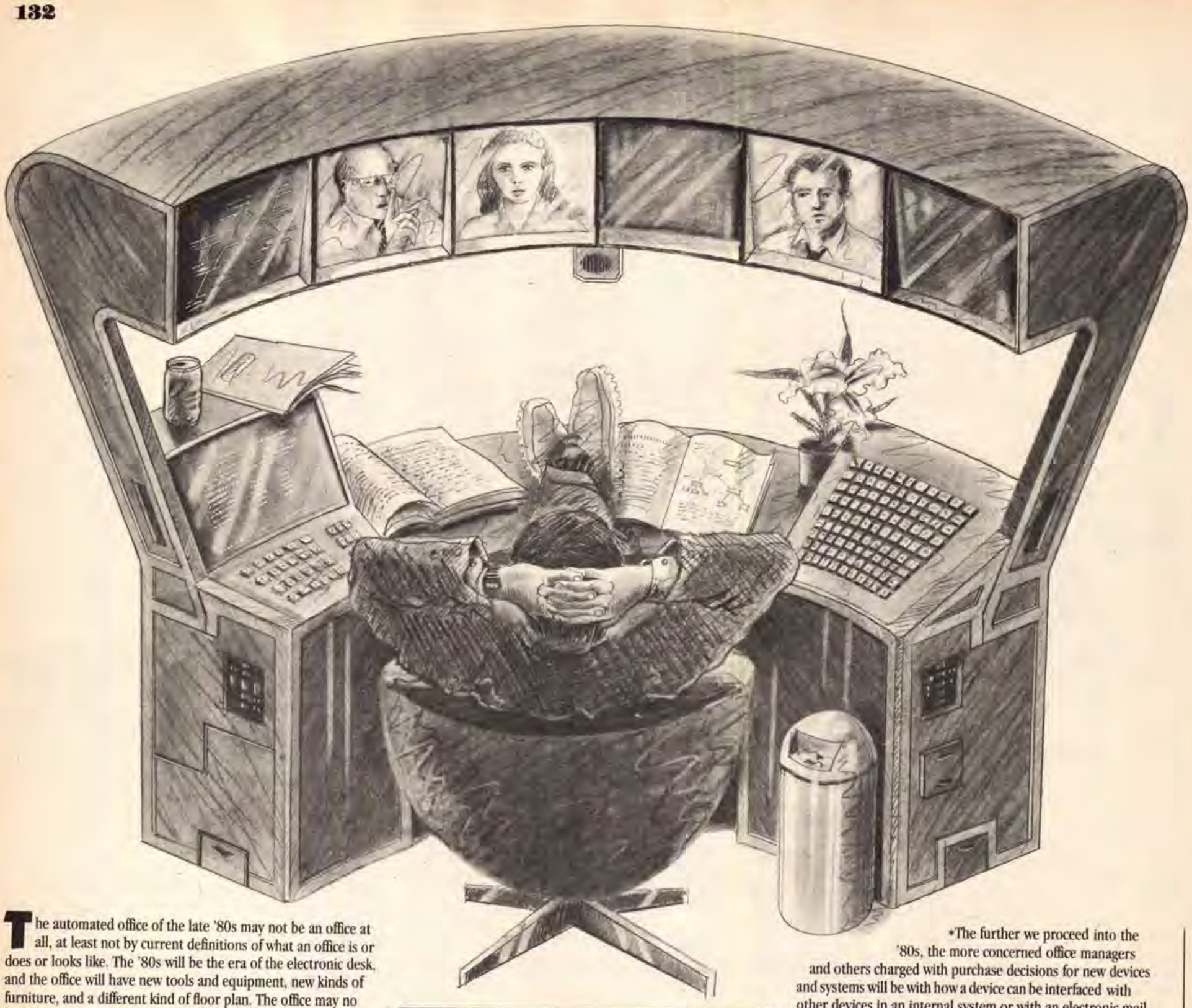
SCRIBOPHONY

And now there's Scribophony. This is an electronic dialogue system whereby it is possible to talk and transmit graphic images at the same time. At both ends of the line are a telephone, a writing tablet, a video converter, and a standard TV receiver. Together with a Scribophone the hookup enables either party to the "conversation" to draw or write on a tablet (while talking), and images will appear simultaneously on both TV sets. Either party can edit the image and talk about it. The result is a two-way visual/verbal interactive hookup. The present cost — a little over $3,000 — is expected to drop. (Philips Telecommunications Industries, B.V., The Netherlands)

EM CAN LINK MANY INFORMATION TECHNOLOGIES

The adage that the combination is greater than the sum of its parts certainly applies when a group of devices such as keyboards, text editors, electronic paginators, copy scanners, laser platemakers, and nonimpact printers are linked by EM equipment and networks. Telecommunications linkage is not coming about simply because the technologies are, or soon will be, available at affordable costs but because businesses are demanding it. The chief pressures for it are coming from data processing, word processing, typesetting, and publications printing operations. All these departments and services know they will be able to cut costs, operate interactively between remote sites, electronically link a wide variety of terminals and data banks and devices, and speed up and improve services when a cost-effective EM system is made available to them.





THE AUTOMATED OFFICE

The automated office of the late '80s may not be an office at all, at least not by current definitions of what an office is or does or looks like. The '80s will be the era of the electronic desk, and the office will have new tools and equipment, new kinds of furniture, and a different kind of floor plan. The office may no longer be a distinct administrative department but simply one element of a coordinated office/data bureau/reproduction/communications operation. In fact, some offices may be portable. They'll be where you are. The size of an attaché case, they'll receive mail, take dictation and transmit it to your secretary, and possibly do more than you can do today with a conventional office and desk.

Some parts of tomorrow's office are here already. Others will become reality in the '80s, and still others that we read about may just be fantasies and will never materialize. But this much is sure: The technologies that are automating many office operations will do more than cut administrative budgets and speed and improve work flow. They will also change the face of the office, its physical plan, and will strongly affect personnel: executives, supporting staff such as secretaries, messengers, and file clerks and professionals such as art directors and designers, artists, copywriters, reporters, editors, and production managers.

THE MANAGEMENT REVOLUTION

The ways in which we manage, for example, information, personnel, reproduction methods, data banks, and internal and external communications systems are all rapidly being changed by the new tools and methods at our disposal. We are now in the early stages of this multifaceted management (how things are managed) revolution. As already reported in Vision '80s, some of its present and future aspects are:

*A trend to multifunctional equipment. Examples: Itek Graphic Systems CPS-320, which is both a text editor for a typesetting system and an interactive business system for such jobs as payroll control, inquiry files, classified ad and display billing reports, inventory control, personnel record keeping, credit reports, general ledger maintenance, and many other data functions. Or the Xerox 9700, which combines the functions of a typesetter, platemaker, microfiche producer, duplicating machine, and collator. (The topics of using typesetting computers for business applications and of multiple uses for computers were reviewed in the *Seybold Report*, Vol. 5, No. 23.)

*As various departments (DP, WP, repro centers, etc.) become technologically interfaced or share the same multifunction terminal, they are likely to be merged administratively under one head. From which ranks this overall "communications director" or "information manager" will come remains to be seen.

*Some companies will centralize functions. There will be WP centers, reproduction centers, message centers, and a central processing unit (CPU) with terminals throughout the organization for sharing its memory and intelligence. Other companies will decentralize their system, so that there will be intelligent terminals, input stations, text editors, typesetters, makeup terminals, or whatever located in those departments where they are needed and where there is enough traffic to use them efficiently.

*An overriding consideration in deciding which devices or systems to buy will be how they are likely to reduce administrative costs and increase productivity.

*The further we proceed into the '80s, the more concerned office managers and others charged with purchase decisions for new devices and systems will be with how a device can be interfaced with other devices in an internal system or with an electronic mail operation for external communication.

*We will be inundated with information. A Xerox ad informs us casually, in text type, that some 72 billion new pieces of information are arriving yearly to be sorted, edited, retrieved, and disseminated.

*As the volume of information and the need to distribute it continue to grow—and the need to distribute it rapidly, even instantly, intensifies—there will be increasing emphasis on speed: speed of everything from dictating to typesetting, from editing or paginating to printing and distributing, and of making decisions.

*Rising costs of materials will lead to more two-sided memos and documents.

*As virtually every aspect of office and business communications becomes digital/electronic, the entire communications process will become an interfaced chain, and information will increasingly be stored in large data banks, remotely located but accessible to many users.

*Many of the 13 million business offices in the United States will be upgraded from their present level of ordinary typewriters to electronic typewriters. A smaller but significant number will install WP text editors and/or typesetters.

*There will be fewer traditional typographic services in the '80s (perhaps down to 1,500 from about 3,000 just a few years ago). But the number of "quick printers" is already up to 8,000 and is growing, and many are also becoming "quick typesetters."

*Of 20,000 commercial printers in the United States, some 10,000 are already offering typesetting services. These trends, plus the increasing amount of type being set internally, will force many

ILLUSTRATION BY ANDRZEJ DUDZINSKI

typesetters to convert to full prepress service operations, as noted in greater detail elsewhere in Vision '80s.

•It is estimated that there are already 150,000 in-plant reproduction centers. According to a study made by *Folio* magazine, one-third of all magazines now set all or part of their type in-house and another 20 percent plan to.

•Also pressuring the trend to office automation are the soaring costs of clerical labor, the shortage of skilled personnel, and the fact that service-based industries now employ about 47 percent of all workers.

•Additional pressure to automate comes from the zooming rise of office costs as a percentage of total company costs. What used to be from 20 to 30 percent is now at a 50 percent level for many companies. If you couple the increased cost of running an office with growing labor costs (especially along with a productivity plateau), you will begin to appreciate why more managers are adapting DP technologies to the office in order to break the grip that ever-rising costs tied to improved productivity have on budgets.

•There will be new career paths for women as well as for men in management and supervisory positions, besides at the typographist and operator levels.

•Salaries as WP operators and typographists will be upgraded for former secretaries acquiring new skills.

•Some personnel will need periodic retraining as new machines and models, improved software, and retrofitted hardware arrive.

•As WP centers grow in size, importance, and linkage to other departments, more of them are likely to report directly to top management. On the other hand, as WP/DP equipment and operations merge, DP executives and staffers may run over the WP people in the race for room at the top.

•Once systems are installed, debugged, and in full operation, concern will shift from accomplished objectives such as faster communication and reduced operating costs to communications-effectiveness. This will involve an understanding and appreciation of graphic and typographic aesthetics and the role they play in making print communications more attractive, readable, understandable, and memorable.

•Many work stations will be provided with electronic typewriters or with CRT-equipped WP terminals sharing common printers and a central processing unit and memory.

•Electronic and microfiche files will replace many file cabinets. Central (even at remote sites) electronic files will be accessed by on-line terminals.

•The mail room will be automated, too. As an increasing number of executive and administrative support (AS) work stations are equipped with keyboards (or tablets) and CRT terminals, incoming mail delivery will be automated, and the number of clerks or mail carts delivering paper documents will dwindle correspondingly. Incoming mail will be of two kinds: electronic and paper. The paper mail will be opened (much of it mechanically) and put on a conveyer belt. Video recorders will scan and convert the letters or documents to digital information. In this form the mail will be routed, along with incoming electronic mail, to an electronic "in box" at the proper work station. There the mail will be stored until the person at the work station calls for it.

•Teleconferences will reduce travel to meetings and increase the need at many locations for small theaters equipped with transceivers, projectors, etc.

•Decreased memory/processor costs will play a large role in stepping up use of the new technologies. For example, the cost of solid state memories is now falling. Some forecasters predict that by 1986 a typewriter could be equipped with a 256K memory for only $100. An 8K text-editing processor may drop from $200 to $50 in the '80s.

•Even as Vision '80s was being written, Intel marketed a megabit bubble.

•The day is fast approaching when it will cost more to mail a conventional letter than to transmit it digitally.

•Secretarial terminals not only will prepare correspondence and documents and input copy that is to be typeset but also will be able to store, retrieve, edit, and transmit to almost anywhere in the world.

•Redundant work by secretaries will be virtually eliminated. Some secretaries now spend 30 to 50 percent of their typing time in revising and retyping.

•Management decisionmakers will be affected by the automated office, which will speed information to them and both make possible and demand faster decisions.

•Top managers will conserve much time and energy. Since much of their time is spent communicating with each other, the extent to which the process is speeded up will improve a top manager's productivity and even the quality of decisions.

•Some offices may shrink as workers and managers are increasingly able to work from their homes and to communicate instantly via an EM system. Conserved travel time and expense will be a by-product of the work-at-home trend. Before this can happen, of course, wideband communications must be available at reasonable cost and most work stations must have terminals.

•As voice input systems are perfected, still more executives will become attuned to the automated office. A recent ad painted this picture for tomorrow's executive: "All executives have multifunction terminals. The ultimate dictation system — computer-based voice recognition — allows draft documents to be output directly from spoken words. The words first appear on the terminal display for editing and revision by the author; then they are run through a dictionary and a grammar/syntax validator before the final draft is ready to be sent (via electronic mail) anywhere in the world — with a duplicate automatically filed in a micrographics storage system. As a matter of course, no paper is used."

•In-plant reproduction operations and automated offices are overlapping and merging somewhat, although as of now each retains its identity. The in-plant market is estimated at $12 billion today.

The market for equipment for the automated office and office-related departments is expected to pass $15 billion by '82. Another analyst sees an $18 billion market by 1985, which is not inconsistent with the other forecasts.

•The point of entry to the automated office is changing. Until very recently one started with one or more word processors. Now many other "first steps" are taken by different companies, including:

Electronic mail/teleconferencing.
Data processing terminals and management work stations.
Electronic filing and retrieval.

Whatever their point of entry, throughout the '80s many offices will go all the way in automating correspondence, installing WP systems, holding television conferences, putting DP on-line to other systems, and automating executive work stations.

Interconnections — that may be the big thing happening now. Many of the "new" technologies are not so new, and had their roots in one department or another. The typing pool grew up to become a WP center. The print shop evolved into a reprographics operation. Record storage centers have been compacted via micrographic devices. But a funny thing happened on the way to sophistication of this technology or that. Each became basically electrodigital and thus capable of being put on-line with any or all of the others. Thus the office of the future will consist not merely of many automated departments but of a totally interconnected series of electrodigital systems. If the computer is the heart of any one device or system, it is telecommunications — within or beyond one office — that links the specialized systems together to become one huge information communications system. Just how might such a system support a company's decisionmakers?

THE SMART COPIER

The smart copier will make a major contribution to the automated office. What is a "smart," or "intelligent," copier? It is an electrostatic copier teamed up with a low-power laser character generator (such as some typesetters use) and a communications interface. It can, for example, from stored fonts at the command of an input disc or tape, form sharp characters (set type and/or pictures) at a rate of up to 1,000 characters per second. It can make multiple copies and, in effect, be a high-speed printer/duplicator. It can be on-line to DP or WP systems for input and to an EM system for electrodigital or facsimile distribution. The smart copier is another example of the multifunctional devices that will serve the automated office.

SOME "BLUE-SKYING"



When some of us were very young and impressionable (in the '20s, let's say), we marveled at stories telling what our world would be like by the year 2000. We'd visit the moon or other planets and travel and live in space, a few pills would meet our nutritional needs for a day, and people ("creatures") from other planets would visit us, and so on and on. Of course, by the '30s we were mature and knew better. But something funny happened on the

THE AUTOMATED OFFICE



Tomorrow's executive work station. *Communicating editing and graphic terminals, modems, electronic drawing pad and pen create, gather and transmit data, text, graphics to multiple remote sites, speed up information exchanging and decision making.*

way to the '80s. Here we are not only believing but experiencing many of the things our wisdom of 50 years ago told us were impossible dreams. We've been to the moon and lived in space and sent machines and cameras to Jupiter and beyond. Some of us believe in and some of us deny the existence of extraterrestrial flying saucers, but those of us who deny are less sure than we used to be. And, for better or worse, we take all kinds of vitamins and food supplement pills — to say nothing of uppers and downers.

The result of all this is that, while we find it hard to believe some of the fantastic projections concerning the automated office of the '80s or '90s or the year 2000, we're not really convinced they **won't** come true! At any rate, here are a few long looks into the year 2000, when we may witness the following:

*Two-way cable TV systems will be found in 80 percent of U.S. homes.

*One single-mode optical fiber will carry as many messages as 10,000 copper wires.

*Picturephones will be common in large cities.

*Remote meter reading will be standard.

*Consumers will shop by TV. After seeing products on their screen, they will order by keying in data on an electronic communicating order pad.

*EFT (electronic funds transfer) will employ bank cards that can activate terminals to conduct transactions. Checks will become obsolete, as will their conventional delivery by mail. Money will flow, literally, on optical fibers.

*Managerial functions will leave the office and be conducted instead from the home, aided by audio/video services, picturephones, rapid digital facsimile, cable TV, and satellite communications networks.

*All filing will be electronic or on microfilm, electronically accessed or moved via facsimile.

*Teleconferencing will be common. Traveling for business meetings and commuting to work will fall off sharply.

*The cost, bulk, complexity, and service requirements of many of today's devices will be so reduced that almost everyone, at home or at work, will have computers and terminals.

*Newspapers will be delivered electronically by home facsimile recorders or on a CRT. From a "menu" on the CRT, the subscriber will order electronic delivery of the desired stories or ads, or even record them on hard copy.

One could go on and on dreaming impossible dreams... but before being sure they are impossible, remember... we did go to the moon, and that was years ago.

OFFICE DESIGN AND OPERATIONAL EFFICIENCY

At first, automating some or most office operations may create more problems than it solves. To make the best use of the equipment and systems, and to maximize personnel output both in quality and quantity, it won't be sufficient to buy the best machines and train their operators thoroughly or to offer an incentive salary increase. It will be necessary to redesign the office itself.

Office plans will consider psychological as well as technological problems and will be revised frequently. More than furniture and prestige and aesthetics will be considered.

The emphasis will be on productive (and this includes pleasant) environments. Considerations of electronic hardware, communications systems, and work flow will be as important as decisions on floor coverings, desks, chairs, pictures, and drapes. The color and style of machines, the angle and height of keyboards, the glare potential of CRT screens, and the nature and location of work surfaces and storage facilities already are primary concerns of office planners.

WHITHER THE PRIVATE CASTLE?

There is a current trend away from private offices toward what is now called the "open office." The purpose is to save many thousands of dollars in square footage, as well as to improve work flow and communications. Many executives often oppose the switch at first, but in tests made six to eight months afterwards, the great majority had come to prefer the open office. Some even "felt" they had gained space (though, in reality, they hadn't).

A certain loss of status occurs when symbols and trappings are removed or changed. But, as Robert Noyce, president of Intel Corporation, wrote in *Business Week*, "We want people to get status from the job they're doing, not from walnut paneling."

THE CONQUEST OF SPACE



The most important "space people" of the '80s may well be office planners. It is to them that companies will turn when success breeds growth and overcrowding. The traditional solutions to the problem have been:

*Squeeze them in — overcrowd. (Result: noise, confusion, lowered productivity.)

*Expand facilities. (Disadvantage: expensive and open-ended.)

A new alternative, the open office layout, aims to cope with some growth while avoiding the low-productivity/high-cost alternatives of traditional solutions. The essential elements of the open office are landscape screens or panels and hang-on components.

LANDSCAPE SCREENS OR PANELS TO REPLACE FIXED WALLS

Landscape screens or movable panels offer these advantages:

*They can be disassembled, moved to a new location, or put into a new configuration easily and quickly.

*Since they do not reach the ceiling, moving them need not involve changes in ceiling lighting, air conditioning, or flooring.

*Office screen systems are modular and can be arranged to satisfy a particular person or function.

*Costs of less than $1 per square foot compare with $6 to $30 per square foot for fixed walls.

*Panels or screens are IRS rated as furniture and qualify for a 10 percent investment tax write-off.

*Owned by the company, they can be taken along when moving to a new location.

*Psychological advantages claimed for the open office include increased privacy for those formerly in a bullpen situation and easier interaction for those formerly in closed private offices.

*Acoustic screens or masking sound systems can protect conversational privacy.

*Screens can be varied in appearance — straight or curved, of differing sizes and heights, stand-alone or attached to one another.

*Some panels can be used to conceal wiring, ducts, or pipes.

*Panels can be colorful and decorative or plain. Their surfaces can be functional (for projecting pictures, accepting pushpins, or even serving as a blackboard or a porcelain-finish whiteboard). They can include see-through or pass-through areas.

HANG-ON COMPONENTS

Either mounted on the screens or freestanding, hang-on components can include: work surfaces, files, platforms for machines, cabinets, tackboards, shelves, credenzas, storage and wardrobe units, files, drawers, and phone modules. Already, modular work stations and landscape screens are being tailored by manufacturers to WP and DP requirements. Lazy Susan turntables can make a terminal accessible to more than one operator. Office components come in a variety of materials, finishes, and fabrics.

ILLUSTRATIONS BY ANDRZEJ DUDZINSKI AND JUREK WAJDOWICZ

LIGHTING

Furniture-integrated lighting, lighting that is custom-selected and positioned where it is most needed, yet glare-free and energy-conserving, is becoming increasingly popular. For aisles free of work stations, freestanding light towers are being used.

THE OPEN OFFICE—SECOND THOUGHTS

Throughout the '70s, some 30 percent of all office workers were shifted from pool arrangements or closed private offices to open-plan offices. According to a thoughtful review of this trend in the *New York Times*, by the end of the '80s six out of ten office workers will be situated in open offices and the interchangeable components ("systems") kind of furniture business will boom.

But, just as with new machines and electronic devices, open-plan offices sometimes need debugging. Some long-term users fault the rigid application of a plan, see the need to police a system after its installation, and note that an overall cubicle look can be jarring. Not everyone is convinced that bringing supervisors and workers physically together truly improves their communications and productivity. The cost savings and tax advantages are generally accepted as real, but improved worker productivity may be less than hoped for, even illusory in some instances. There are complaints about too many people in one area, people interfering with each other, the distraction of other people's phone signals, the awkwardness of doing confidential work, and visual distractions.

Open-office workers who have come from a pool situation are generally happier in this new environment than those who have left private offices.

The screens can also create honeycombs that sometimes reduce rather than improve communications. Some companies—such as Mercedes-Benz in Montvale, New Jersey, after eight years with open-plan offices—are turning back to more private offices, more personal space.

Where confidentiality is important, as in a legal or accounting office, the open plan is least successful. Creative people such as art directors and copywriters are most resistant to the open office. With such objections in mind, when some offices of the Young & Rubicam advertising agency were redesigned to put 138 people where 65 had been in conventional offices, a modified system rather than a true open-plan office was used.

It would seem that the success of future open offices would be improved by more prior consultation with the people to be affected, both to help them understand the purpose and to take into account their feelings and preferences.

HOW NEW EQUIPMENT WILL AFFECT OFFICE ORGANIZATION AND FURNITURE

Office planners in the '80s will have to consider the whole range of technologies reviewed in Vision '80s and decide which are, or soon will be, part of their office scheme before sitting down at the drawing board. In addition, they'll have to answer such questions as:

*What stand-alone equipment will be installed, and where and for how long is it expected to cope with the traffic?

*Will there be a fully centralized WP center? A distributed or a departmental input and/or text-editing operation? Or a combination of these?

*What kind and size of work groups will use the equipment?

*Will there be internal communication among machines? External telecommunications? An electronic mail/message center?

*Will there be a central and/or distributed copier-reproduction system?

*How is WP used? For administrative support? As input for work to be typeset? To output data-bank information? For list maintenance and addressing? For information storage and retrieval? As a telecommunications device?

*Will there be a COM facility?

FURNITURE AND PRODUCTIVITY



A primary concern of the office planner is to improve productivity while providing enough flexibility so that an installation will not become obsolete prematurely. Not only furniture manufacturers but also equipment manufacturers are aware of these needs and are trying to design machines, cabinets, work stations, and chairs accordingly. Perhaps a key design trait of many new office pieces is their modularity.

Office furnishings suppliers are already refining desks, panels, and lighting fixtures to meet DP, WP, and typesetting needs. Work-flow patterns affect the efficient design of components. Increasingly, furnishings are being purchased because of how they function in a specific environment, as well as for how they look. Decisionmaking considerations include glare problems, fireproofing, task and ambient lighting, the functional values of enclosed and exterior desk spaces, reading angles, body positions, distance of eye to paper or screen, noise reduction, concealment of equipment cords, shaping a desk to fit equipment, using room dividers as mounting or projection or writing surfaces, and mobility of desks and tables, as well as modularity potential for customizing work stations. Increasingly, human physical and psychological needs are being considered, too. Office **planning**, obviously, involves more than office **decorating**. It is essentially concerned with work flow and productivity, and aesthetic considerations are ancillary means to those ends.

In sum, the big change has been in the design of office systems to support today's electronic office equipment. The same technologies that are effecting changes in office procedures or systems are revolutionizing office layouts. As Ken Walker, president of Walker/Grad Inc., observed, "Walking the line between automation and humanization will make formidable demands on the designer."

BUT WHAT ABOUT PEOPLE?

Obviously, in the office environment, it isn't enough to install more productive and more capable devices and systems. Despite today's tremendous focus on equipment, the true bottom line is people. Not just training them but making them empathize, making them interested, giving them a proper sense of importance and responsibility, and making them happy. These are human concerns that should be responded to, for both humane and business reasons. People are still the key to productivity and output quality. Management, ever-fascinated with computers and budgets, should never lose sight of this basic fact.

With this perspective in mind, let's take a look at people in the office of the '80s with respect to:

1. Career paths, salaries, and the job market.

2. Maximizing productivity.

3. The impact of automation on individual and organizational behavior.

4. Lines of authority: Who does what? Who's in charge?

5. The aphysical and remote "office."

CAREER PATHS, SALARIES, AND THE JOB MARKET

Some present realities and predicted trends in the job market include:

*There are more jobs for women.

*More of these jobs are at the managerial level.

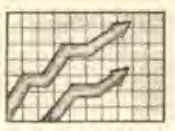
*Of about 3,000,000 secretaries (99 percent women), the skill level is declining as the most skilled move into managerial positions.

*The demand for secretaries will continue to increase, but there may be a need for better secretarial training in grammar and basic business skills.

*Although automation may reduce the staff need to cope with a given workload, an increase in workloads and the number of offices is likely to keep the demand for administrative support staff greater than the supply.

*Salaries for correspondence center managers in the United States, for example, are keeping up with or are rising faster than the inflation rate in many instances. This is also true for correspondence and administrative secretaries.

MAXIMIZING PRODUCTIVITY



A new machine creates new problems while solving old ones. Managers charged with increasing office productivity should realize that installing a machine, even the absolutely correct machine, is not in itself a sufficient solution. A new machine affects procedures and people, and everything—machines, procedures, and people—must be compatible if productivity is to be maximized. Frequent seminars and courses addressing this problem, run by such organizations as Frost and Sullivan, Martin Simpson Research Association, Inc., and various trade associations and universities, can be most helpful to the executive trying to cope with problems created by new machines.

THE MOST COMMON OFFICE PROBLEMS

*Increasing workloads.

*Faster deadlines (for executives, professionals, and support staff).

*Need for more people and more time.

*Increasing costs of personnel, space, equipment, supplies — in short, of everything.

*Uneven workload, with unpredictable peaks and valleys.

How to cope with these problems — getting the most work done well for the least possible cost — is a major headache for today's office managers. Part of the solution is to install more productive office machines and systems.

NEW EQUIPMENT REACHING THE TIP OF THE ICEBERG

There are an estimated 30 million work stations in the United States. Word processor penetration, for example, is strongest in companies large enough to support WP centers or having special application stations or where long documents are reused and revised or repetitive letters are an important part of the workload.

Such centers often have three or more machines, although many have one or two. The installation potential for this market segment is in the hundreds of thousands and has yet to be fully tapped.

Beyond that is the vast market of 10 million general-purpose secretarial work stations that will be approached in the early '80s, and then the 20 million or so "professional" work stations. With this potential, it is obvious that the '80s will see many new and improved machines as competitive manufacturers scramble for their share of the market.

IT'S NOT JUST WHAT EQUIPMENT, BUT HOW IT'S ORGANIZED

Sometimes a centralized typing department can step up output dramatically. For example, one installation positioned four correspondence secretaries at work stations in one large "center," with a supervisor at an outside station. While using the same equipment as before, output increased from 2½-10 wpm to 25 wpm. These low productivity figures (2½-10-wpm) are largely because the general-purpose secretary spends only about 15 percent of the time typing.

Of course, there are arguments against WP centers, too, including their alleged "impersonality."

WHERE DOES THE TIME GO?



Analysts of office productivity tell us that some secretaries spend only one hour a day on typing. On the one hand, a more productive typewriter or word processor may up productivity. But, on the other, how do you justify cost of a relatively expensive machine if it is idle most of the time? This is a question the market will have to answer when manufacturers go after those 30 million single work stations. Meanwhile, in multistation WP centers, correspondence secretarial time goes like this:

Machine-related (text editor) work (22% keyboarding; 9% playback)	31%
Record keeping, etc.	16
At-desk conferences, phone calls	5
Away from desk, including breaks but not lunchtime	40
Lateness in arrival	8

This is a dismal productivity picture. For a manager striving to maximize productivity, it is bad news. The center's studies for this data used magnetic card typewriters. Replacing them with full-page display CRT machines alone would eliminate the 9 percent of time spent watching playback. But even so, less than one-third of total time is spent on the primary job function.

In management's battle to increase productivity, purchasing the most productive equipment for the problem is just the first step.

Controlling the work flow, adjusting personnel to the new machines, and enabling a skilled typist to spend more time typing are also keys to increasing work-station output. It may be advisable to call in an outside expert to help cope with these problems, because the right equipment, by itself, isn't likely to give the full answer.

This subject — how to increase office productivity — could fill many books and still not be exhausted. It seems like the weather that we all **talk** so much about, but can't or don't **do** much about. But, with proper professional guidance, one can affect office productivity more successfully than one can make (or stop) rain or snow.

One source of help in this area is Office Management Systems Corporation, a consulting, publishing, and training firm specializing in word processing/administrative support technology.

AUTOMATION AND BEHAVIOR

Here are some things that generally happen when an office is automated:

*Output **capability** goes up.

*Some employees worry about being replaced by a machine.

*Others are afraid they'll never learn to use the new devices.

*Managers focus disproportionately on keeping machines and systems running, but neglect underlying personnel problems.

*Top management, hot for new systems at first, often develops cold feet when machines need debugging and the social impact of automation surfaces.

*Automation is greatest in support staff areas but is not so quickly adopted by top management and professionals for themselves.

*A whole new complex set of attitudes on the part of professional staff develops toward the newly automated support staff.

*Likewise, the staff operating the new equipment develops a new mix of positive and negative attitudes toward the organization and to the executives and professionals they support.

Anticipating and influencing the above situations and attitudes becomes a new and major responsibility of the office manager. Here, too, outside professional help may be warranted. Everyone in the organization — top management, professionals who are served by automated equipment, operators — requires careful orientation concerning the benefits to all the individuals involved. Attitudes as much as skills will determine the success of a new system. For example: Employees should become solution- rather than complaint-oriented.

As an example of what good equipment coupled with good organization and development of good personal attitudes can do, consider this: Where a general-purpose secretary produces 2½ wpm, a typing specialist will output 5 wpm, a supervised pool typist 10 wpm, and with incentives and favorable environment supervised pool typists using the same equipment can produce up to 25 wpm.

With computer-aided equipment they could be considerably more productive.

WHO'S IN CHARGE HERE?

One effect of office automation and of the new electrodigital devices throughout the information management process is to change lines of authority. New centers often develop new managers. Functions merge under a new supervisor. Will an overall vice president in charge of information management emerge? Or will a director of communications sit astride executives, professionals, support staffs, data bases, reproduction/storage/EM centers? And if so, from what ranks will such a person spring? And how will specialists — art directors and designers, for example — retain control over work quality within this new chain of command?

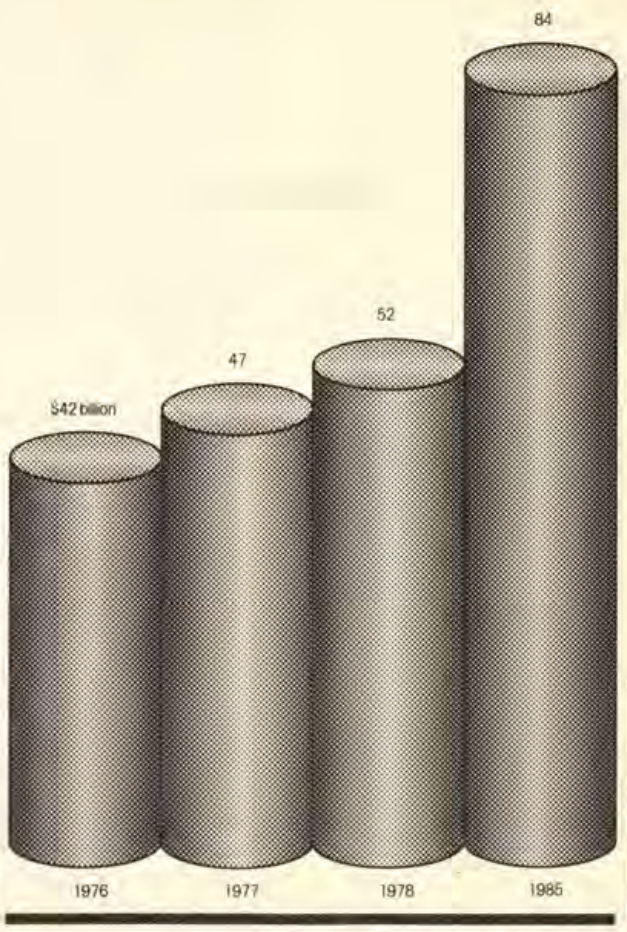
THE APHYSICAL AND REMOTE OFFICE



The executive's terminal could include a large split-screen CRT, a keyboard or graphic tablet, digital dictation facilities for converting voice input, intercoms, phones, a video receiver, and linkages via telecommunications to secretarial terminals, data bases, remote terminals, outside services, EM networks, COM, CPUs, storage/retrieval facilities, and photocomposition and reproduction/copier facilities. The secretarial terminal, similarly interfaced, could include a CRT/keyboard terminal, printer, processor, video viewing screen, dictation facilities, intercom, and phone.

The executive, via a telecommunications network, can converse or exchange data or graphics with faraway work stations, thus saving travel time and money while speeding decisions. Split-screen CRTs for executives and secretaries and matrix keyboards will facilitate visual communications and display several documents or people at once. Central offices will shrink as more people work in or near their homes. Travel time saved will add to work or leisure time, and money or wear-and-tear saved on commuting will be added benefits

ILLUSTRATIONS BY JUREK WAJDOWICZ



Printing industry forecasts. *Much indicated growth represents price increases and inflation. For example, in 1977 a 10 percent growth in sales dollars failed to expand profits at all.*

of the "aphysical" office—the office that will be less a **place** to go and more a **network** linking people at multiple nonoffice locations.

This office of the future lies out beyond the horizon a bit, but seems to be getting closer. This is one of the eventual developments the word processing system will have to tie into, in a very big way. The "office of the future" concept gets somewhat exotic—visualize executives, for instance, working at desks with their own video screens. If they want to know something, they push a few buttons and the response is shown on their screen. If they want to write something, they type it into the machine, and the text appears instantly on the screen; or they may dictate and have it translated into the machine. They can revise or edit it on their own screen. These are far-out concepts that do not exist yet. But these are dreams of the people who want to create the office of the future.

THE EUROPEAN DIFFERENCE

Because Europeans do less rewriting and retyping of letters than Americans do, secretaries in Europe spend less time as typists and more as administrative assistants. Consequently, WP systems for the European market concentrate less on text-editing capabilities and more on efficient handling of repetitive letters, lists, documents, etc. This may change if the European office manager sees advantages in using WP text editors to keyboard and edit material to be typeset, as is being done increasingly in the United States.

INFORMATION MANAGEMENT

Ultimately, all the technologies reviewed in Vision '80s will electrodigitally merge into one complete information management system. That's really what Vision '80s is all about. Word processing and typesetting do not exist in a vacuum today, but as part of something much larger that is coming to be known in the industry as "information management."

The problem in information management is that the cost of managing information in a large organization—almost any organization, for that matter, but especially in large organizations like governments, big corporations, foundations, and so forth—is astronomical and is growing rapidly. Some people estimate the cost of managing information as high as 15 percent of the gross revenues of a large corporation, and perhaps even higher in certain industries.

- **Scope of the problem:** The scope of the problem is enormous, stretching all the way from information arriving in an organization to information being disseminated at the other end to someone you want to influence. In between, there is a tremendous amount of information processing. For example, think about the kinds of departments in organizations that are concerned only with handling information, not with manufacturing or selling the product. There is the market research department, which brings information into the company, centralizes it, and makes sense of it. There's research and development. The accounting department is, in essence, an information department. On the output side are the sales promotion, advertising, and public relations departments. These departments, just a few of those handling information, are crucial to the flow of knowledge within the company. Beneath these departments is a whole galaxy of support departments: the word processing center and the in-plant print shop, to name just two. There is also the mail room, which is in charge of distribution. There are the messengers who run around, bringing things back and forth. There are the telephone switchboard, the computer data processing department, the records storage and retrieval deparments, the forms management group, and the company library. If you add up the cost of all these, and then add on the money spent going to meetings and buying information from the outside, you come up with some rather astronomical totals. And this whole vast information enterprise is almost totally unmanaged in many organizations today.

- **New management discipline:** What is beginning to emerge is a new management discipline that is going to be called information management. Corporations will have information managers, who will have responsibility for word processing and in-plant print shops, but a lot of other responsibilities as well. Their prime responsibility will be to take this disarray of disjointed information techniques and operations and put them together into a functioning information-management system.

The corporate information manager will be concerned with the nature of information, its flow within and outside the organization, and its purpose (to sell, to provide a basis for decisions, to remind, etc.). The information manager will also be concerned with security, distribution patterns, message priorities, costs, media linkages, and all the technologies and systems reviewed in Vision '80s, including such features as the open office and just how centralized or dispersed the WP, typesetting, reproduction, or EM facilities should be.

TELEPHONES



Perhaps the communications instrument most taken for granted in the office is the telephone; but it, too, will be computerized in the '80s. For starters, Bell System networks, modems, and switching systems will handle a large portion of tomorrow's EM. Computer-directed switchboards and branch exchanges developed not only by Bell but by such competitors as GTE, ITT, NEC, Northern Telecom, RCA, and Tele/Resources already make possible automatic call forwarding to an alternate line (if the first line is busy), conference calls, speed calling using one digit to activate stored numbers, and dictation.

Other features of ESS (electronic switching systems) and EKTS (electronic key telephone sets) include executive override (ability to cut in on another extension while in use), handling multiple calls by holding one or more while talking to another, alerts re incoming calls on busy extensions, conference calls, automatic recalling of busy lines, hot lines that connect at the lift of the receiver, paging, picking up a call on a different extension from the one ringing, automatic least-cost routing of long-distance calls, message accounting or record keeping for bill verification, and, of course, reprogramming.

Part of the impetus for these developments traces to the 1968 Federal Communications Commission ruling ordering telephone companies to allow customer-owned equipment to use phone company exchanges and lines. The result has been a proliferation of programmable devices (that can be custom-programmed for a given company's needs) to reduce workload, save operator salaries, speed communications, and offer new services.

The multibutton electronic telephone—and the ESS of the '80s—is obviously more than a conversation piece. It is the core of the office communications system linking such communications components as data processing, word processing, typesetting, platemaking, copying/duplicating, voice, facsimile, dictation, telex/TWX, and COM. It can even be equipped with a terminal, be a picturephone for teleconferences, or serve as a calculator. The office manager of the '80s is going to be able to use the telephone in many, many ways. (For more information concerning teleconferences and Bell's Picturephone Meeting Service, see the discussion in the section of Vision '80s on Electronic Mail.)

SERVICES

The automated office and its information management systems are so new, so technologically and economically complex, so revolutionary in their impact on people, costs, procedures, and capabilities, that many offices, large and small, may well find it worthwhile calling in consultants to help make the changeover. There is no standard solution or configuration; each office is a custom situation, which requires a customized analysis and plan.

OVERALL DIRECTION



Despite the tremendous impact that each of the many devices and systems described in Vision '80s is having, and will have, on the office and on information management, that impact is dwarfed by the two chief directions that will intensify in the '80s:

1. Widespread interfacing, the on-line or off-line connecting of each kind of device or system into one continuous electrodigital information management system.

2. The increased use of powerful CPUs (central processing units) to serve many kinds of devices at many stations, with a corollary decline of the dedicated, special-purpose device or system.

The former trend, universal interfacing, will come about when the market demands it.

The latter development, of a powerful CPU processor/memory that can link many levels of input to various kinds of output, will come about as processor costs continue to fall while their performance and power grow. IBM, Xerox, Microdata, and the entire minicomputer industry are implementing this, so that even small businesses can and will automate in the '80s to a far greater extent than was thought possible just two or three years ago. The hardware developments that will, of course, bring this about will be accompanied by increasingly sophisticated software packages, increased component reliability, and more self-diagnostic capability.



WHICH SHALL IT BE?



This section of Vision '80s, however, will focus on the questions that one should ask when considering installation of word processing or direct-entry typesetting equipment or systems and interactive composition terminals.

The following checklist does not supply answers (which must be customized to be truly meaningful) but lists many of the features and requirements one should consider when determining whether to buy such equipment and, if so, which machines or systems to buy.

Obviously, the first thing to do is to get a clear picture of your needs, immediate and for the near future. Don't burden yourself or a vendor with a comprehensive checklist; focus your list on your real needs.

TO BUY OR NOT TO BUY

? —What kind of work needs to be processed: editorial, secretarial, clerical, payroll, other?

—What is the workload or volume?

—How even is the work flow? How does it peak and ebb?

—What are your objectives concerning cost-effectiveness and speeding up production?

—With what other devices must the new equipment interface or communicate?

—What department(s) must it serve? Should there be a centralized or decentralized system? A dedicated or general-purpose system?

—How is the workload expected to grow in the next few years?

—Can this equipment or system be expanded as needed?

—How long will it take to pay for itself? Will it be inadequate or obsolete before then?

—How do the cost, production speed, quality, and security features of a purchase compare with the alternatives of buying WP typesetting services or of using time-sharing services?

—Have all costs been included? Initial cost, maintenance, personnel, materials, allocated overhead, etc.?

—What are the true operating costs?

—What is the cost/performance rating of systems being considered?

CONCERNING VENDORS

? Before considering which machine or model to buy, you should find out which manufacturers could supply your needs and then narrow the list of vendors further by asking such questions as:

—Is the vendor knowledgeable about the system? Does the salesperson know what he/she is talking about? Are there technical support people close at hand?

—Has the vendor done successful installations in the past? (Ask for references.)

—Is the vendor fully committed to small computer systems?

—Is the vendor financially strong?

—How reliably does their equipment work?

—How quick and effective is the service?

—Is there someone specific who takes total responsibility for the entire system?

—What if the machine starts acting "wrong"? Is maintenance handled by the vendor, by several different organizations, or by "third-party" organizations? Was the software written by a "systems house" independent of the vendor?

—What is the cost of a maintenance contract? What does it cover? What is the purchase price?

—How long will it take to pay for itself?

—What are the repair, supply, and font costs?

—What kind of plans (purchase, lease, etc.) do they offer? What are their tax advantages?

—Is the equipment hardware/software upgradable?

—What software programs are available and at what price?

—Is their training program satisfactory? Who will train your people to use the system? At what cost? How long will it take? What about training personnel who join your organization later? Is someone generally available to answer your questions?

—If you wish to learn to program the machine, are there facilities for teaching you?

—Will equipment fit into a system having devices from other manufacturers? Must supplies be purchased from a "single source" manufacturer? Does this matter?

—What trade-in deals are there when you want to upgrade?

How large is the "satisfied customer" base?

WORD PROCESSORS

? Word processors, as earlier information in Vision '80s indicated, come in a wide variety of systems and models, each with its own combination of capabilities. Getting the answers to these questions from vendors, vendor literature, consultants, and experienced users should help you make the best decision.

EASY TO USE?

? —Is it a turnkey system—complete with hardware/software and ready to be used?

—Is it easy to learn to operate?

—Does it have a good set of operator prompts?

—Does it have its own intelligence?

—What functions are (and are not) available?

—Does it have automatic word wrap?

—Does it have a full-page CRT? Partial-page CRT? Single-line display?

—What storage medium is used? Cards? Discs? Other? What is their capacity?

—if disc-oriented, does it have true read/write dual-disc drive? Does this matter?

EDITING

? —Can words, phrases, or paragraphs be moved to new positions? Can such transpositions be made throughout a document or just within a page?

—Can you correct text easily, or make insertions and deletions?

—Is there a built-in control for error handling?

—How big a block can be defined? Transposed? Stored?

—How large is the buffer memory? Large enough to facilitate transposing large blocks?

—How are hyphenation decisions made? Can lines be justified? How large/good is the dictionary and program?

—Can multipage documents be repaginated? Can the system merge text elements from different documents?

—Can it perform global search-and-replace operations? Can it locate **any** string of characters, whether some occurrences are all caps or all lowercase or a mixture or underscored? How does it scroll? Can it search backward as well as forward?

—Does it have automatic header, footer, paragraph, page numbering, and titling features?

—How well does it cope with long documents?

—How easily does it handle repetitive correspondence?

—How quickly does the system respond?

DOCUMENT FORMATTING

? —How easy is it to select and use a format? What format choices are there? How easily and to what extent can they be modified?

—Can you reformat via the keyboard?

—What software programs are available and at what cost? Can software be upgraded?

—What about such features as automatic centering, automatic cursor positioning, decimal alignment, high-speed indenting, electronic carriage return, and number of tabbing positions?

—Can it be used to design forms?

—How is tabular matter handled?

—Can you type columns vertically and back up to the top of the page to do other columns?

—Can columns be shifted sidewise? Transposed?

DOCUMENT HANDLING

? —Can finished documents be stored easily, duplicated, edited readily, printed automatically, and archived for permanent storage?

—Can indexes or tables of contents be created automatically?

—Is there a batch filing/retrieving capability?

OUTPUT OPTIONS

? —What choice of printers do you have? Type ball? Daisy wheel? Nonimpact? Matrix? Intelligent copier? Other?

—Speed of output? Does it have a bidirectional printer?

—Quality of output—at low and high speeds?

—What choice of type styles and sizes is there?

—How wide a carriage can you have?

—Will the WP accept proportionally spaced daisy wheels? When justifying lines, will space be added between words only or also between characters? (The latter would spoil the value of the PS wheel.)

—Can it operate several printers at once?

—Can you input/edit a job at the same time a previous document is being printed out?

—Is there a photocomposition link? Via compatible disc? Interface? On-line?

—Is there a DP link? How does it work and with what other machines or systems?

—Optional feeds—for twin sheets, envelopes, labels, continuous forms?

—Is there a communications program? Does it work and with what other machines or systems?

—Is a dual-head printer available, so that you can have two fonts on-line? This feature can mix type styles and languages, or offer a pi font to access special symbols in one pass.

—How does it handle multilevel equations?

OFFICE SYSTEM FEATURES

? —Data processing: Can it also serve as a data processor? Can it print out information stored in a data base?

—Sorting? Collating?

—Arithmetic computations?

—Extent of backup storage?

—Document security provisions?

—Telecommunications links? Asynchronous? Synchronous?

—What code is used? With what devices is it compatible?

—Can it handle OCR input?

DISPLAY FEATURES

? —If it is a CWP, does it communicate in the background or foreground? (If the former, it will enable the operator to use the keyboard and display for other work simultaneously.)

—Can text being edited be highlighted?

—Character size? Can it be enlarged or reduced?

—Can underscores, superscripts, subscripts, and other grammatical notations be displayed as they will appear (not merely as codes)?

—Line spacing: Single, double, one-and-a-half?

—Will display show justified spacing, line for line as it will appear?

—Can cursor be moved diagonally as well as horizontally and vertically?

—Can screen viewing angle be adjusted?

—Can screen brightness be adjusted?

—Are the screen and keyboard in one or separate components?

—How readable are the letters on the screen? Is there flicker or glare?

DIRECT-ENTRY TYPESETTERS

? Many of the considerations listed in the word processor checklist apply when weighing the purchase of a direct-entry typesetter. Before considering **which** typesetting machine to buy, you should also ask the following questions.

YOUR REQUIREMENTS

? —Just what work do you want to set internally, and what typesetting will you still want to purchase outside?

—How much is spent each year on outside type suppliers? How much are clients billed for type each year?

—How much of the markup is net profit?

—How much of the type is spec'd by the type house?

—What percentage of type charges are for rush jobs, overtime, and special delivery costs?

—How much time is lost waiting for type?

—How good is the service?

—What about inputting and editing on a WP text editor, to save a significant portion of outside typesetting costs, and then sending the resultant card, tape, or disc to a typographic service to take advantage of the shop's know-how and type library?

—What kinds of typesetting do you need? Text? Display? How frequently do you need each? How big are these jobs?

—How sophisticated are your design/typographic needs?

—How sensitive or confidential is the material?

—How much of the work is revision of standing jobs?

—What are the problems and advantages of your present method of getting type set?

—What about paste-up? Should you add a paste-up department or send such work to a service, or install a makeup terminal?

SYSTEMS ARCHITECTURE

? —Can a simple stand-alone unit be expanded into a system with multiple stations?

MACHINE CAPABILITIES

? —What kind of input does it take? Directly from keyboard? Perforated paper tape: 6-, 7-, or 8-level? Magnetic tape? Word processor output? Dataphone impulses? TTS tapes?

—Is it disc-compatible with any WP or easily interfaced?

—Output on paper or film? Right or wrong reading? What are the roller sheet widths and lengths? What do **you** want?

—Does the machine have multiprocessing capability, so that it can be used to edit one job while typesetting another?

WHICH SHALL IT BE?

—What kind of processor can you use? Will it take RC and/or stabilization paper?

—Can the typesetter deliver dry-processed paper ready for platemaking? Is output quality satisfactory for your needs?

—How long a tape or film or paper will it accommodate without risk of jamming?

—What changes can be made on copy that has been keyboarded before it is set in type? What editing functions are there?

—What storage medium is used? Paper tape? Magnetic tape? Cassette? Floppy disc? Other?

—Does it have a serial or random access file?

—Just how large and flexible is the file management system?

—What is the access speed for locating points in a file?

—How large is the working buffer that can be scrolled for editing?

—How is edited copy rejustified? Can you change the justification parameters?

—Can you copy job files to keep backup copies?

—Typeface sizes: What is its size range? How many sizes are made from one master? Exactly what sizes can it produce?

—Number of characters in a font? (The larger the font, the greater the capability for handling special characters, old-style figures, small caps, superior or inferior characters, or foreign accents, for example.) How are character width values stored?

—Capability of the system to mix and base-align typefaces and sizes? How many faces can be on-line at one time?

—Can you store formats, as for tabular matter? Can stored formats be copied from one medium to another?

—If more than one alphabet is carried on the image master, what economies does this mean in typeface purchases? How does this affect your ability to mix faces from one image master to another? Does the machine use segmented discs, and is this meaningful to you?

—Maximum line length that can be set?

—Finest leading that can be achieved?

—Ability of the system to do minus and reverse leading or column wrap, as for math tabulations, formulas, and area makeup? Are controls for minus leading done by keyboard or automated programs?

—Does it have a CRT display? Full- or partial-page?

—How many tab positions are there, and will they serve your needs?

—Do you need a true read/write dual-disc drive?

—Capability for subtle letterfitting? Can it set with various degrees of tightness?

—What unit system is used on the machine? (The finer the units—1/54 em compared with 1/18 em, for example—the subtler the control over letterfit.)

—Can it kern characters? (Kerning is the nesting of characters into one another, so that particular character combinations will fit well together.) How is this done—by keyboard command? Automatically? Can the program be bypassed? Is the program adequate for your needs?

—Can it hang punctuation, i.e., set quotation marks, commas, or periods at the ends of lines out into the margin, as some prefer?

—What about other typographic refinements?

—Can the system handle left and right indentions and centering of lines easily?

—What kind of hyphenation and justification program does it have? How easy is it for the operator to use, and how satisfactory?

—Can it handle runarounds?

—Can it position initials?

—Can it modify typefaces? Slant, stretch, condense, contour, or curve them, for example?

—Can typefaces be bought in quantity at reduced prices?

—Do you have to buy a different image master for every size, or does the image master cover a range of sizes?

—Does this manufacturer bring out new faces promptly?

—Is typeface reproduction sharp and faithful in the full size range?

—Can you use both the basic type styles and in-fashion faces?

If you want typefaces that are currently in fashion, you generally have to buy them. And when they go out of style, you can store them easily, since they don't deteriorate or wear out like metal type and they also take little space. If you take care of a film master, it's a low-cost, long-term investment.

—What kind of library of typefaces is available in the system, and what do the faces cost? What choice does the library give in both text and display?

—What should you include in a startup typeface library?

—Is there a white-space reduction program for the larger type sizes, and does it suit your needs?

—What is the speed, measured in lines per minute (9-point, 11-pica lines)?

—How reliable is the manufacturer in terms of servicing machines that break down? And how often do they break down?

—How easy is it, really, to train a typist to operate the typesetter?

COSTS

? —How many dollars can be saved by typesetting work that was formerly typewritten? Consider costs of input, editing, paper, filing, handling, printing, and distributing or mailing. All these are affected by copy composition.

—What is the purchase price?

—Can equipment be leased?

—What about upgrading?

—Can the investment be paid off in three years?

In measuring costs, consider purchasing (or leasing) price, plus maintenance, repairs, materials, supplies, allocated overhead, cost of operator (even the space the operator takes), and fringe benefits—the very same factors that go into any good cost accounting system. And don't forget to allow for downtime, when the machine needs repairs or the operator is out.

—What about operating costs? (You may need a good accountant or typographic consultant to help you estimate this accurately.

INTERACTIVE COMPOSITION TERMINALS

? Some factors to consider concerning electronic makeup terminals are:

—Display size: 8½ × 11? Full tabloid? Other?

—What inputs can equipment be connected to or interfaced with?

—To what typesetters can it output?

—What type styles can it simulate or actually display?

—When on-line to a digital typesetter, can it call up fonts from the typesetter for display on the compositor display tube?

—Can it display each character in its correct size and width?

—Does it employ a keyboard or graphic tablet, or both?

—Precisely what editorial, makeup, and markup functions can it perform?

—Can it accept and use stored formats?

—Does it automatically create the necessary codes for the typesetter?

—Is it a soft-copy proofing terminal or a fully interactive device?

—What skills must the operator have?

—Can it communicate with editing or makeup terminals at other locations?

—How many characters can it display at a time? Enough to make up the jobs or pages you would use it for?

—Can it display pi characters?

—Can it set rules, boxes, and borders?

—Can it incorporate illustrations—line and/or tone?

—Can it screen tone copy?

—Can it represent illustrations by outlining them?

—How does it handle runarounds?

—Does it use an electronic stylus or pen, and if so, what can it do?



DOWN THE ROAD

What do others see? Although Vision '80s was written by one hand, it is an amalgam of the facts and ideas and visions of very many people. Perhaps we should wrap up this report with excerpts from the observations of some of those who have tried to look ahead. As Cervantes wrote, "Forewarned, forearmed."

Alvin Toffler puts it a little differently when he observes, "Performance improves when the individual knows what to expect." It is in this spirit that Vision '80s peers down the road.

ADAPTING TO CHANGE

How will individuals react to the new and strange devices, methods, and pressures? In *Future Shock*, Toffler paints this picture: "...the individual's sense of the future plays so critical a part in his ability to cope. The faster the pace of life, the more rapidly the present environment slips away from us, the more rapidly do future potentialities turn into present reality.... Some individuals, of course, project themselves so far into the future for such long periods that their anticipations become escapist fantasies. Far more common, however, are those individuals whose anticipations are so thin and short-range that they are continually surprised and flustered by change.... The men who rise in management are expected, with each successive promotion, to concern themselves with events further in the future...."

WORKING IN THE TWENTY-FIRST CENTURY

•Fewer single-person households; more multiple-wage-earner households (married or not), for the obvious economic advantages. (Theodore J. Gordon, President of the Futures Group and formerly Chief Engineer of the Saturn Program for McDonnell-Douglas Astronautics Company)

•In the office, as electronics handles most communications, most of the printed-paper routines will dwindle by the end of the century. Gone or greatly decreased will be mail opening and sorting, stamping, physical delivering; the office will have a new social as well as a new work structure. (Walter A. Hahn, Senior Specialist on science, technology, and futures research for the Congressional Research Service)

A POTPOURRI OF THOUGHTS

•**On design**: "The assistance of technology will free the designer to design." (Massimo Vignelli, graphic and industrial designer, at the Stanford Conference on Design)

•**On a paperless society**: "It is possible to create, store, manipulate, communicate, change, retrieve, format, merge, consolidate, add, delete, and distribute data without ever writing it down, printing it, or creating a piece of paper."

•**On the office of the future**: "There is even a name for our revolution, according to some. They call it 'The Office of the Future.'

"Frankly, at AM we don't think much of that name. First, we really aren't talking about an office with its implications of a physical place—a location to which people go on a regularly scheduled basis.

"Rather, we're talking about a process that will be used by and serve to support people and their mental duties, regardless of where they are. We are talking about a process that, in many applications, will go on without any particular linkage to the hours office workers keep. And we are talking about a process that will essentially ignore the barriers of time and distance that have so long been a principal influence on the locational relationship of one office to another.

"Second, we don't like the name because the phenomenon is not really of the future. It is happening now. Not in full force or in full configuration, to be sure, but it is not a some-time-ahead thing. The confluence of market need and technological feasibility has already been reached." (Roy Ash, President, AM International; quote from *TypeWorld*)

•**On replacing the USPS**: "Our rate of losses from the U.S. Postal Service is rising, as are the delivery delays. We will be experimenting with various electronic connection approaches." (Raymond P. Wenig, President, International Management Services, Inc.)*

•**On people and computers**: "Clerical workers will need to understand some computer logic, how a computer works..." (Robert McCurdy, Director of Service Information, Cummins Engine Co., Inc.)*

"The office staff will have to learn how to operate more exotic equipment... the bookkeeper will need to know how to enter information into a computer" (Arthur Vanderee, President, Unicorn Press)*

*From comments in an executive size-up by *Modern Office Procedures* magazine, 111 Chester Avenue, Cleveland, Ohio 44114. (One could also add that writers, editors, artists, and designers will also need to know how to use many of the digital/electronic tools described in Vision '80s.)

•**On electronic imaging systems**: "In our opinion, advances in electronic imaging systems, combined with advanced microprocessor science, will result in cost-reduced pagination systems during the next five years. This is important in that it will provide the latest technology to medium and small printing companies, enabling them to remain both competitive and profitable. Furthermore, we see facsimile transmission expanding out of the newspaper area into other fields of publication" (Robert A. M. Coppenrath, President, AGFA-GEVAERT, Inc.)*

•**On micrographics vs. printing**: "The effect of micrographics on conventional printing as we have known it is remarkable and will continue to impact. Computer output microfilm is replacing major volumes of impressions on paper. Parts catalogs, professional journals, and other stored information for selective retrieval will generally leave the printer's market." (Henry Henneberg, Executive Director, Printing Industries Association of Southern California, Inc.)*

•**On the proliferation of computer systems**: "My crystal ball says that the one competitive force that will have the greatest impact on the typesetting industries over the next five years is the proliferation of computer systems (software and hardware) as a result of decreasing hardware costs caused by technological innovations, as well as increased competition. This will bring about tremendous challenges to our industry, and a potentially painful learning curve for the publishing community." (James E. O'Connell, President, Automatech Graphics Corp.)*

•**On typographic service diversification**: "The successful typesetter of the future will provide a total preparatory service, from layout through film. The growth company will diversify, with heavy involvement in word processing and minicomputers, and provide software and total graphic support services in these areas. The company on the grow will probably further diverisify into one or more print-related specialty services. The 'problem' is to develop the new opportunities with commitments of time, talent, energy, and finances." (Victor N. Stein, Chairman, The Type House, Inc.)*

•**On the role of the printer**: "The prepress automation equipment available in the next five years will alter the complexion of the publisher/printer interface. Many aspects of the production cycle that formerly constituted part of the printer's burden will be retained by the publisher. Aesthetic judgment and responsibility for format, accuracy and appearance of publications will be confined to the publisher's office, with the role of the printer largely a mechanical one. Production time will be greatly reduced by eliminating the liaison normally required between the printer and publisher for the proofing and correction of copy." (Alfred L. Fenaughty, President, Information International, Inc.)*

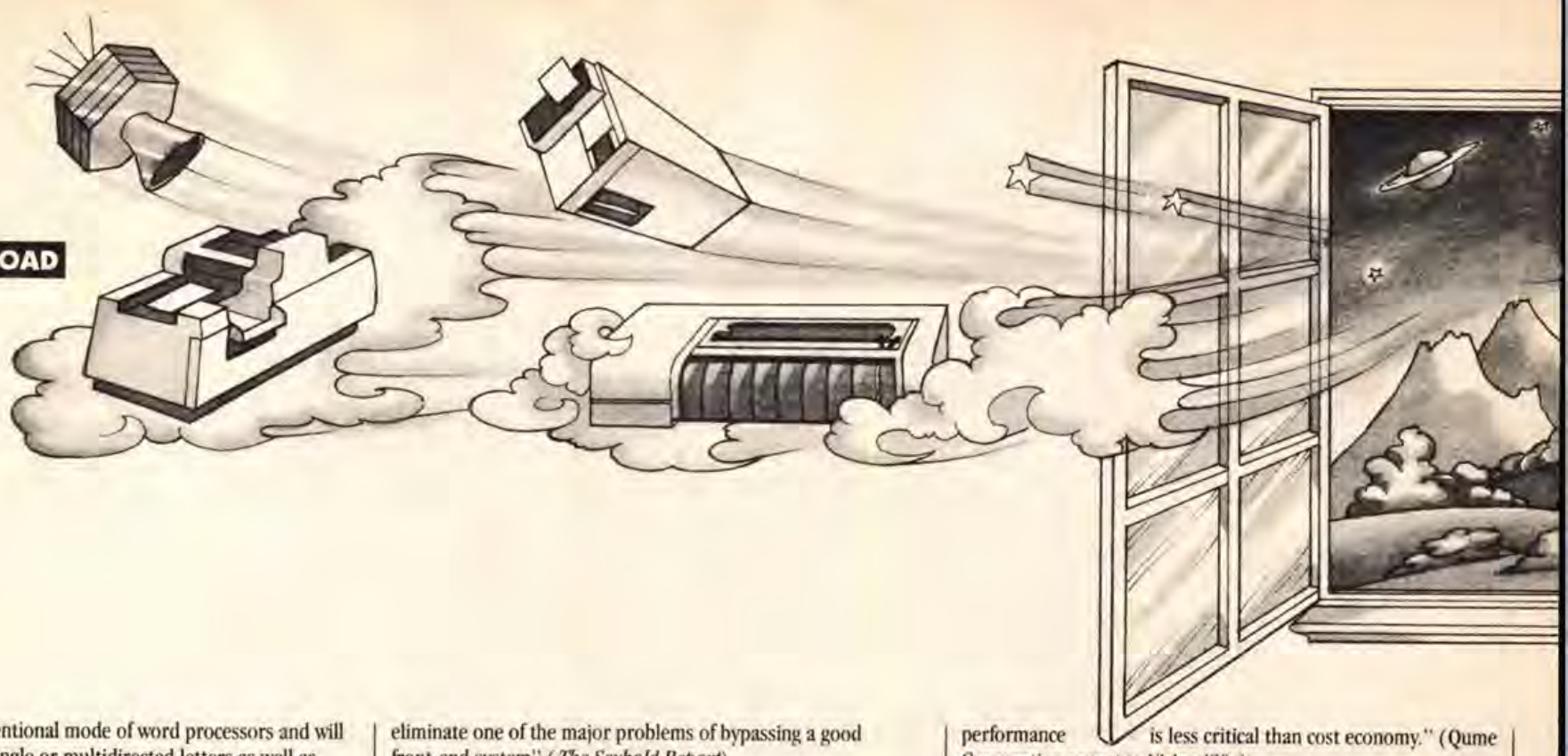
*Excerpts from comments made in *Graphic Communications World*, P.O. Box 12000, Lake Park, Florida 33403.

•**On the printing plant of the future**: "The publisher's remote printing plant... will be a converting plant, actually, almost wholly automated and perhaps run by two or three operators and a maintenance specialist. Its input will be electronic data received via satellite or wire... There may be no plates to worry about if you substitute an electrographic press for the conventional one...." (William E. Sherman, General Manager of Graphics Markets Division, Eastman Kodak Co., and a vice president of that company, writing on "The Printworld of January 2, 2001" in *Printing Impressions*)

•**On standardizing software packages to keep costs down**: "While it is believed that the cost of hardware, particularly memory, is going down, that doesn't appear true for software unless standard packages can be used." ("Critical Trends" study of Research and Engineering Council of the Graphic Arts)

•**On office-oriented computer systems**: "New, lower-cost, more powerful computer systems will be as at home in the office as in the typesetting plant. They will look and operate in the

ILLUSTRATION BY JACQUI MORGAN



conversational, conventional mode of word processors and will be able to generate single or multidirected letters as well as output via typesetters. Telecommunications links will be integral parts of these new text-processing computer systems, making them fully compatible with other sources of original documents such as remote word processors and computers." (Peter R. Wallace, Vice President—Marketing, Quadex Corporation)

•**On interactive graphics composition systems**: "Although commercial requirements are somewhat different in terms of the type of typographical composition needed, an interactive graphics composition system with an attractive entry price would find wide appeal in the large and small in-plant markets and among commercial typesetting services. The Composer-1550, for example, with its calligraphic hardware features, provides at each composition station immediate feedback of all operator commands and allows the user to edit and visually control the end result. This feature appeals to in-plant and shop managers who realize the high costs of skilled labor. Typically, typists or secretaries can be made to perform typographical functions on the Composer-1550 with no prior composition experience.

"Thus, the primary push of the Imlac Corporation is to develop a multistation system where one could intermix both alphanumeric and low-cost graphics terminals and supply a subset of the present Composer-1550 software to make this product very attractive to both the in-plant and the commercial market. Coupled with a variety of low-price equipment configurations, the new product would be able to satisfy the needs of the lower market end in addition to expanding into multiterminal configuration for larger systems requirements. The support requirements would be significantly reduced by micro-programming the system to efficiently handle, with minimal operator involvement:

1. Multicolumn makeup of catalog, manual, and periodical pages.

2. Formatting of single- and multiline tabular material.

3. Background transfer of word processing information."
(Stuart H. Charter, Product Marketing Manager—Graphic Arts, Imlac Corporation)

•**On more sophisticated use of stored formats**: "What is next for interactive graphic terminals? We don't see any immediate prospect for yet another generation of still lower-cost devices. Rather, we see more sophisticated software, including ATP-1/54-like control over the aesthetic niceties (available on the AKI Optimix) and more sophisticated use of stored formats.

"Next on the agenda after display ads, we would anticipate the use of such devices for page makeup for magazines, bookwork, and the like. We would also anticipate that more interactive area composition capabilities—perhaps like those which Berg and Syntext have already demonstrated—will be built into conventional composition system approaches." (*The Seybold Report*)

•**On electronic dictionaries**: "We can see another possible trend which would salvage and extend the usefulness of the second-generation machine: that would be the introduction of a special hyphenation 'box' with a large 'total' dictionary, to eliminate one of the major problems of bypassing a good front-end system." (*The Seybold Report*)

•**Voice input is real, today**: "The Chicago commodities market big board has the prices up on the ceiling so that everybody can see and read them from the floor. A man from the floor who has a voice transmitter around his neck reads in the stock or commodity prices, and they appear up on the wall. Consider a paraplegic in the Veterans' Hospital. He is equipped with a digital analyzer hooked into a teletype machine. He types out his letters by voice on that machine. It's a little bit complicated and expensive in that particular form. It is one of the first prototypes. He also, with that machine, which looks so complicated, operates the lights in his room, his telephone, and a few other things—all entirely by voice [command]. And, his wheelchair, too, runs by voice." (Dr. James Kasprzak, Chief of Management Administration for Word Processing Grant, Headquarters, Department of the Army, Washington, D.C.)

•**On more micrographics interfacing**: "'The computer as an aid in information retrieval will spur the future acceptance of microfilm publishing through automatic indexing and assisting retrieval.' So stated Sam Greene, Vice President of Terminal Data Corp., Woodland Hills, California, during a talk at the Australasian Micrographics Congress and Exhibition. In Greene's opinion, the interfacing of micrographics with computer systems is one of the most important of the new technologies. Green points to Digital Equipment Corp.'s use of Computer Output Microfilm (COM) systems and high-speed multiformat document cameras as an example of the new technology marriage. DEC uses micrographics linked to its own computers as an integral part of its operations, such as in the preparation of internal phone directories, product documentation, and field service manuals. Greene also cited work at the U.S. Patent Office, which recently installed a computer-controlled microform search system for identifying and locating patent files." (News item from *Computerworld*)

•**On more business applications for word processing systems**: "The dramatic growth of the word processing segment of the office systems industry can be credited in large part to the development of the daisy-wheel printer. Without the letter-quality print capability, high speed, and affordable cost of the daisy-wheel character printers, which are standard components of virtually all text-editing systems today, the industry would certainly have experienced much slower development. As office systems become more automated, we expect to see a much broader range of business applications enjoying the productivity benefits of text-editing systems and demanding letter-quality printer output. New applications will include many of the administrative and accounting functions, reulting in some merging of word processing, information processing, and data communications systems.

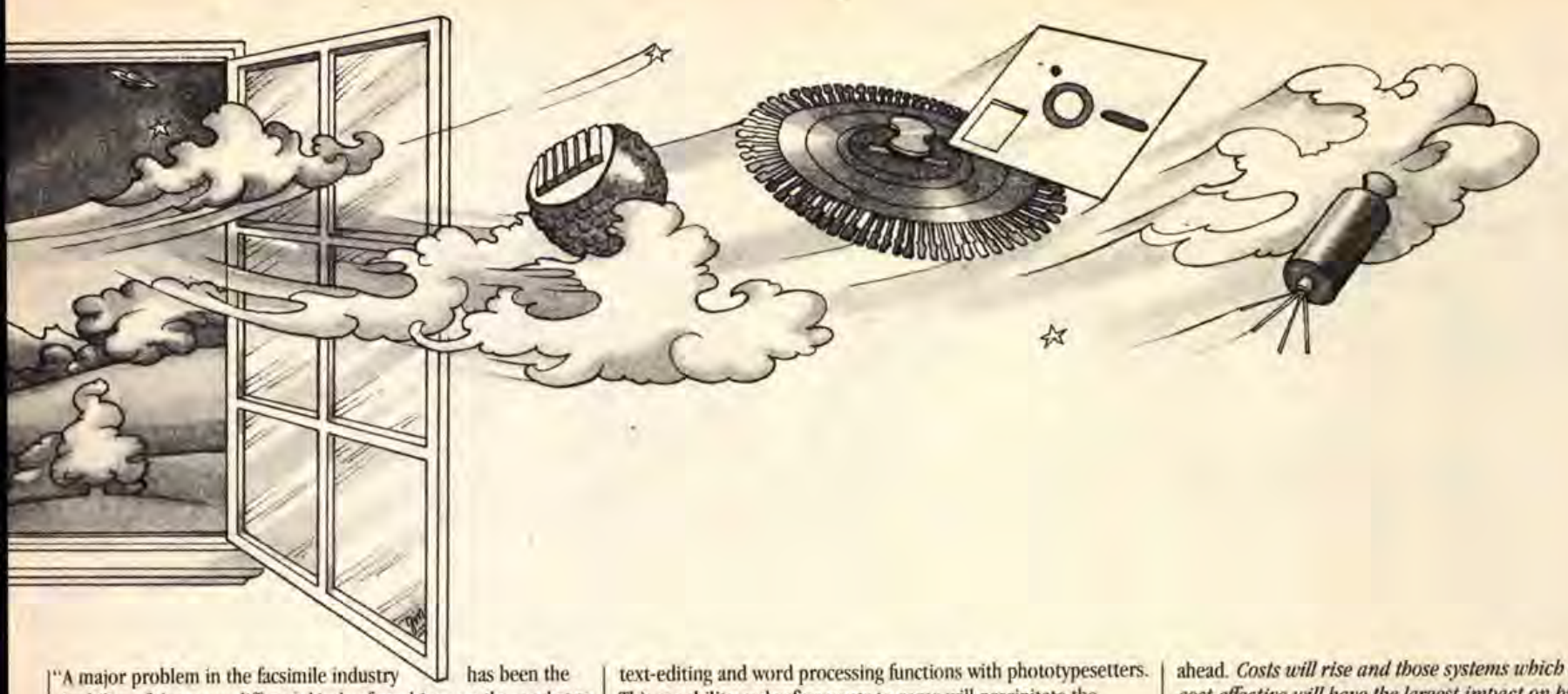
"We expect to see continued progress in the enhancement of letter-quality printer systems in the form of paper-handling accessories, wide ranges of type styles, character sets, and improved ribbons. Qume has been an early leader in this product development area and will continue to keep it high in product development priority. The next five years will no doubt see improvements in printer speed performance as well as progress in cost reductions for applications where top printer performance is less critical than cost economy." (Qume Corporation report to Vision '80s)

•**On software—more, better, and for more jobs**: "The so-called 'paperless office' is only a reality if the information being transmitted is in a readily useable form. We see a strong need for quality printers, as well as the option to work in a paperless mode (electronic mail). Also, interfaces for photocomposition units and OCR readers will allow manipulation of information processed through word processing systems. We see a strong emphasis on internal logic or software-controlled systems rather than hardware-oriented.
For the past ten years, the applications handled by word processing systems were limited by the hardware that was available. Naturally, stronger emphasis on software will mean continued overlapping of word processing and data processing functions. For example, the TES 501 has basic arithmetic capabilities and allows applications such as the preparation of bills with descriptive information of services (especially for the legal industry) to be rendered in a professional and attractive form. We anticipate expanded use of word processors for data or information retrieval applications (file management). Until information retrieval took its place within the office alongside of word processing, there was no effective method of handling file management applications that are too cumbersome for manual methods but not cost-effective enough to use an expensive computer system. These file management applications include personnel records, outstanding orders, document tracking, and time-keeping.

"Olivetti sees the 'Office of the Future' being determined by the needs of the client. Systems should be flexible to allow the requirements of different offices to be handled. This will mean stronger emphasis on preprogrammed systems that do not require extensive customer programming, where the customer's application potential is not limited by the hardware. Both the low-end electronic typewriters and full-scale word processors with peripherals should strive for maximum flexibility." (E. W. Grossman, Vice President—Marketing, Olivetti Corp. of America)

•**On "fax" developments, present and future**: "The use of facsimile equipment for urgent business communications is accelerating. The number of units in the field is expected to double by '83, and the high-speed digital segment of the market is expected to increase 500 percent by '80. The dramatic growth of the facsimile industry is largely due to the adoption of international standards for machine compatibility, escalating traffic volume and decreasing cost per page, and the development of digital machines that can transmit information many times faster than analog machines. Facsimile equipment is becoming a standard tool in most offices, and there are strong indications that in 10 to 15 years it will become common in the home as well. As delivery volume reaches an estimated 50 billion pages by '90, cost per delivery will drop to 19 cents, which at that time will probably be cheaper than first class mail. Facsimile equipment may become a viable alternative for carrying the bulk of personal and business mail. It may even be economically desirable for people to work out of an electronic office in their homes, using computer terminals for information access, television conferences, and fax equipment for sending memos and documents back and forth.

ILLUSTRATION BY JACQUI MORGAN



"A major problem in the facsimile industry has been the inability of the many different kinds of machines on the market to communicate with each other. Graphic Sciences newest dex® systems are major advances toward solving this problem. They are compatible with each other, with many other manufacturers' equipment, and with international equipment standards. Dexnet links digital and high-speed analog systems to provide a single communications interface with the entire world. It can send a full page of printed, handwritten, pictorial, or other graphic information anywhere in the world in as little as 20 seconds. Machine compatibility will allow for the development of universal networks of facsimile equipment. Future fax equipment may be able to communicate with other kinds of equipment such as communicating typewriters and copiers. In addition to paper copy, magnetic media (card, tape, or disc) may be used for input. New printing methods such as ink-jet and laser imaging may also be adapted for use in facsimile equipment, resulting in faster imprinting speed and better copy quality. The ability to produce multiple copies of documents according to instructions 'read' by the transmitting machine and sent to the receiving unit may also be anticipated. Recent developments in digital technology have paved the way for the 'intelligent copier' that will be able to merge text and graphics from separate transmitters into completed documents." (Dal Berry, President, Graphic Sciences, Inc., a subsidiary of Burroughs Corporation)

•**On total in-house communication centers, etc.**: "At one time, the dissemination of information was thought to be moving toward concentration and control by giant companies who could use competitive tools of continuing print communications, such as newsletters, booklets, fact sheets — to name a few.

"Just the opposite is happening today. There's a plethora of special interest and 'point-of-view' publications that flood newsstands, libraries, offices, and homes.

"The creative element of the printing/publishing process has become more accessible to the entrepreneur, thanks to sophisticated, yet easy-to-use and low-cost, phototypesetting systems. Computerized technology has opened up many new ways for the printed word to inform, instruct, inspire, and move to action.

"Itek has been a cutting edge in this field. Developments in electro-optics and computer sciences enabled Itek to introduce the Quadritek phototypesetting system in '76. It is proving to be a versatile tool for such markets as in-plant and small commercial printers, art design and typographic studios and offices requiring in-house typesetting capability.

"Technology has decentralized typesetting, opening it up to the business and institutional world and creating vast possibilities for the transmission of ideas and information. This is happening right now in large and small corporation offices, in schools, in banks, in advertising agencies and a host of businesses that would not have even considered in-house typesetting ten, even five, years ago.

"A long-range outcome will be the establishment of total in-house communications centers. Already it is possible to link text-editing and word processing functions with phototypesetters. This capability and refinements to come will precipitate the reallocation of some job responsibilities and shifting of comprehensive information functions to in-house printing departments.

"Another long-range development will be additional openings for creative designers in companies who can do their own composition on typesetting equipment. Indeed, the low-cost and simplified operation of the equipment will provide opportunities to experiment with layout and type elements in ways not previously possible.

"No less important, although probably a side effect, will be the elevation of our expectations of the printed word and print media. With increasing production of sophisticated print documents, the competition for creative excellence will rise.

"Most surely, these forecasts are made with limited vision based on what we have before us now. I have little doubt that the present incidence of in-house and individual phototypesetting is but the tip of the iceberg.

"We will see the '80s as a decade when phototypesetting will be almost as common as typewriting. The phototypesetting process will be an integral part of a much larger print communications network involving the creative uses of the printed word from conception through dissemination." (James F. Higgins, Vice President and General Manager, Itek Graphic Products Division of Itek Corporation)

•**One system should do it all**: "As advanced as the integrated electronic office already may be, it barely hints at what Datapoint has in mind for the future. The company figures that office workers must have the capability to analyze, store, and communicate not only computer-readable words and data but graphic, audio, and video information as well. One system should do it all, and I expect we'll have all the pieces in place within five years." (Victor Poor, Senior Vice President, Datapoint Corporation)

•**Cohabiting files**: "Our word processing files cohabit with files for data processing and with files for communications management. Having those multiple files available at one location gives us a unique position. And therein lies our strength." (Harold E. O'Kelley, Chairman, Datapoint Corporation)

•**On mobile telephones and the '80s**: "AMPS — advanced mobile phone service. A truly portable phone. Instead of calling from a phone booth to report the result of a grand jury investigation…or the drama at the scene of a fire or a political rally…reporters will simply take their travel phones with them — **right out of the car!** — and talk directly with their newsrooms from the scene of the action. Let your imaginations go with the potential applications of AMPS for medical reporting, crime detection and prevention, political meetings, and important public hearings." (From "Technology in the Eighties," an A.T.&T. multi-image, multimedia address to the American Newspaper Publishers Association)

•**How energy costs will affect printing**: "Some new systems being introduced today may prove to be inadequate in the years ahead. *Costs will rise and those systems which are energy cost-effective will have the largest impact on business.* Those that are energy-expensive, such as *high-powered lasers and electron beam writing, will be at a disadvantage.* We believe, for example, that *low-powered* lasers, i.e., He-Ne, *have a significant place* in the future of printing." (Dr. Harry Crawford, research fellow in Du Pont's Photo Products Department, writing in *Printing Impressions*)

"…These new output devices will all *use raster-scan technology.* They will not stroke characters. **They will create entire pages, including illustrations**, at a resolution of from 200 lines per inch up to more than 600, so that they will clearly be able to rival the quality of output on present CRT typesetters.

"And, of course, we will also witness the next logical step, where longer runs are indeed necessary, and that will be **direct-to-plate transmission of fully composed pages**.

"Consequently, my prediction is that the days of the phototypesetting device as we know it today are numbered. Certainly, so-called "second-generation" machines are now on their way out except for the direct-entry market. I doubt if you will see them manufactured — even the best of them — for more than a couple of years. Third-generation CRT typesetters will come down in price and will continue to be used until they are replaced by direct-to-plate composition. This will not happen all at once, but it will begin to happen within the next five years. And in the meantime, the same raster-scan technology that will produce printing plates will be generating output through techniques that are analogous to office copying machines, and we will indeed have virtually a complete fusion of technologies. It will be impossible to draw any logical distinction between systems that are intended to be used for composition and those that are intended to be used for a wide variety of office functions. The same terminals will serve a multiplicity of purposes and will access a variety of data bases….

"The principal challenges that remain have to do with the development of page make-up software, increasing use of interactive area composition techniques, and the digitizing, storage, and manipulation of graphic images including four-color separations." (John Seybold)

HOW DOES IT ALL ADD UP?

In the present technological stage, we are converting a paper-based flow of information to an electronic technology of inputting, processing, storing, and outputting. In the next stage, there will be no paper base; the base and the initial input will be digital. Today we are enthusiastic about capturing keystrokes. Tomorrow we will eliminate them.

We are moving from redundant manual input to one-time input to voice input. What's the ultimate stage? Thought-wave communications?

And, as we produce and consume and communicate more, faster, and at less cost, what about quality? The quality of products, ideas, graphics, and services — of life itself? Will intensity and compaction and the speed of light serve or control civilization? Can we keep the means from becoming the end?



UPDATE

VISION '80s UPDATE

New typesetters, new typefaces, new electronic page/ad composers, new software, new ways of transmitting information. New, new, new, faster, cheaper, better, easier—these words typify the tone and tempo of the '80s. So much so that the data reported in Vision '80s already need to be updated.

Hence this *Update*. No doubt, the news of devices and methods that affect graphic communicators will continue to pour in on us. Therefore, as a service to its readers, U&lc will, as the news requires, summarize and interpret it for you in future Vision '80s Updates.

PACE—A NEW RATE OF ACCELERATION

The cumulative impact of all the new technologies that are enveloping us is to transform more "impossible dreams" into reality, faster and faster. Tomorrow, Alice will have to run at breakneck speed just to stand still.

Have some of the prospects described in Vision '80s seemed unreal to you? Consider this. As recently as '78 and early '79, when some of these words were first written, Vision '80s reported that reduced memory costs and the increased capacity of a memory chip would bring the computer-electronic age to every office and home. A 32K chip was common then, and giants like IBM, DEC, and Texas Instruments were developing 64K and 96K chips! Our ink was hardly dry when we learned of Japanese 200K chips that would not lose their memory as chips could.

Then, in early '79, there began to appear in the business columns little notes about IBM (and others) developing 1,000K chips. That's 1 million bits (1 megabit) of memory capability. And printed circuits on chips could now be as fine as one micron in diameter!

The twenty-first century, indeed! In April of '79, Intel announced it had made and was marketing a 1,000K memory chip, selling for $2,000! Alice must run "furioser and furioser" to keep up.

As if that were not enough, a 4,000K bubble is expected within a few years, and by the mid-'80s, a 16,000K bubble! Meanwhile IBM has speeded up circuits to virtually the speed of light. Further, these new circuits generate almost no heat.

Think back to so many of the things discussed in Vision '80s, from digital typesetters to fiber optics, from dry typesetters and direct-to-plate typesetters and nonimpact printers to more widely available telecommunications—things that were not expected to evolve until the '80s. They couldn't wait. So many of our projections in Vision '80s are already reaching the market that our forecasts are beginning to seem conservative.

TYPESETTING

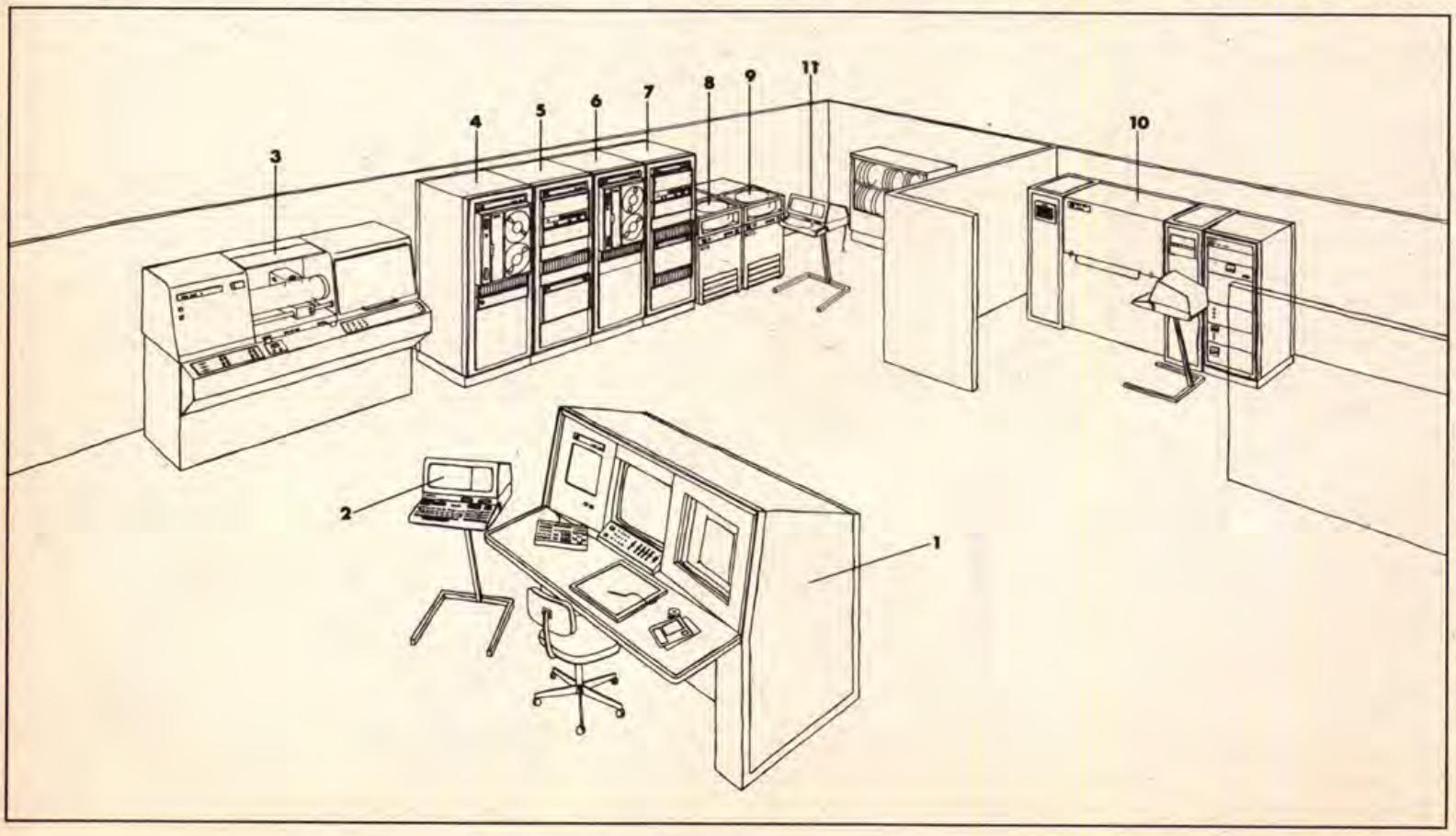
Let's focus on the news that came out of the big Chicago show, Print '80, held in April, 1980, and review the items alphabetically, by manufacturer.

Alphakey. CRS now has a roll-fed (up to 16 inches wide) model.

AM International. Demonstrated two-way communications between Comp/Edit phototypesetters and input/editing terminals and showed how its typesetters, terminals, AMtext® 425 word processors, Comp/Set 4800 area composer, 8400 Autokon electronic camera, as well as its J100 WP/DP device and its J325 OCR unit, could be modularly configured to become a versatile, communicating, pre-press system. Also new, the Comp/Set forms program.

Autologic. Demonstrated how its APS5 Micro typesetters can take input having Pacesetter or V-I-P coding. Also showed new composition software, its MicroSet composition program and its TFMS (Text/File Management Systems text-editing program).

Berthold of North America. New to the American market is the ACS-3200. This is a direct-entry typesetter with some area composition features. Unlike the FPS-2000, which features form-setting, the ACS-3200 is essentially a text typesetter. Also new is the CPS-2001. This is an off-line input/editing terminal for either the ACS-3200, FPS-2000, or APU-3600 machines. Also new, more software for the ADS-3000 composition terminal, a new kerning program, a user-programmable exception-word dictionary, and the SBS-2001 lower-cost makeup terminal. The



Sci-Tex Response 300. *The system's eleven components are: (1) color design console, (2) video terminal, (3) electronic scanner for input, (4), (6) magnetic tape units, (5), (7) minicomputers, (8), (9) disc drives, (10) laser plotter for exposing output film, (11) video display terminal. System converts artwork to film, separates and corrects colors. Information is converted to digital form facilitating its manipulation. System can store information for later output and/or editing. Not only can pictures be edited, sized and cropped but type can be repaired (as broken letters). The Response 300 can do step-and-repeat work and can be used to* ***create*** *geometric designs, lines, even illustrations. Film up to 40" x 72" can be exposed with all elements positioned by the system. The Response 300 also does electronic makeup. (Illustration courtesy of "Graphic Arts Monthly," April, 1980.)*

UPDATE



DIMANI Program makes it possible to alter the width of any character in a font and to customize font width programs to user needs. Another new program produces round-cornered rules, in ten weights, while typesetting. A variety of rule styles, including dashes and dots, are automated.

Compugraphic. Several new improvements on the EditWriter series were announced. Most intriguing is the AutoKern option. Installable on all models, it uses a kern card related to the filmstrip being used. Every possible combination of characters can be kerned, the degree of kerning can be varied from 1 to 15 units on a 54-unit system, and the unit can be bypassed at operator discretion. AutoKern also provides three levels of character-fit compensation or letterspacing tightness: bookset, adset, and tightset. The recently announced automatic ruling program, the communications interface, and the EditWriter Preview were also featured at Print '80. The latter is a video monitor that offers an instant CRT display of what an ad, table, page, or area will look like when output (but not showing the actual typeface that will be used). The Preview can be loaded with applicable font widths so that line endings, margins, and other considerations are accurately displayed. Also shown, along with the other typesetters and terminals, was the EditWriter 7770: 50 lines per minute, 68-pica line length, 12-inch paper width.

Discorp. A less expensive version of the Forms Setter D-2500, the D-1000, is now available. New software is interactive. The two devices are combination type composers and ruled-form setters. A third, less expensive version only sets ruled forms. The complete line includes software, entry and editing terminals, mini-computers, printers, and setters. The system is modular.

Information International. Triple-I now offers lower-cost text input and editing terminals for AIDS (Automated Illustration Documentation System). The system can output digitized color or black-and-white halftones. New to the company's line is the Microedit system. This is a micro-computer, text entry/editing system using floppy discs that can serve AIDS at local or remote sites. New software for the TECS 3300 editing composition system is also available. The 3600 Illustration Scanner and the VideoComp 570 Pagesetter are now being tested by *Newsweek* to scan, separate, and correct full-color copy, to crop, mask, and size it, and then to digitize the results for storage or electronic "typesetting" in full-page form on the Model 570.

Itek. The Quadritek now features foreground/background operation and a dry output option that can be used or bypassed at operator's choice. It claims RC quality for its dry output. New floppy-disc options for Itek's CPS systems are now available. The Quadritek 1201 is a dual floppy-disc system.

3M. 3M's I.N.T. (Image 'N Transfer) is a set of colored sheets that can be exposed to film negatives, processed, then have its line image burnished onto other material such as a film cel. Sheets are in black, white, red, blue, green, and yellow. The Disney Studio in Burbank uses I.N.T. to produce a three-word title in 10 minutes, from concept to finished cel.

Mergenthaler. An improved model of the CRTronic, a digital direct-entry typesetter offered in Europe, is now in the U.S. market. A 143-lb desk-top device, it has considerable editing capability, can take input from a mini floppy diskette, and can output 45-pica lines at up to 40 lines per minute. Size range is 4-72 points in 1/10-point increments from one digital master. Eight fonts can be on-line at a time, and they can be expanded/condensed from 50 percent to 100 percent in 1 percent increments; up to 48 points can be slanted up to 12 degrees. Keyboard is movable, and screen can be tilted for operator comfort. The CRTronic scans at 1,270 lines per inch and has paging, tabulation, and horizontal rule features. Reverse leading and vertical ruling will be options later in 1980.

The recently introduced Omnitech 2000 dry-output laser typesetter now has an off-line terminal, the 2001. Prices have come down to $13,000 for the high-speed Linoterm.
The Linotron 202 now comes in a higher-speed version, 750 lines per minute, and has a rounding algorithm to produce smoother curves in the larger type sizes. The Model 202 can now take 240 on-line fonts, and it expands the size range to 4½-108 points for some typefaces.

Monotype. The Lasercomp typesetter now handles floppy-disc input from a Xenotron electronic composition terminal.

Wang. A hyphenation and justification program (software) for Wang's Office Information Systems gives the operator a preview of line endings, as they will run on Wang typesetters. To do so, it uses a second "typeset" file. To make corrections, the WP file is edited. Wang typesetters now offer automatic kerning of up to 75 pairs per typeface.

ELECTRONIC PAGINATION

Alphakey. MultiSet III's pagination program can store up to 99 page styles, take input from AMtext® 425 word processor Quadex floppy discs, and telecommunicate to remote-site word processors and computers. The FDTS-III stand-alone terminal can now be an on-line front end for an AlphaComp typesetter.

Autologic. The APS-Comp software is a combination text/data processing package. It composes forms and pages and can work from text or data files. It accepts and stores customized format programs and is a powerful input/editing/composition terminal for the APS-5 typesetters.

Bedford. This is an interactive, real-time (immediate response), multiterminal composition and data management system. It reduces input keyboarding and virtually eliminates manual paste-up. It also simplifies such complex jobs as math, tabular, and display typesetting.

Bobst. A new generation of the MOPAS input/editing system, the MOPAS 400, operates with Bobst's new Photoset CRT 2001 typesetter, a version of the APS-5 Micro made under agreement with Autologic. The MOPAS 400 has programs for formatting, mathematical texts, timetables, statistics, and book and magazine typesetting as well as for many other kinds of jobs.

Camex. The ProFormer is like the Camex 1351 plus sophisticated forms composition capabilities. It can handle 17 x 21-inch pages and zoom the image up or down to view enlarged details or to display the entire unit being composed. It can also create and store grids, rules, and text.

CCI. Computer Composition International has a new book pagination program.

Imlac. Major improvements now available for the Composer 1550 family lower the cost of its multiterminal systems and make possible an eight-terminal system.

Mergenthaler. The Linoscreen Composer adds a capable interactive composing terminal to the Mergenthaler line. Its new features facilitate full-page electronic makeup. It can also serve as a text editor. Other Mergenthaler composition devices are the Linoscreen 7000, the System 325, and the MVP Classified Ad System.

Mycro-Tek. The ADCOMP is an on-line, interactive display makeup terminal for the Mycro-Comp front-end system. It has a graphic tablet, electronic pen, and drawing pad, is self-coding, and copyfits automatically.

AND WHAT ABOUT THE ART DIRECTOR OR GRAPHIC DESIGNER OF TOMORROW?

Will he/she be overwhelmed by all these technologies? Hardly. No more than you and I were floored by the automobile or by TV or by air travel. Tomorrow's adults play with computers as toys and use them routinely as learning devices today.

The challenge of tomorrow may not be how to use the new technologies as such — but how to harness them for human good. Tomorrow's graphic designer may have to be both a Janus and an Argus. Like the former two-headed god, he/she will need to look into the past and the future at once and, like the god of 1,000 eyes, be able to see in all directions, the better to strike the right balance between tradition and novelty. This striving is age-old and constant. Only the tools are new and changing.

(Please note. U&lc's Vision '80s Updates are terse reports intended primarily to alert readers to new developments and their significance. Manufacturers should be contacted directly when additional information is needed.)



Yesterday, Today, and Tomorrow

Some of you who have been in the graphic arts for all of a long career can recall the '30s, '40s, and '50s. In the '30s and '40s, there was no such thing as photographic typesetting, although some impractical men talked about Orotype and Rutherford machines. The big typefaces were Bodonis, Garamonds, Baskervilles, Caslons, Bookmans, and Centuries, and for a new look, one turned to Futuras, Bernhard Modern, Fairfield, and Egyptians.

The Type Directors Club was founded in 1946, and Harold Horman and Edward Rondthaler were setting headlines photographically at their new company, Photo-Lettering, Inc. They could slant and curve and stretch type in one dimension and add all kinds of shadows and textures, but everyone knew photographic lettering was a fad that had nothing to do with real typesetting.

The '30s and '40s certainly were times of crazy ideas, like putting a man on the moon or thinking that offset lithography with its flat, gray tones could ever amount to anything but a low-budget, low-quality, short-run printing process.

Even in the '50s — when the first beep-beep of the first Sputnik signaled a new era in space and lithography was enhanced with deep-etch and bimetallic plates and Photo-Lettering became nationally known and accepted and we had the Times Roman family and electronic color scanning became commercial — few people could envision further miracles. A man on the moon? Preposterous. Photographic text typesetting to replace metal? Absurd. Digital typesetting, electronic page makeup? Undreamed of.

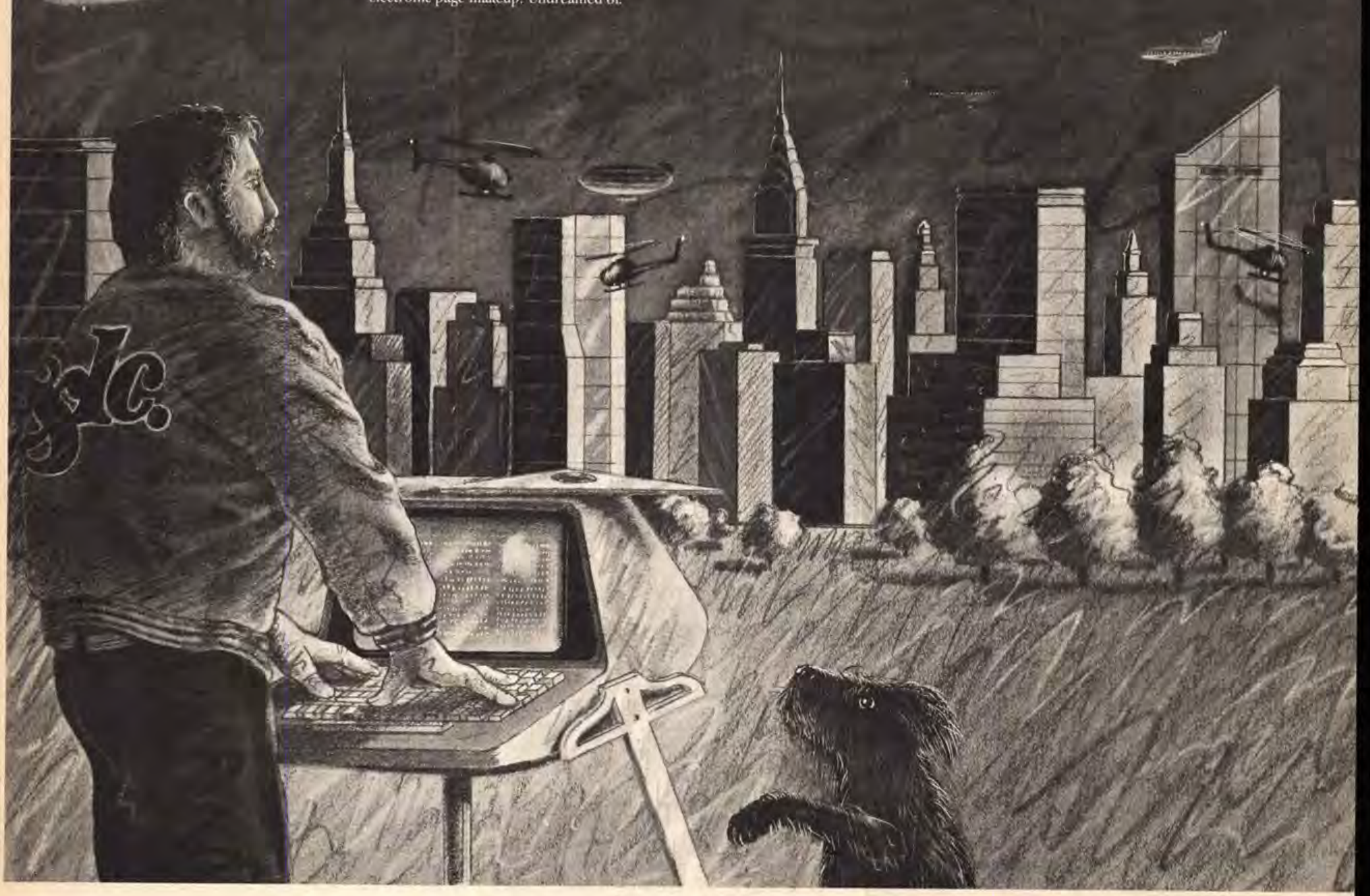
And so came the '60s, the Age of Aquarius, Helvetica, and moon probes. In 1970 Toffler's *Future Shock* documented where we had been and where we were heading. The '70s brought us CRTs and automated offices, digital/laser typesetters, ITC and laser platemakers, and wide use of electronic color scanning, and some younger people wondered what the graphic arts had been like without all these, and whether there really ever were such things as dinosaurs and metal type and letterpress printing, and how **did** people read in the '30s, '40s, and '50s when letters floated apart from each other so much.

And here we are, with a wide-ranging vision of the '80s. We dare to dream of — and even recognize as reality — electronic printing, electronic mail, and all the other impossible dreams recorded in Vision '80s.

Dream, then, the impossible dreams, for they are the only reality. Just as the impossibilities of the '40s became the realities of the '60s (and some have became obsolete already), so will today's fantastic concepts come to pass in the '80s and beyond. . . and when they do, they'll brew more and more impossible dreams.

Vision '80s is rapidly fading as a vision and fast becoming reality. Today is transience. Yesterday is for nostalgia and for teaching us lessons. Only tomorrow is real.

This, then, is our vision of the '80s.



Thoughtgram

Einstein 12, 2020/4:12:08:03
To: JT 124308000
From: EG 121877311

Please pardon this intrusion on your heavy schedule, but I feel you might be amused by the enclosed quaint report I came across today. It is called Vision '80s and purports to predict the future of information and communications systems in the '80s — the 1980s, some 40 years ago. It's a rather unimaginative piece, full of details about things that are already obsolete. No mention even of this Thoughtgram, whereby one simply thinks of words and images and to whom they are to be sent and out they go. (By the way, I had my transceiver embedded in my left wrist. The new model is so tiny that one can barely see it with the naked eye.)

I'll send you a copy of Vision '80s. It is printed on paper, can you imagine that! It enthuses about fiber optic cables and satellite relay stations as if they were the ultimate. I suppose, at the time, the writer could not dream of today's thought-transmission transceivers and networks and neutrinos that travel through the earth at the speed of light. After all, the whole second half of the twentieth century was concerned with conquering space in one form or another. That generation didn't realize they were just extensions of Vasco Da Gama or Columbus. The moon landing and the Jupiter probes were just more of the same. . . more, faster, further, but still focused on space.

It is good to be alive in **these** exciting times. Before this year 2020 ends, it may truly stand for perfect vision. It began with proof positive of Einstein's universal field theory, then followed the renaming of months after scientists of great vision (enough of Roman gods!), and it may yet end with the conquest of time. We are on the threshold of being able to see into the past and the future. Now **that's** exciting! The ultimate accomplishment, of course, will be to **control** the future. Even with our present healthy life-span of 110 years, you and I may help bring that day closer but will not live to see it.

Enough of these meanderings. Forgive me for taking precious milliseconds to queue these thoughts on your overburdened transceiver. And do remember me to your dear ones, wherever on earth or in space they are.



ILLUSTRATION BY ANDRZEJ DUDZINSKI

The future is here.

It's no longer enough to keep your competitive edge razor sharp.

In the 80's, you'll have to keep it laser sharp. With technology.

Technology is the future.

Which is why the future is at Mergenthaler Linotype. Where technology sets the pace.

But you've heard that before.

Everyone seems to claim the mantle of technological might.

So it's a good idea to examine those claims carefully—ours included. There are three very common sensical ways to do so.

First, weigh the Research and Development effort.

Second, see how new the new equipment really is.

Third, consider how pragmatically technology is applied to solve your particular problems.

Here's what you'll discover about Mergenthaler Linotype.

The only international R & D.

Of course most American graphic arts equipment manufacturers have R & D. In America.

We have R & D in England and Germany as well. Which makes ours the largest R & D of its kind in the world.

The result is a unique technological thrust powered by the scientific spirit of three nations.

But what does it produce?

Solutions for the 80's.

We'll discuss only three of our new developments on these pages. Each designed to work for you in ways never possible before.

Omnitech/2000 breaks through to fifth generation typesetting by combining digital, dry output and laser technologies.

The result is performance and economies that set new standards for moderately priced equipment.

Mergenthaler Linotype

Couple Omnitech/2000 with our new WPI/2000 word processing interface and a remarkable thing happens. It becomes a total production center that:

—accepts input via phone lines from virtually any word processor located anywhere,

—typesets that input,

—and outputs finished plates that go directly to press. Without any intermediate steps.

CRTronic is a low cost typesetter that finally brings advanced digital CRT technology within anyone's means.

And within anyone's space limitations. It's so small you can set it on a tabletop.

But this is the only machine of any size that combines an intelligent front end with a digital CRT back end.

CRTronic is a digitized, midgetized giant of a typesetter that makes full-range typesetting practical anywhere.

Linoscreen Composer has a unique combination of three operating modes that make the most of electronic composing's inherently vast cost-cutting potential.

An Edit Mode cuts editing costs by speeding up text throughput.

A Compose Mode is so flexible you can actually create ads on screen—moving elements at will; seeing everything in actual size.

And a Layout Mode lays out complete pages as large as 100 x 158 picas.

Everything can be done with a new bare minimum of markup and pasteup costs. Or none at all.

We produced solutions for the 80's once before.

That was in the 1880's when our revolutionary Linotypes literally created modern typesetting.

So we understand the graphic arts market as well as anyone. We know what your problems are.

Which is why we don't design with technology for its own sake. But with technology for your sake.

And for both our sakes, we have never sacrificed quality.. Our equipment sets operating standards; our typefaces set type standards around the world.

Quality, experience, technology. That's a rare combination. An invaluable one for you in the 80's.

That's why your future is here.

Omnitech/2000 is the future in digital, dry lasertypesetting.

Why settle for third or fourth generation phototypesetting when fifth generation lasertypesetting offers so much more right now?

Low cost silverless paper output and digitized master fonts can save thousands of dollars of operating costs.

At least 20 typefaces, each with 246 type sizes from 4½ to 127½ points, are on-line simultaneously.

Expand, condense or slant type at will; set true reverse type and graphic effects; set entire pages as well as galleys.

Forms are a snap to produce and update—without costly drafting and pasteup.

And much more.



☐ Please call me to arrange for a demonstration.
☐ Have a sales representative contact me.
☐ Send additional information.

Name _____

Company _____

_____

Street _____

City _____ State _____

Zip _____ Phone ( ) _____

Mergenthaler Linotype Company
201 Old Country Road, Melville, New York 11747
Phone (516) 673-4197

Show me my future with Omnitech/2000

CRTronic is the future in low cost digital typesetting.

CRTronic offers you the productivity advantages of advanced digital CRT technology in a low cost machine so small it sets on a tabletop.

Small size, yes. But big capabilities:

You can put 8 digitized fonts, each generating all point sizes from 4 to 72 in 1/10 point increments, on-line simultaneously.

You can electronically slant type 12° in sizes up to 48 point; can condense or expand type electronically.

There are two dual density mini-floppy disk drives; a 2000 character exception word dictionary; automatic file management.

And much more.



☐ Please call me to arrange for a demonstration.
☐ Have a sales representative contact me.
☐ Send additional information.

Name _____

Company _____

_____

Street _____

City _____ State _____

Zip _____ Phone ( ) _____

Mergenthaler Linotype Company
201 Old Country Road, Melville, New York 11747
Phone (516) 673-4197

Show me my future with CRTronic

Linoscreen Composer is the future in electronic composing.

Don't get so excited about cutting composing costs that you forget pages still have to be laid out.

Linoscreen Composer's unique trio of Edit, Compose and Layout Modes cuts costs in all three areas.

Sixteen thousand displayable characters, a capacity unmatched by other machines of this type.

A maximum ad size that can range up to 100 picas wide and 158 picas deep.

An optional Graphics Tablet that lets you trace art outlines and fit text around and within those outlines.

And much more.

Mergenthaler Linotype



☐ Please call me to arrange for a demonstration.
☐ Have a sales representative contact me.
☐ Send additional information.

Name _____

Company _____

_____

Street _____

City _____ State _____

Zip _____ Phone ( ) _____

Mergenthaler Linotype Company
201 Old Country Road, Melville, New York 11747
Phone (516) 673-4197

Show me my future with Linoscreen Composer

The future is yours.

We've got something to shout about:

tv

For years, you've known AM Varityper as a leader in high-quality phototypesetting machines.

Our Comp/Set and Comp/Edit phototypesetters have brought modern phototypesetting capabilities to thousands of commercial and in-house typesetting operations.

But what you might not know is that we're a leader in type, too. That leadership is reflected in our type library, which is one of the largest and most comprehensive in the business.

It's reflected in our service, which now offers you 24-hour delivery* on any of hundreds of standard type discs from our library. It's also reflected in our equipment, which gives you more flexibility and typesetting power than any comparably priced system.

More than 500 typefaces. We've assembled a library of over 500 of the most popular typefaces available today, including most ITC faces.

You'll be able to choose from a wide variety of styles, from traditional to the most modern. We offer styles for every kind of job, including scripts, novelty faces, and even reverses.

And now the newest members of the ITC family, the eight Fenice typefaces, are available. In fact, the font shown above is 16 point Fenice Light.

Foreign languages, special characters. Our type styles are available in all Latin-based languages. Plus other languages like Hebrew, Greek and Arabic, and others.

You'll also be able to choose from thousands of special characters that meet every typographic need:

Comp/Set, AM and Varityper are registered trademarks and Comp/Edit, The Informationists and Type Express are trademarks of AM International, Inc.
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scientific, math and engineering.

We have television channel symbols and astrological symbols. And symbols for crossword puzzles, bridge and chess. If we don't have the characters you need, we'll create them for you.

Each of our type discs has four typefaces. You can choose from our enormous selection of standard type discs. Or, if you want a different combination, we'll make up a disc with any four faces from our library.

Putting it all together. When you put one of our type discs into one of our phototypesetters, you'll see real typographic power and flexibility at work. You'll be able to set type in sizes from 5½ to 74 points. You'll be able to change typefaces at the push of a button. And you'll have a combination of styles and sizes that's hard to beat. For example, with our Comp/Edit system you get 138 sizes and 16 fonts on-line. That's 2,208 fonts accessible on-line!

But we offer more than flexibility. We offer you top quality, too. Our characters are designed to give optimum reproduction in the full range of sizes from 5½ to 74 points.

The standard width characteristics of each style are built into the type disc. But in addition, our flexible system takes into consideration the fact that there are many variables that often make it desirable to depart from "normal" spacing on some jobs. So we give you complete, easy control of letterfit to suit esthetic considerations, and to suit tight copyfitting conditions. Simple routines for white space reduction and expansion alter the set width of any face in use, while the mortise routine affords complete control of the fit of any character combinations.

So all your jobs will have the professional look you want.

The Type Express. In addition to more than 500 typefaces, top-quality type and precise control of design, we'll give you the kind of service you need to help you meet your deadlines.

We know that you often need a new typeface in a hurry. We meet that need with our special priority service. We call it Type Express.

It's special rush shipment on any one of hundreds of our standard type discs. Just call our toll-free Type Express line, (800) 526-0709, in New Jersey call (201) 884-2662, and we'll have your type disc out of our plant within eight business hours. And there's only a small premium charge. (If you want overnight air freight delivery, we'll arrange that, too.) So you'll be able to get the typefaces you need, when you need them.*

Now you know why we're the leaders in type: more than 500 typefaces, design flexibility, typesetting power and super service. To top it all off, you'll be amazed at our low cost-per-font.

For more information on our type, or any of our phototypesetters, write to: AM Varityper, 11 Mount Pleasant Ave., East Hanover, NJ 07936. In Europe: AM International Information Services Ltd., Varityper Division, 44 Church St., Luton Beds, England 44-582-28391.

AM **Varityper**
the Informationists.

*This service available in U.S. only.

GRAPHIC AID FROM LETRASET

Hurting for an idea? Dying for some stimulation? Try some graphic aid from Letraset. We have more letters, devices and symbols than you can imagine. They're all in easy-to-use formats – dry transfer sheets, self-adhesive films, drawing tapes – creative aid for just about any way you work. So instead of living with all that creative agony, use Letraset products to help create your visuals. With the pressure you've got, every little bit of aid helps.

Letraset
Letraset USA Inc.
40 Eisenhower Drive
Paramus, N.J. 07652

Paddington and parasol from Sheet 3231

PARASOL

Aachen Bold and Letratone Sheet LT163

Process

DOUBLE VISION

Octopuss Shaded

Letraline Tape 884

Victorian and flourishes from Sheet 3231

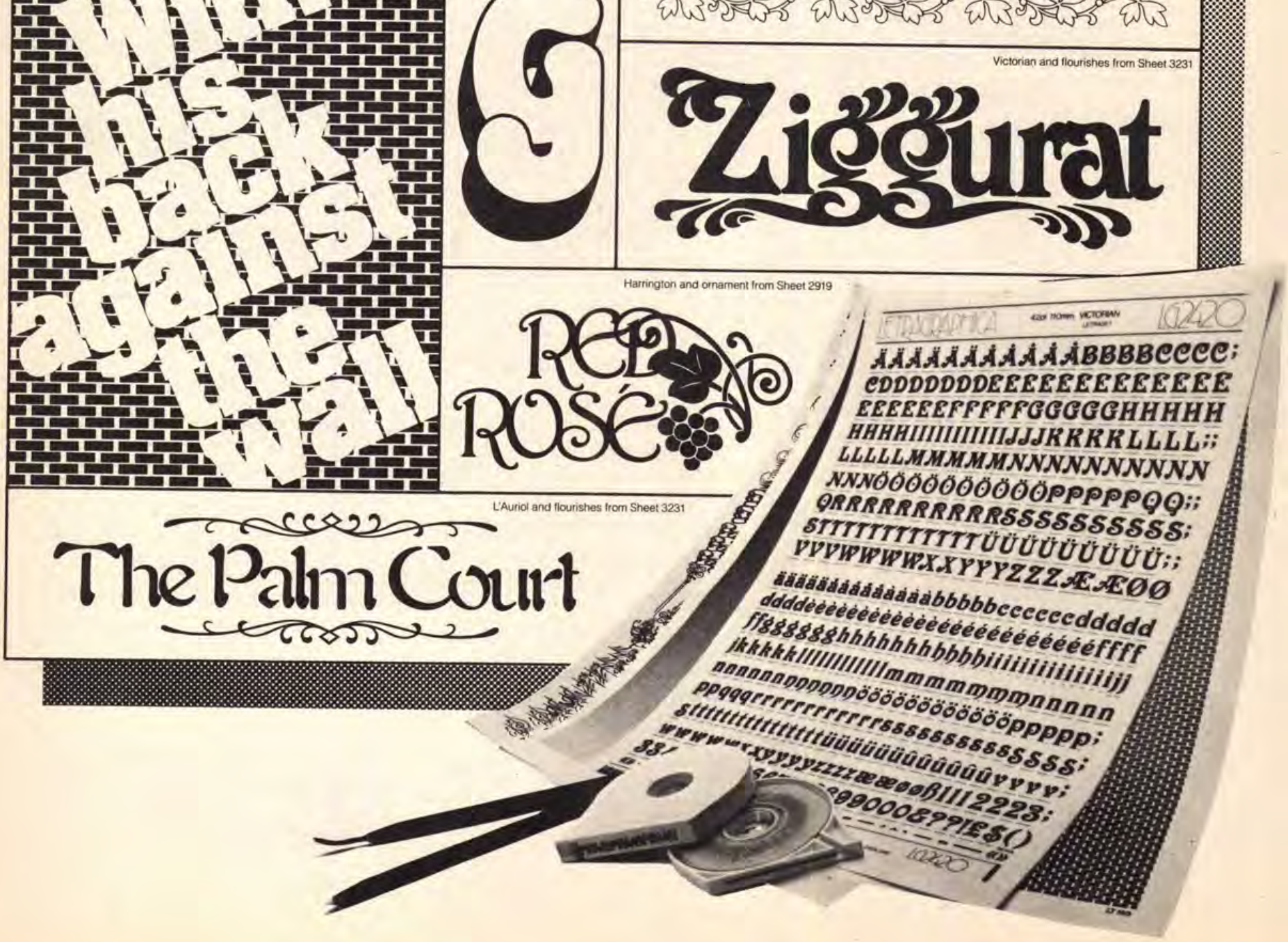
Ziggurat

Harrington and ornament from Sheet 2919

RED ROSÉ

L'Auriol and flourishes from Sheet 3231

The Palm Court



MEMO: To Readers of U&lc

You've given us a rousing response—even more than we predicted! Each issue of U&lc has featured a page of pictures and news briefs about The Design Schools and their gifted graduates. Hundreds of readers from all over the United States and Europe have written to us asking for more information. We are glad to know that there is widespread interest in our unique group of schools and their very employable graduates. The largest and most vital organization of its kind in the United States, The Design Schools have a combined enrollment of more than 5,000 students at the locations listed below.

The schools share a common philosophy and often pool resources and experiences. We schedule our programs over a continuous 24-month period, which is divided into eight quarters.* Each school offers a broad selection of courses structured within the framework of four majors: Visual Communications, Photography, Interior Design and Fashion Illustration. Our faculties have achieved professional recognition and maintain contact with the design world.

At The Design Schools, we place primary emphasis on skills development. Each year, more than 85 percent of our graduating students obtain employment in their fields.

This page is addressed to the vast number of employers who read U&lc regularly and hire visual people. We ask you to consider our graduates for staff positions—they are ready to go to work for you.

Also, you may know someone who wants to attend an art school that gives the student a broad range of marketable skills. The Design Schools all fit that description.

We will be pleased to hear from you.

*Interior Design is 27 months, with nine quarters.



Houston Advertising Design graduate Mary Epperson is typical in many respects of the students who graduate from The Design Schools each year. Ambitious and strongly motivated, she went to work for the *Houston Chronicle* following her graduation. After three years of creating brochures, slide presentations, outdoor advertising and in-house ads, she was recently honored in the annual competition of the International Newspaper Promotion Association. Her entry—a beautifully designed, 16-page-plus-cover-and-inserts brochure—won first place in the "Selling with Data" category. Not tempted to rest on her laurels, she is considering a return to the Art Institute of Houston to take a few Continuing Education courses. "I've grown a lot in the past years," she says, "but then, so has the school. I'd like to take a new watercolor course and maybe brush up on my airbrush."

The Design Schools

Art Institute of Atlanta
Art Institute of Fort Lauderdale
Art Institute of Houston
Art Institute of Philadelphia
Art Institute of Pittsburgh
Colorado Institute of Art

12

Edward A. Hamilton, Design Director
The Design Schools
Pan Am Building, Suite 256, East Mezzanine
200 Park Avenue
New York, N.Y. 10166

I would like to know more about The Design Schools graduates.
Please send me your free booklet "Design Graduates at Work." ☐

I don't have an opening at present, but please keep me advised. ☐

Name _____ Position _____

Company _____ Phone (____) _____

Address _____ City _____ State _____ Zip _____

Skills of special interest to me _____

You can rely on Chartpak's big graphic guns.

Velvet Touch transfer lettering, Color, Shading & Pattern film, & Graphic tape are our major products, but our new 232 page general catalog is crammed with many other products that graphics people use every day. Ask your Art Supply dealer for one.

Velvet Touch

chartpak Velvet Touch Lettering ITC benguiat gothic medium 72PT/M/BG72C

AAAAAAABBBB
AAAAAAAAABBC
CCCDDDEEEEEEE
CCDDDEEEEEEEE
EEEEFFFGGGHH?
EEEFFFGGGHHH;
HHHIIIIIIIJJJKKKLL;
HHHIIIIIIIJJJKKKLL!
LLMMNNNNNNNN::
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OOOOOOPPPQQ

chartpak Velvet Touch Lettering ITC benguiat gothic medium 72PT/M/BG72C

Velvet Touch letters are manufactured from a tough vinyl ink that goes down fast and stays down - it will not crack. In addition, Velvet Touch is the only transfer lettering product produced on a Mylar polyester film. This sheet is transparent and will not distort or curl even under severe burnishing pressure.

A practical 8¼"×11¼" size sheet provides easy maneuverability on the drawing board and permits file folder storage. Velvet Touch has a guaranteed two year shelf life and excellent letter opacity.

ITC Benguiat Gothic Medium is one of our 20 new type styles introduced this year, for a total of 295 of the most popular and contemporary faces available.

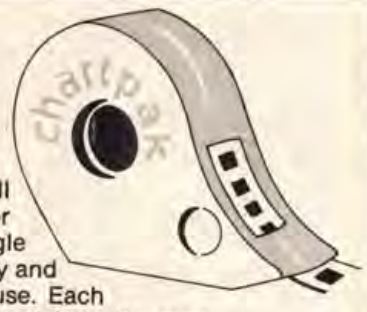
➳ Besides all the obvious reasons why Velvet Touch is a unique transfer lettering, there are other benefits. Preferred letter frequency: each Velvet Touch sheet contains a wide selection of the most frequently used letters, numbers and punctuation marks. Careful research determined the most often used vowels, consonants and punctuation marks.
Greater density/less waste: each Velvet Touch sheet offers the user a greater density of letters, thereby assuring less waste and increased economy.

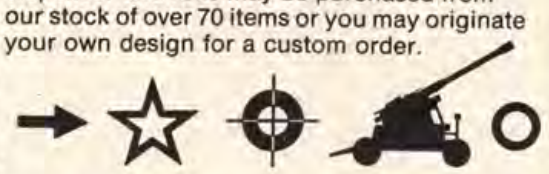
Multiple Symbol Sheets: Each sheet provides a quick professional means of applying repetitive drawing symbols, words and letters. Included are the popular ITC Dingbats, architectural symbols, sports, military sheets and others totaling 120.

Velvet Touch is quick and easy to apply. Simply position the letter using guidelines provided, rub with the Chartpak Burnisher, and utilizing the carrier sheet, burnish with the bone end of the burnisher.



Roll Dry Transfer: Another aspect of Chartpak transfer Lettering is the roll method. Used for applying a single symbol, it is easy and economical to use. Each symbol is packaged in its own dispenser and rolls may be purchased from our stock of over 70 items or you may originate your own design for a custom order.

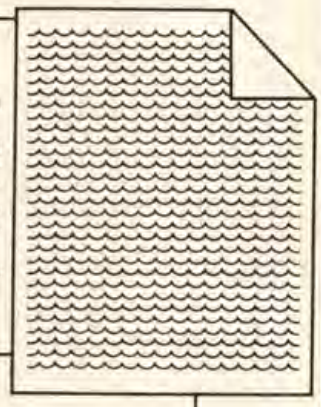




Colored Velvet Touch: Available in vivid red, blue, green and yellow in six type styles, this variation of Velvet Touch lettering is excellent for creating advertising layouts, package comps, posters, or other graphic applications. Ask your local art supply dealer or pick up a general catalog to find out about specific point sizes, colors and numbers.

Graphic Film

Chartpak Pattern and Shading Films: These films save both time and money by eliminating hours of repetitive hand drawing. They feature a "low tack" adhesive which allows for easy repositioning prior to burnishing. Upon burnishing, the adhesive bond is heat resistant and suitable for diazo reproduction.



You can choose from 169 different patterns depicting building materials such as brick, sand and concrete, or various topographic areas, textile patterns, grids and architectural details.

Chartpak Shading Films are available in screen coordinated values from 27½ to 85 line and in intensity from 10% to 70%.

Chartpak Color Film: Especially designed for use by artists and illustators in preparation of comps, finished art, packaging and other graphic assignments. Permits laying down large areas of color quickly and efficiently. Chartpak has developed a new adhesive system which adheres firmly yet can be removed easily and repositioned. Each sheet is treated with a chip-proof coating to facilitate easy cutting.

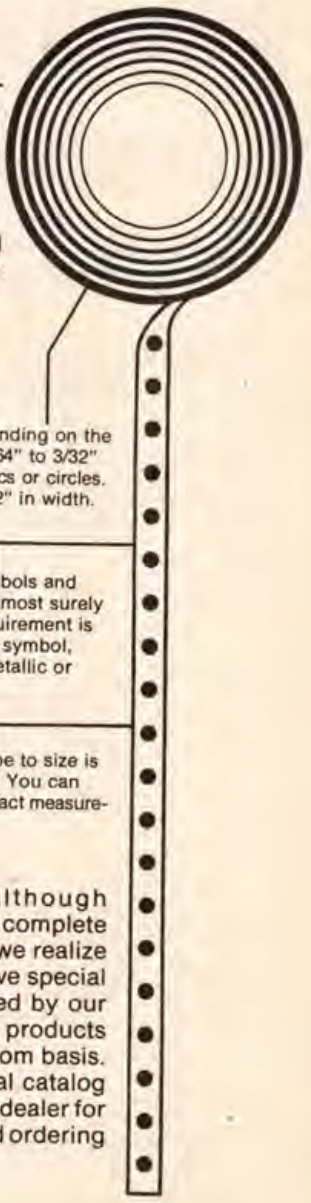


Chartpak Color Film is extremely easy to apply. Using a sharp knife, cut and lay down a piece of film larger than you need, then trim off the surplus film.

Blockout Film: A quality prepress product from Chartpak provides excellent results for the artist, stripper or photographer. Blockout Film consists of a thin "light-safe" acetate film coated with a low tack repositionable adhesive. It is easy to strip, photographs black and is used for masks and color separations on finished art or negatives.

Graphic Tape

➳ Whatever the application we have over 6,000 different types of tape. Some are glossy, matte, textured, fluorescent or metallic. They are available in color or black and white in a host of patterns symbols, widths and materials. All you do is position and trim.



Roll length is 324" or 648" depending on the width of the tape. Most tapes 1/64" to 3/32" are excellent for curved lines, arcs or circles. Some tapes are available up to 2" in width.

There are so many different symbols and patterns available that there is almost surely a tape for you whether your requirement is a decorative border, production, symbol, plant and office layout, color, metallic or drafting tape.

Chartpak's method of slitting tape to size is the most sophisticated available. You can expect sharp, clean edges and exact measurements in every roll you buy.

Custom Products: Although Chartpak manufactures a complete line of graphic products, we realize that many people may have special needs that are not covered by our stock items. Any of our products may be ordered on a custom basis. Please consult our general catalog or your nearest art supply dealer for detailed specifications and ordering information.

chartpak

A TIMES MIRROR COMPANY
ONE RIVER ROAD
LEEDS, MASSACHUSETTS 01053

"I bought a Pos One camera to make 5 stats a day."



Sheila Meltzer, princip
Second Look Advertisin
Ft. Lauderdale, Florida

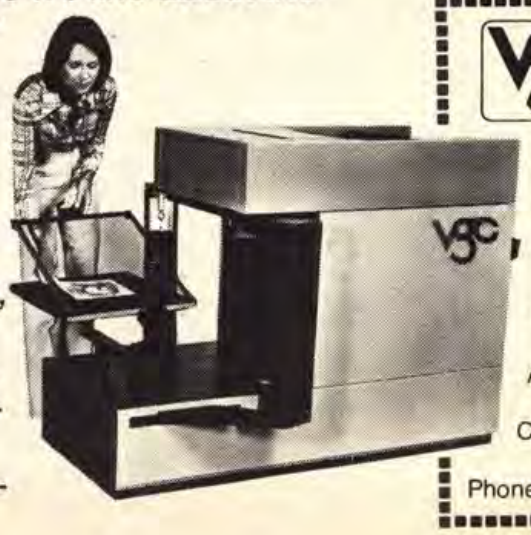
"We're located in the suburbs, with no stat services nearby. So when we started our agency a few months back one of our first purchases was a Pos One® camera/processor.

"Though we only average about 5 stats a day, we find that the unit is paying for itself in convenience and actual cost savings, when compared to using an outside service.

"I can honestly say that the Pos One camera has improved the quality of our mechanicals, presentations, and comprehensives. It has also increased production and helps us meet our deadlines.

"Some of the other things we like about the Pos One unit? It has so many automatic features that it's simple—and a real pleasure—to use. It works in normal room light, without a darkroom or plumbing. It will deliver all the reproductions we need, including positives, reverses, enlargements, reductions, screened veloxes, film transparencies, line conversions, and more. And it's a one-step system, with automatic processing, so you can produce a dry stat in a couple of minutes. Best of all, we can get stats quickly anytime we want them, day or night—even weekends.

"Incidentally, we bought the extra capabilities of the Pos One model 520 because we're planning to install a text phototypesetter and the "520" has a built-in processor for RC photocomp materials."



To find out more about Pos One camera/processors send for a free illustrated brochure.

Call Us Toll Free 800-327-1813

IN FLORIDA (305) 722-3000. IN CANADA (416) 533-2305.

VISUAL GRAPHICS CORPORATION
VGC Park, 5701 N.W. 94th Ave.
Tamarac, FL 33321

[ ] Please send more information on the Pos One cameras.
[ ] Please arrange a demonstration.
[ ] Give me the facts on leasing.

Name _____ Title _____

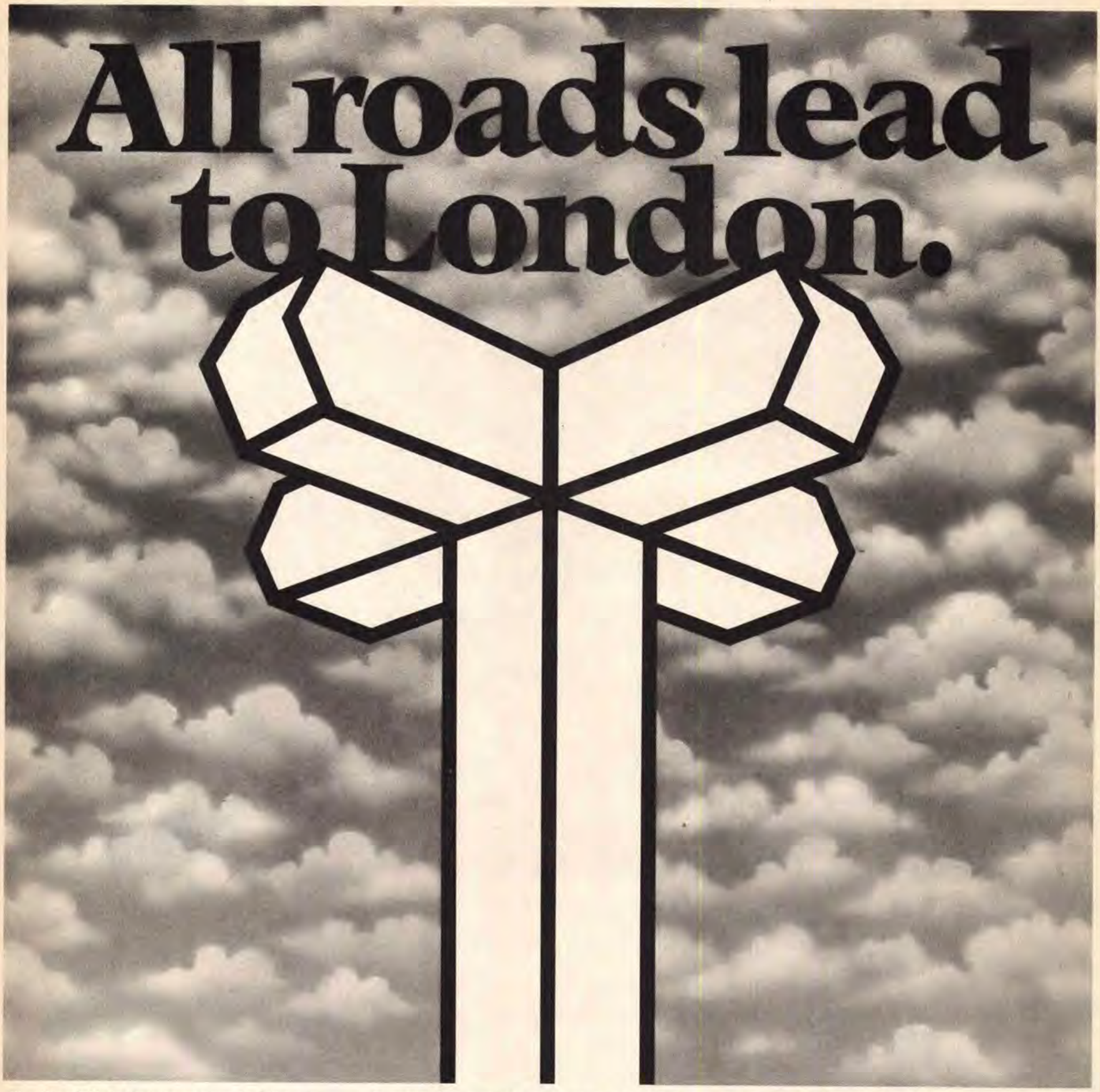
Company _____

Address _____

City _____ State _____ Zip _____

Phone _____

U&lc 6/80



TypeTrend'80, the first international exhibition specifically for type users, will be held at Paperpoint, London from 21 October until 7 November.

Exhibitors include many of the worlds leading type creators who will be showing their latest designs.

Innovations in type technology which effect every type user will also be on display.

TypeTrend'80 is the signpost to current thinking on type design.

TypeTrend'80, die erste internationale Austellung, die speziell für alle diejenigen bestimmt ist, die mit der Anwendung von Schrift und Typografie befaßt sind, findet im Paperpoint, London, vom 21 Oktober bis 7 November statt.

Zu den Ausstellern gehören viele der weltweit führenden Typografen, die hier ihre neuesten Schöpfungen ausstellen.

Technologische Neuerungen auf dem Gebiet der Typografie, die jeden Anwender betreffen, werden ebenfalls gezeigt.

TypeTrend'80 ist ein Wegweiser für die Entwicklungsrichtung auf dem Gebiet der Typografie.

TypeTrend'80, la première exposition internationale destinée tout spécialement aux utilisateurs de caractères, se tiendra à Paperpoint, à Londres, du 21 Octobre au 7 Novembre.

Parmi les exposants se trouveront les créateurs de caractères les plus importants au monde, qui viendront présenter leurs toutes dernières créations.

Seront également présentées les innovations techniques qui affectent tous les utilisateurs.

TypeTrend'80, c'est l'avant-garde de la pensée moderne dans le domaine des caractères.

SET IN FONTS ACCOLADE

TypeTrend'80

Paperpoint, 63 Poland Street, London W1.
21 October - 7 November.

For information: INGRAMA SA, Quai Perdonnet 21B, CH-1800 Vevey, Switzerland Telephone: (021) 518556, Telex: 451160 igm ch

THE ALPHATYPE CRS TYPE MASTERS GUILD —
a group truly concerned about providing you with the finest typographic quality.

To back their commitment, they use the Alphatype CRS... the digital phototypesetter with resolution of 5,300 lines to the inch for razor-sharp characters. Unprecedented control over letterspacing and kerning in ⅛ unit increments. And size for size type design for the highest quality in terms of letterform and maximum legibility. All of which gives them virtually unlimited flexibility to aesthetically solve any typographic challenge.

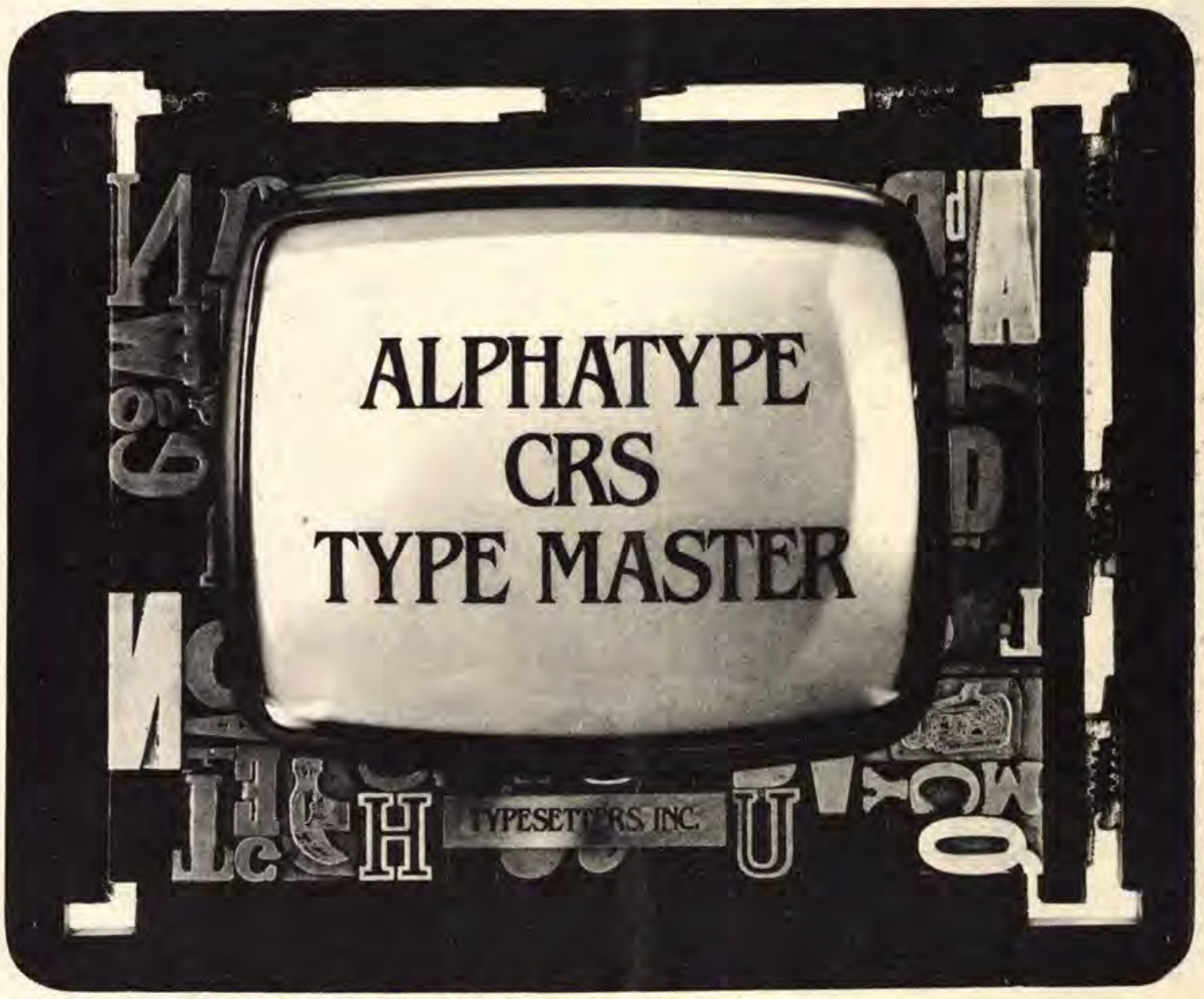


You can select from their extensive type font library — with the newest faces being added daily.

The CRS brings a new standard of quality to your advertisements, annual reports, books, forms and publications.

The Type Masters Guild — able to handle all of your requirements with true typeartistry. Call a Type Master for your next job and see for yourself. You'll never again settle for less!

THE ALPHATYPE CRS



WE DON'T JUST SET TYPE. WE SET NEW STANDARDS.

In the United States

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Progress Litho Service
(602) 258-6001

Arkansas, Little Rock
Prestige Composition Inc.
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California
Headliners/Identicolor
San Francisco
(415) 781-0463
Rapid Typographers
San Francisco
(415) 982-6071
Repro Typographers
San Francisco
(415) 362-3971
Taurus Phototypography
Los Angeles
(213) 382-8244
TypoGraphic Innovations
Beverly Hills
(213) 657-6030

Illinois, Chicago
A-1 Composition Co., Inc.
(312) 236-8733
House of Typography
(312) 263-1532
Make Up Master
(312) 454-1882
Publishers Typesetters Inc.
(312) 283-3340
RyderTypes, Inc.
(312) 467-7117

Louisiana, New Orleans
Forstall Typographers
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Martin/Greater Film Graphics Inc
(504) 524-1741

Michigan, Detroit
The Thomas P. Henry Co.
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Minnesota, Minneapolis
Great Faces, Inc.
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P & H Photo Composition
(612) 374-3213
Type Tronics, Inc.
(612) 339-5563

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Lettergraphics/Kansas City, Inc.
Kansas City
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Master Typographers, Inc.
St. Louis
(314) 645-2878

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Able Phototype Systems
Yonkers
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Thorner-Sidney Press, Inc.
Buffalo
(716) 856-4500
Word Management Corp./
Typography Services
Albany
(518) 482-8650

New York, New York
City Typographic Service, Inc.
(212) 686-2760
Cresset, Baxter-Spencer, Inc.
(212) 766-9432
Line & Tone Associates, Inc.
(212) 921-8333
M.J. Baumwell Typography, Inc.
(212) 868-0515
Primar Typographers, Inc.
(212) 269-7916
Tribeca Typographers, Inc.
(212) 925-8080

Ohio, Cleveland
Advertype Inc.
(216) 241-2274
Bohme & Blinkmann, Inc.
(216) 621-5388

Oklahoma, Oklahoma City
Alphasource, Inc.
(405) 521-0310

Pennsylvania
Armstrong Inc.
Philadelphia
(215) 574-8600
Estelle Bair Composition
Blue Bell
(215) 542-7790

Tennesee, Memphis
Graphic Arts Associates, Inc.
(901) 345-8973
Lettergraphics Memphis
(901) 458-4584

Texas, Austin
Candlelight Type Print Corp.
(512) 476-0732

Virginia, Richmond
Riddick Advertising Art
(804) 270-1811

Washington, Seattle
Western Typographers Inc.
(206) 624-3642

Wisconsin, Menasha
Graphic Composition, Inc.
(414) 739-3152

Wisconsin, Milwaukee
Peter A. Altenhofen
Typographers, Inc.
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Zahn-Klicka-Hill
Typographers Inc.
(414) 276-0136

In Canada

Manitoba, Winnipeg
B/W Type Service Ltd.
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Ontario, Toronto
Canadian Composition
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M & H Typography Ltd. (Tor.)
(416) 922-3194
Techni-Process Ltd.
(416) 363-2493

Quebec, Montreal
M & H Typography, Ltd. (Mont.)
(514) 866-6736
TypoGraphica 2000 Inc.
(514) 933-3315

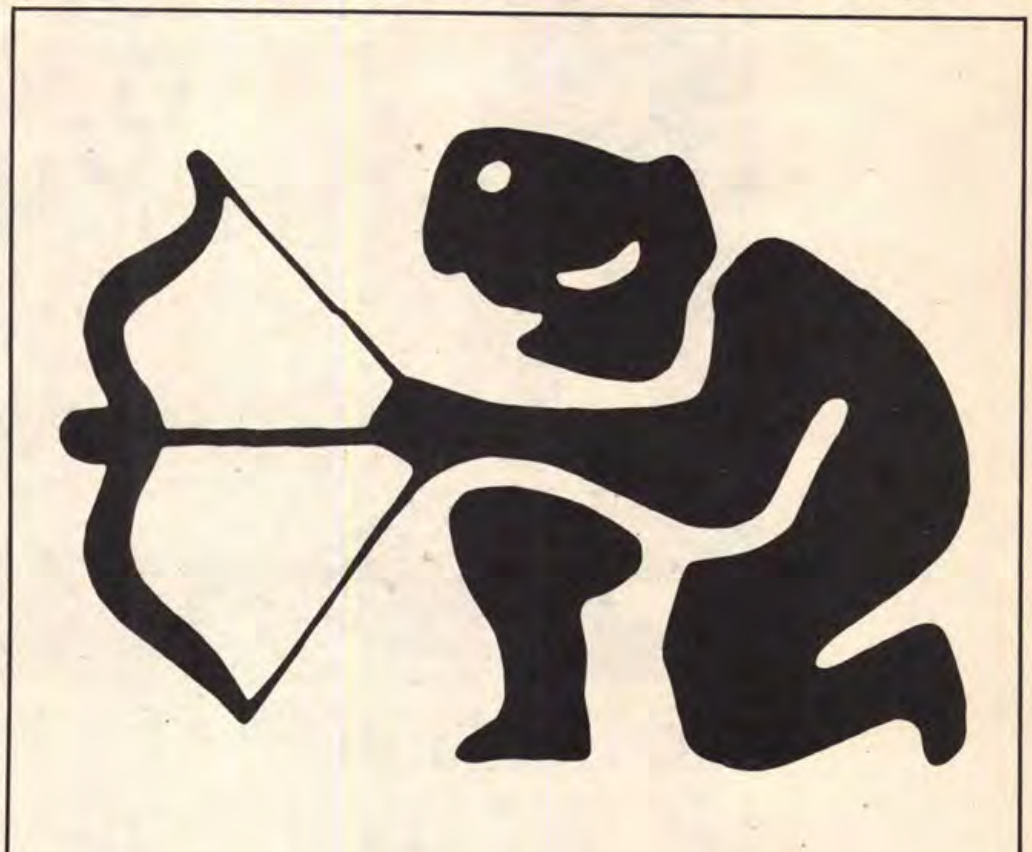
Quebec, Quebec
Gravel Photograveur Inc.
(418) 683-1501

...And more to come!

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AlphaKey Systems A Division Of Alphatype Corporation 7711 N. Merrimac Ave. Niles, Illinois 60648 312-965-8800

Make your words come alive



Instantly place graphic images anywhere in a block of type. Simultaneously, as you typeset the copy. Liven up your words with signs of the Zodiac. Logos. Trademarks. Arrows. Pointers. In any size, without intermediate processes.

This is possible with Autologic typesetters because we have one of the largest libraries of special "pi" characters in the industry, all digitized in fine detail. Resolution of up to 3615 lines per inch gives Autologic the sharpest characters in its class.

The eminent typographic designers on staff at Autologic maintain tight controls to ensure that the fonts we digitize meet today's graphic standards. Studies are made to maintain consistent relationships between "pi" characters and fonts. We are continuously adding new fonts to our library of 700 typefaces, largest digitized library in the industry.



Autologic gives you the speed and reliability of digital CRT typesetting, with the highest standards of output quality.

Autologic, Incorporated. 1050 Rancho Conejo Blvd., Newbury Park, CA 91320, (213) 889-7400. A subsidiary of Volt Information Sciences, Inc.

Autologic

Leader in Digitized Typesetting

HOW TO CREATE DAZZLING HEADLINE TYPOGRAPHY.

We've just come out with a new headline phototypesetter–the Typositor® 4000–and want to show you all the marvelous things you could do if you had one on your premises.

So we had an award-winning creative team put together a 20 page, 4-color book that's packed with exciting typographic ideas, a few

The Juliet Music School

of which are illustrated on this page.

There's also a section that gives you a brief rundown on all the remarkable features of the Typositor 4000.* Features such as simple operation in normal room light, automated controls, full visual spacing, automatic focusing and solid state circuitry. Plus the unique new VGC Microfont,® which enables you to set type up to 3 times faster than with 2″ font machines.

Jig-O Shine

With a Typositor 4000 at your command you'll have all the quality display type you need, in sizes from 24 to 96 point, for just pennies per word. Use the headlines straight out of the machine, or add a few handlettered touches of your own by following the examples shown in our new type design book.



To receive complete information on the incredible Typositor 4000, as well as a complimentary copy of our unusual typography book (while supply lasts), call or send in the coupon now.

LOGOS

FREE BOOK



Call Us Toll-Free 800-327-1813

IN FLORIDA (305) 722-3000. IN CANADA (416) 533-2305.

VGC® VISUAL GRAPHICS CORPORATION
VGC Park, 5701 N.W. 94th Ave.,
Tamarac, FL 33321

☐ Please send more information on the Typositor 4000, plus the free type design book.
☐ Please arrange a demonstration.

Name_____

Title_____

Company_____

Address_____

City_____

State_____ Zip_____

Phone_____

U8Ic 6/80

*PATENT APPLIED FOR

Why pick on us.

Maybe it's because of our reputation as topnotch professionals in a time when quality and ethics are always promised but seldom delivered.

Maybe it's because we believe that wherever tomorrow's technology takes us, it takes a special type of people to make typography creative.

Maybe it's because ATA membership means the recognition of ones peers. And to any professional that's worth protecting.

Maybe that's why out of more than 10,000 typesetters in the world, only 56 companies have made it so far.

And maybe you pick on an ATA typographer simply because you want the best. Quite simply, we are.

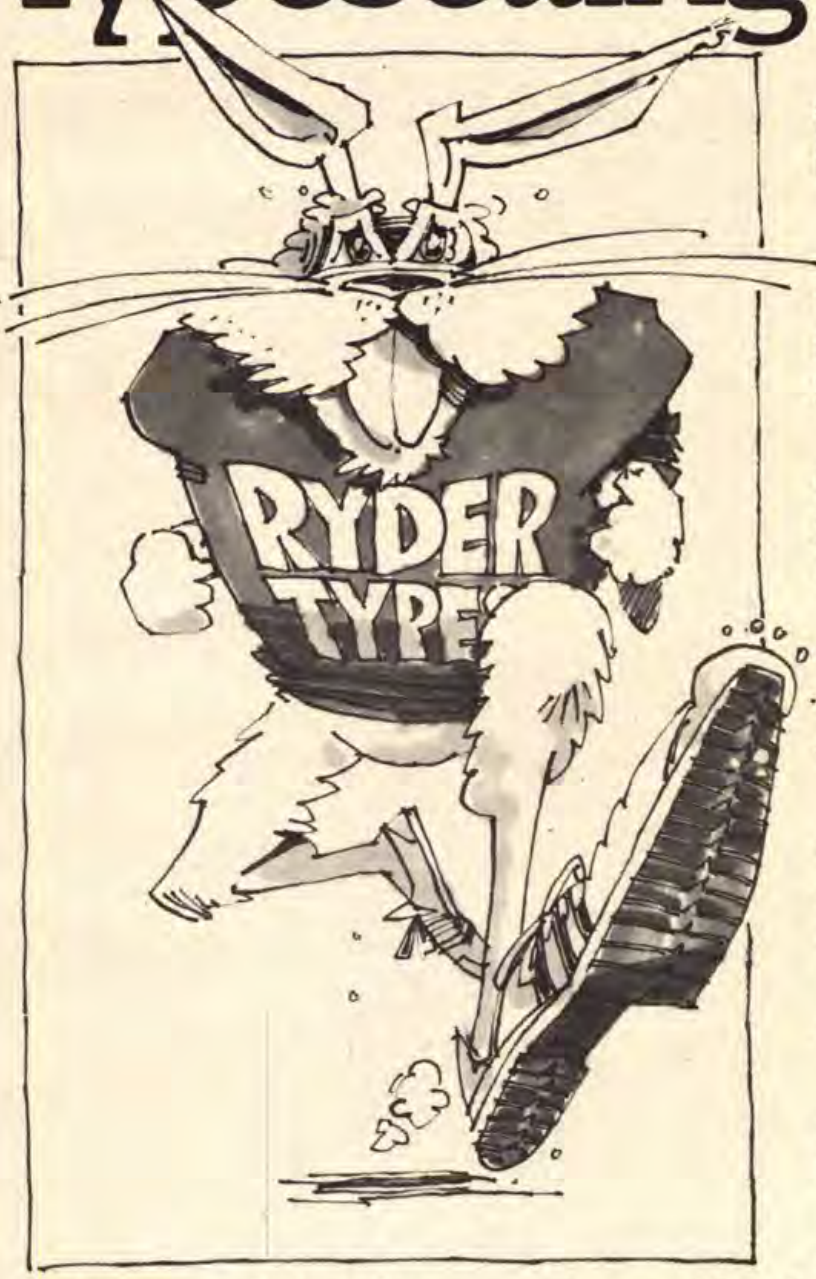
Advertising Typographers Association of America, Inc., 461 Eighth Avenue, New York, N.Y. 10001.

Walter A. Dew, Jr., Executive Secretary.

The ATA.

We set standards for the people who set type.

We'd Like To Clear Up Some Very Strange Rumors About Our New Digital Typesetting Capabilities.



Just recently, RyderTypes became the first advertising typographer in Chicago to install digitized typesetting equipment.

And since digitized typesetting is based on advanced cathode ray tube technology, some people think we should now be able to set type faster than Superman can fly.

Well, it's true that our new AlphaType CRS system is fast. In less than a minute, for instance, it could easily print out the text of this ad after initial keyboard input.

But please don't send in a job at 10:30 and expect to have it back by 10:45, because speed alone wasn't the reason we installed the CRS.

We wanted this new system to give our customers access to the most sophisticated, highest quality phototypesetting that's available anywhere.

The CRS allows refinements in type spacing and kerning unheard of until recently.

Until now, most conventional photo composition could be adjusted in ½ units only, like minus ½ set letter spacing.

But with the CRS, precise ⅛ unit adjustments can be made. This ad was set with minus ⅝ unit letter spacing and ¾ of a point of negative line leading.

Until now, the creation and manufacture of a particular type font grid took months. But the Italia type face that we're using here was added to our CRS library in just a fraction of that time.

The CRS offers a wide selection of typefaces that is being added to almost daily. The CRS allows unlimited mixing of type sizes and type styles within a job without any loss of speed. The CRS produces extreme enlargements of type characters without any loss of sharpness.

In fact, about the only thing the CRS doesn't do is set type quite as fast as you may have heard it did.

To separate the incredible rumors from the even more incredible facts, call a RyderTypes salesman soon.

RyderTypes, Inc., 500 N. Dearborn, Chicago, Ill. 60610. Tel: (312) 467-7117.

»Typography may be defined as the craft of...arranging the letters, distributing the space and controlling the type as to aid to the maximum the reader's comprehension of the text«

Stanley Morison: *»First Principles of Typography«*



»Typomatic may be defined as the art of designing a photo-lettering machine to arrange the letters, distribute the space and control the type as to aid to the maximum the reader's comprehension of the text«

D. Stempel AG: *»First Principles of Designing a Photo-lettering Machine«*

D. Stempel AG
P. O. Box 701160
D-6000 Frankfurt 70
Telephone 0611/60681
Telex 4189089 stpl d

Mergenthaler, Linotype, Stempel, Haas



Chwast Buffalo™
Chwast Buffalo™ Outline

Mergenthaler Linotype Stempel Haas

For more information, please call toll free 800-645-5764, in New York toll free 800-832-5288, and talk to our Typographic Sales Reps.

They've got the *n e w s !*

The "mechanical perfection" was a large, noisy, unwieldy, vituperative, greasy, dross-laden Linotype® machine capable of magnificent synergy between the operator's sweaty purpose and the typeface designer's graceful art.

In constant, it seems, need of oil for hundreds of complaining parts which voraciously consumed thousands of millions of matrices and regularly type-set *the Linotype® n e w s :*

the first run of
the Twentieth Century Limited
refrigerator advertisements
"Gone With the Wind"
1st Boston Marathon results
inaugural addresses of 14 presidents
Edsel ad campaigns
Sputnik tremors
MacArthur's return
Hiroshima's pain
"The Eagle has Landed" mankind on
the moon

Ottmar Mergenthaler's "Line-o-type" machine set the world's standard of typographic excellence.

Although this editorial was written in 1918 the "constructive thought, the painstaking attention" which "the Company" continues to devote to the development of typography ensures that *Linotype® typography* is as synonymous today as it was when 'The Linotype® Bulletin' published that thought 62 years ago.

THE LINOTYPE® BULLETIN

DEVOTED TO THE LINOTYPE® AND ITS USE ✻ PUBLISHED BY THE MERGENTHALER LINOTYPE COMPANY

THE high standard of mechanical perfection which were originated and the great economies effected by developed by the Mergenthaler Lino- composing machines type Company are thoroughly recog- nized and established in the minds of master printers. We want to drive home with equal force also the con- structive thought, the painstaking at- tention, and the large expenditure of time and money which the Company is now devoting to the development of Linotype Typography in the de- partments of typographic design and punch-cutting.

THE LINOTYPE® BULLETIN
VOLUME EIGHTEEN NUMBER THREE



Galliard™ Bold Roman

abcdefghijklm
ABCDEFGHIJ
KLMN
123456789

SOME RECENT
TYPOGRAPHY
ADDITIONS

11½ POINT SCOTCH
18 AND 24 POINT CASLON OLD FACE SMALL CAPS
18 AND 24 POINT BODONI SMALL CAPS
12 POINT PROPRIETARY CHARACTER NO. 26

LINOTYPE®
Distributor
and
Keyboard
OIL

A FINE, LIGHT
oil, specially
manufactured
for lubricating
Distributor
Bearings and
Keyboard Cam
Yoke Pivots.



2-oz. Bottle 50 Cents
Enough to lubricate several
machines for many months.

THE SWASH capital, however, if the copy permits, may be used in the Bodoni manner. Caslon's swash letters in their original form are particularly good for this purpose.

(14 Point Caslon Old Face, 2 points leaded; 24 Point Caslon Old Face Swash Initial)

DECORATIVE initial of the Linotype Louis XV series. This specimen shows the type set close against the side of the initial, a usage which has the sanction of some typogra

Mergenthaler New Baskerville™

abcdefghijklm
nopqrstuvwxyz

Icone™ 55

ABCDEFGHI
JKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrs

Icone™ Bold 65

ABCDEFGHI
JKLMNOPQRSTUVWXYZ
abcdefghijklmnop

Icone™ Black 85

ABCDEFGHI
JKLMNOPQRS

Snell Roundhand™ Bold

abcdefghijklmno

ef

Mergenthaler
Linotype
Stempel
Haas

The Mergenthaler Linotype group is the only U.S. typesetting equipment manufacturer regularly commissioning new typeface designs.

The Linotype **n e w s .**

When you have spent almost one hundred years carefully developing the world's largest original typeface library, one of the best ways we know to enlarge that library is to commission the artistry of the world's leading typographic scholars and type designers:

Matthew Carter and ***Galliard,***™
Sumner Stone and ***Stone Informal,*** ***Stone Sans,*** ***Stone Serif,*** ***Snell Roundhand,***™
Adrian Frutiger. ***Univers,*** ***Icone,***™

And for the sheer fun of it, with Seymour Chwast's *Buffalo,*™ we recently began a program to commission new faces from the best graphic designers of today.

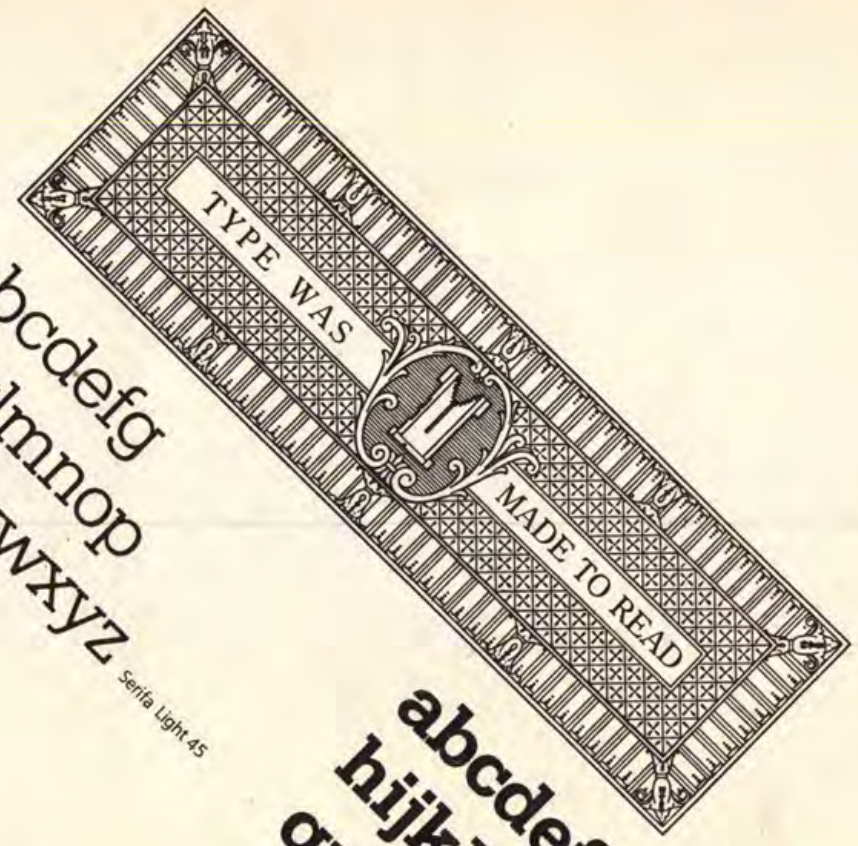
More Linotype **n e w s .**

Mergenthaler Linotype, Stempel, Haas also licenses the best typefaces from foundries and studios throughout the world. This assures you of getting the original designs from Ed Benguiat, M.F. Benton, A.M. Cassandre, Eric Gill, Herb Lubalin and Hermann Zapf.

Auriol™ Black
abcdefg
hijklmnop
qrstuvwxyz Serifa Light 45

Auriol™ Bold
abc

Auriol™
abc



abcdefg
hijklmnop
qrstuvwxyz Serifa Bold 65



ECORATIVE initial of the Linotype Bodoni series. The body type should line with the top of the initial and not with the shoulder. Compare this with the Caslon and Louis XV initials, and note how each is designed to harmonize with the type used.



ABC
DEFGHIJK
LMNOPQRST
UVWXYZ Mergenthaler New Baskerville™

The LINOTYPE BULLETIN

DEVOTED TO THE LINOTYPE AND ITS USERS

Published by MERGENTHALER LINOTYPE COMPANY. Mailed Free to any Printer Anywhere
Address all communications to "Editor LINOTYPE BULLETIN, Tribune Building, New York City"

VOL. III. JANUARY-FEBRUARY, 1907. NO. 2.

Parisian

ABC
GHIJKLMNO

Setting a High Standard

Wanted—To correspond with a machinist-operator who is also a good printer, a bachelor, and preferably a Mason and sportsman; must be a southerner, a Democrat, and a man of good morals and refinement.—From the *American Press.*

Goudy Catalogue

ABC
QRST

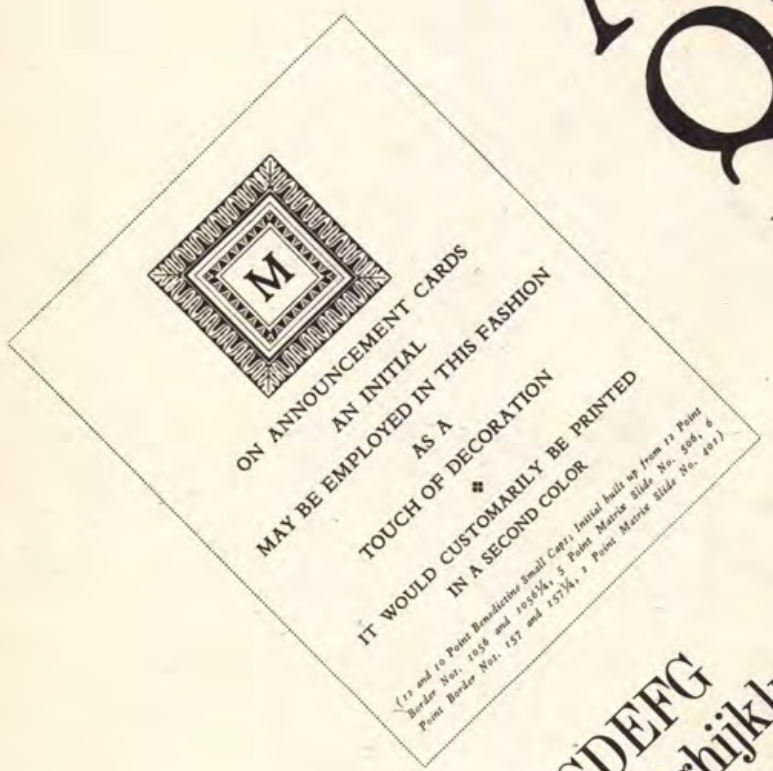
wider spaces for display

c)—Wide space-bands form spaces varying from .047" to .147". They are furnished as regular equipment with display Linotypes, or may be separately ordered.



Goudy Heavyface

abcdefghi



Torino

ABCDEFG
abcdefghijklmnop
qrstuvwxyz
abcdefghijklmnopqr

Trooper

Torino Italic

ABCDabcdefghijklmn
opqrstuvwxyz

Trooper Italic

abcdefghijklmnopqr
stuvwxyz

Trooper Italic

ABCDEFGHIJ
LMNOPQRSTUVW

"HARD EDGE"
The Newest Creation in Straw Hats

LEAVE it to Jones & Smith to work out the smartest straw hat style—the new ones are certainly beauties. The patented "Hard Edge" is entirely new. It holds the style—prevents the edge of the brim from chipping.

$3 $4 $5

WILLIAMS HAT SHOP
Bloomfield, New Jersey

Cloister Bold

Genuine Hand-Tailored
Blue Serge Suits
Imported Materials

Thousands of men who purchased blue serge suits from us at our annual sale last year will hail this occasion with delight. The fine workmanship of these suits fashioned in every style and detail are a real value at

$50

Tailored by the House of
LEVINE & FAIRCHILD
Broadway and Fourth St.
NEW YORK

Bodoni Bold and Ionic

abcdefgh Goudy Handtooled
abcdefghijklmnop
1234567890 Libra
abcdefghijklm
nopqrstuvwxyz Libra Light
ABCDEFG
abcdefghijklm
nopqrstuvwxyz Arrow

We are into something n e w s .

On these few pages we have shown a sampling of faces we have released over the last century. Some will recognize the old "hot metal" faces. Most will recognize the new ITC releases and our own n e w s faces. *Auriol*™ and *Icone*,™ *Serifa*™ and *Galliard*.™ We will continue to show you all the beautiful, commanding, whimsical, forthright, elegant, powerful "tones of voice" you can speak with when you specify Mergenthaler Linotype equipment.

Just look for the Linotype® n e w s .

In 1980, just as is in 1890, Mergenthaler Linotype Company continues to offer a full range of type expression on all our typesetting equipment.

The Linotype® n e w s .

Auriol™ Ornament

For more information, please call toll free 800-645-5764, in New York toll free 800-832-5288, and talk to our Typographic Sales Reps.

They've got the Linotype® n e w s !

CUT OUT AND SEND TO:

Mergenthaler Linotype Company

Typographic Marketing 201 Old Country Road Melville, New York 11747

Form

get your own sample of the Linotype® n e w s !

name

company/title

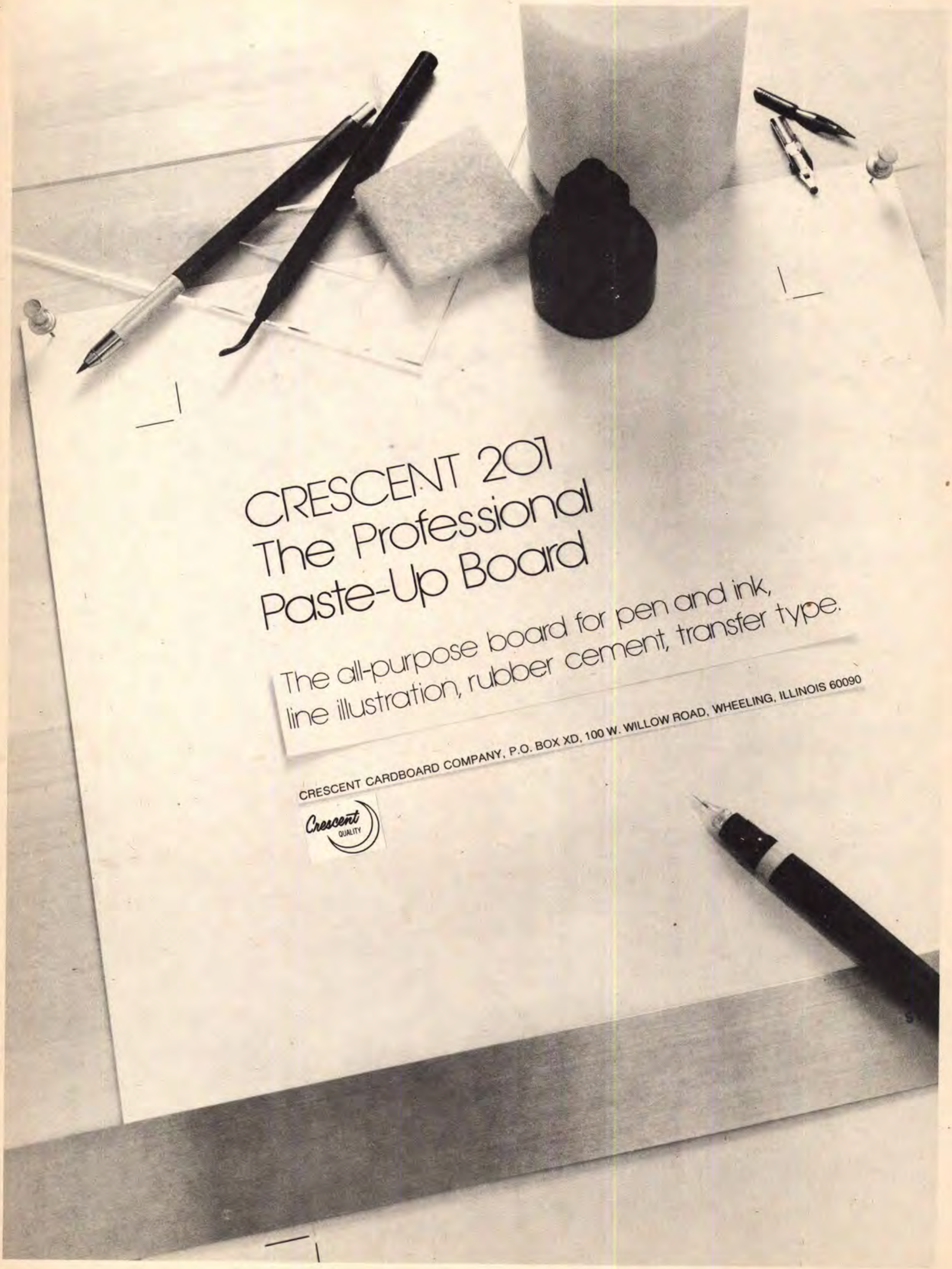
address

city/state

zip

UBlc 6/80

Mergenthaler Linotype Stempel Haas



CRESCENT 201
The Professional Paste-Up Board

The all-purpose board for pen and ink, line illustration, rubber cement, transfer type.

CRESCENT CARDBOARD COMPANY, P.O. BOX XD, 100 W. WILLOW ROAD, WHEELING, ILLINOIS 60090

Crescent QUALITY

Attuned to the times.

In choosing the right editing terminal for a specific installation, one should check their many special features and determine which are meaningful to the system of which they will be a part. Some features to consider are: - Kind of display (CRT, gas plasma, light-emitting diode (LED), for example). The kind of display affects, among other things, cost, durability, and ease of viewing. - Highlighting. This feature is the ability to call a portion of the text to the operator's attention, as by underscoring (on the electronic display but not on the output), by blinking letters, or by increased intensity in a specific spot or area. Some displays reverse the brightness (from light characters on dark background). Highlighting helps the operator spot a portion of text so that it can be verified before being edited. - Character enlarging/reducing. Doubling letter size increases readability. Reducing characters to half-size increases the amount of copy that can be shown on a screen at one time. - Grammatical notations. Quotation marks, underscores, and superior figures, for example, are displayed graphically in some systems, whereas in other systems they are represented by codes. - Scrolling. This feature involves the shifting of copy up or down on the screen. The document in the system memory may be too big to be viewed all at once, even on a full-page screen. Scrolling permits moving off the screen copy that has been OK'd or edited and moving onto the screen copy for which there had been no room. Scrolling on a partial-page display enables the operator to see and edit an entire page or document even though it cannot all be viewed at once. Some systems can scroll horizontally, so that long lines of copy wider than the screen can be brought in view successively. - Variable line spacing. This adjustment permits mixed display of single-, double-, and one-and-one-half-line-spaced copy. - Pitch representation. This feature presents the text as it will print, i.e., 10-pitch, 12-pitch, or PS (proportional spacing). - Diagonal cursor movement. The cursor is the light spot on screen that is moved about by a cursor control on the keyboard (such as a group of keys, a cue ball, a joystick, or other device). The cursor is positioned at a point where an editing action is to take place. All cursors can be moved both horizontally and vertically; some can be moved diagonally as well. Key considerations in comparing text-editing terminals are how much copy can be edited at a time and how easily. Many word processing systems are page-oriented to match the needs of an office that outputs, distributes, and files information in complete page format. Word processor text-editors with full-page displays, unlike typesetting editing terminals, are often so page-oriented that editing can only be done easily within a page. That is no handicap when correcting spelling errors, for example; but it can slow things down when, in a multipage document, one must transpose a block of copy from page 2 to page 6. If the system is document-oriented and the full document is stored on one disc, transposition of a block of copy from any part of a multi-page document to any other part is a simple keyboard operation. Page orientation requires the operator, in the example cited, to call page to the screen. By means of keyboard instructions, the block to be transposed is deleted and stored in the machine's buffer memory. The operator closes the gap made by the deletion. To bring forward a corresponding amount of copy from page 3, page 2 is returned to file and page 3 is called up. Copy to be moved from the top of the page is put into the buffer memory. Page 3 is returned to file and page 2 is brought to the screen, and the stored copy from page 3 is inserted on page 2. This process is repeated page by page until the copy removed from page 2 is ultimately inserted on page 6. Some page-oriented systems automatically rearrange the text affected; however, this, too, slows the operation. Lexitron's recently introduced VP-1303 offers a new level of control. It permits the operator to move blocks not only to another page within a document but to another document – whether on the same or another disc – without closing out the first document. Some word processors and most typesetting editing terminals are document-oriented. In an office, with document orientation, an entire document is typed and corrected before any of it is printed out. To be cost-effective, the printer unit of the word processor should be off-line, stand alone, (or be able to operate in the printer mode on one batch of text while the keyboarder is inputting or editing another batch), and have an automatic paper feed so that the operator need only set it up in order to run a multipage document, thereby leaving the operator free to enter or edit other documents or to do other work. With page-oriented machines, the operator need only feed a sheet of paper and press a button to get each one printed and then is free to proceed editing the next page. Unlike document-oriented systems, when the operator finishes editing the last page, all pages except the last have already been printed out. The advantages of one system over another vary for each specific operation. Page size in word processor text-editing systems is defined in number of characters. Some systems have 8,000-character pages; others take up to 11,000. These are the number of characters that can be stored for one page in the buffer memory. Sometimes this quota is more than can be displayed at one time on the screen. A buffer is a temporary storage area for data or information being edited or being transferred between parts of a computer-controlled system. In some systems the buffer capacity is the same as that of the display screen; in other cases, with page-oriented devices, it may be larger. In a document-oriented system, the buffer memory might be a full disc and hold perhaps the equivalent of 75 pages of material. If this was all one document, the operator could scroll through the entire disc (assuming that storage is on a disc) and bring any part of it to the screen without having to call it up page by page from the file directory. This ability to scroll through a file of any length is known as infinite, or virtual, scrolling. On some page-oriented text editors, by defining a page in file as consisting of 999 lines instead of the customary 66 lines, one can fool the system and scroll through all 999 lines – the equivalent of 15 pages in this instance. The pages can then be defined after final editing, or as on some DEC systems, the document need not be broken into pages until it is ready for the output stage. Some discs hold much more: some Vydec discs hold 60 pages, and some IBM and Wang discs hold up to 120 pages. The editing terminal needs first to be told where a correction is to be made and what kind of correction, and then must be fed the correction. To locate the correction, the cursor or movable light spot is directed to the place on the screen where an insertion, deletion, or correction is to be made. In the case of transposing a block of copy, the block may be "defined" by positioning the cursor first at the beginning of the block and then at the end while striking the appropriate begin and end command keys. Systems with a highlighting ability, as described above, would highlight the block to be deleted so the operator could be sure it had been correctly defined. By keyboard instruction the block can then be deleted, stored, or inserted at another place in the copy. If it is necessary to keep track of the various versions of a document, each version can be kept in the electronic file, or hard copies (paper) can be produced for temporary or permanent manual filing. There seem to be as many different ways of moving blocks of copy in a document as there are makes and models of editing terminals. Essentially, however, those systems that can move blocks of copy around do so by one of two methods, using commands known as block move and save/call. A block move is a one-step operation, as explained above. The operator defines the block of copy to be moved, gives it a number, scrolls to where it is to be inserted, calls it up by number, and, by cursor positioning and keyboard command, inserts it in its new position. A block move is almost easier and faster to do than to explain. A save/call, operation, on the other hand, requires defining the block with the cursor, giving it a name, and putting it in the electronic file. Then the document is scrolled, or the new page on which it is to be inserted is called up, and the block is recalled from the file by name and inserted. Some word processing systems offer both block-move and save/call capabilities. The former is easier and faster for some moves; the latter is useful when there are multiple moves. The size of the block of copy that can be moved, how far it can be moved within a document, etc., can all vary from system to system.

Whether setting typography to special contours; modifying letterforms to different shapes and angles; outlining type designs; creating shadows and inlines; reworking logos; reproportioning ads; supplying color-imaging and rub-down transfers; converting client-furnished word processing into fine typography...you can rely upon us to offer the best product for your typographic dollar.

mjb
M J BAUMWELL TYPOGRAPHY INC.
461 8TH AVENUE
NEW YORK NY 10001
(212) 868-0515

In advertising it has always been magical to work with the word "new," which is quite appropriate in this particular case, as you will see.

When ordering your next headline say the word "neo" quickly before you say "Americana" for the word "neo" is the insignificant origin of a significant effect. Through the fine graduation of the character weight, we extend the potential of a type without spoiling its original character.

The result is a type programme with a completely new dimension for designers and A.Ds. For everyone who not only wants to follow a trend but also set a trend with our types, there are over one thousand now available. From the good old Futura to the much loved Gill, typefaces have never changed so much to their advantage as of "new."

Sagen Sie bei der Bestellung Ihres nächsten Titelsatzes schnell noch „Neo", bevor Sie nur „Century Old Style" sagen! Denn das Wörtchen „Neo" ist die kleine Ursache für eine große Wirkung:

Durch die feine Abstufung der Strichstärken perfektionieren wir das Wesen einer Schrift, ohne ihren ursprünglichen Charakter zu manipulieren.

Was dabei herauskommt, ist ein Schriftenprogramm mit einer völlig neuen Dimension. Für Designer, A.D.s. Für alle, die den Trend mehr machen, als daß sie ihn nur mitmachen – mit tausend einsatzfähigen Schriften. Von der guten alten Futura bis hin zur vielgeliebten Gill. Die sich noch nie so sehr zum Vorteil verändert haben wie neo-dings.

Headliners.
You are what you set.

Trendsetter

BELGIUM, BRUSSELS	Graphiservice 255, Chaussé de Waterloo Bte 3 1060 Bruxelles Telephone 2-538 90 05
	Photogravure Deloge 131, rue de Birmingham 1070 Bruxelles Telephone 2-524 00 70
DENMARK, COPENHAGEN	Ty/pho/grafen Vestergade 2 1456 København K Telephone 1-15 11 34
ENGLAND, BIRMINGHAM	Artwork Composition 12-22 Albert Street Birmingham B4 7UD Telephone 21-643 09 46
LONDON	Headliners (UK) Shropshire House 2-20 Capper Street London WC 1E 6JA Telephone 1-580 70 45
FINLAND, HELSINKI	Suomen Typografi Uudenmaankatu 33 E 00120 Helsinki 12 Telephone 0-64 28 33
FRANCE, PARIS	La Typographie Internationale 5, Rue des Reculettes 75013 Paris Telephone 1-337 80 00
GERMANY, BERLIN	Fotosatz Richter GmbH Kurfürstenstraße 72–74 1000 Berlin 30 Telephone 030-262 40 05
DÜSSELDORF	Typographische Werkstatt Jöllenbeck+Schlieper Talstraße 22–24 Postfach 9102 4000 Düsseldorf Telephone 0211-37 09 43
ESSEN	Typographische Werkstatt Jöllenbeck+Schlieper Rüttenscheider Straße 119 Postfach 101853 4300 Essen Telephone 0201-77 50 57
WIESBADEN	Typo-Studio Horst Oberländer Dotzheimer Straße 80 6200 Wiesbaden Telephone 06121-44 90 44
FRANKFURT/MAIN	Typographica Feldbergstraße 49 6000 Frankfurt/Main Telephone 0611-72 46 51
	Typo-Studio Horst Oberländer Feldbergstraße 21 6000 Frankfurt/Main Telephone 0611-72 57 25
HAMBURG	Headliners Hamburg Eppendorfer Landstraße 12 2000 Hamburg 20 Telephone 040-46 46 66
KÖLN	Typographische Werkstatt Jöllenbeck+Schlieper Dürener Straße 85 5000 Köln 41 Telephone 0221-40 30 28
MÜNCHEN	Typographica Herzog-Rudolf-Straße 1 8000 München Telephone 089-29 50 47
STUTTGART	Layout-Setzerei Hansjörg Stulle Reuchlinstraße 31 Postfach 3023 7000 Stuttgart 1 Telephone 0711-61 30 75
HOLLAND, AMSTERDAM	Lay-out Zetterij A.Damman N.Z. Voorburgwal 67–73 Postbus 3708 Amsterdam-C Telephone 20-26 51 11
REPUBLIC OF IRELAND, DUBLIN	Headliners Graphical Services 9–12 St. Andrews Lane Dublin 2 Eire Telephone 77 84 82
NORWAY, OSLO	Norske Typografen Karl Johans Gate 25 Postbox 9549 Egertorvet Oslo 1 Telephone 2-33 00 19
SWEDEN, GOTHENBURG	Fototext/Typografen Järntorgsg. 12–14 Box 7045 402 31 Göteborg Telephone 31-17 75 65
MALMÖ	Malmö-Typografen Stora Trädgårdsgatan 3 B Box 6104 200 11 Malmö 6 Telephone 40-11 26 50
STOCKHOLM	Typografen 2 Norrtullsgatan 33 113 27 Stockholm Telephone 8-34 92 55
EUROPEAN COORDINATOR	Headliners Europe Kaptensgatan 6 Box 14024 S-104 40 Stockholm Telephone 8-63 51 30

NO NO NO!

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We can create all types of visuals from art, photographs, type, or just about any source material you may have. We can do things like convert your black-and-white material into color and combine type with art, photos, and three-dimensional objects.

Our advanced techniques give predictable, professional results so that your slide program will have visual excitement, clarity, and good graphic quality. Call us in for a meeting to review your manuscript and requirements.

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If you're spending too little time on developing your layout ideas and too much time specifying type and handling mechanical details, we can help.

Whether you're designing national ads, price lists, catalogs, manuals, labels, or any other kind of printed material, we can supply type that complements your visual concept, assemble your mechanical with art in position and produce film negatives ready for printing.

Arrow has the most complete and up-to-date type library in the country. If you like modern, professional typographic quality and good, old-fashioned dependability repeated job after job, try us.

Using Arrow leaves you more time for truly creative work.

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THE STANDOUT NAME IN SYNDICATED ART FOR 27 YEARS


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Call it clip art, stock art or syndicated art, it's all the same. But ours is different and, we think, better. It's simply a quick and economical means to an end. Collateral pieces, in-house graphics, whatever – anything where hours and dollars are limited.

Back in 1952 we started the **"Clip Books of Line Art"** as a continuing monthly service and we still serve a few of our original subscribers. Some are among **Fortune's 500,** some have large art departments and some are simply one-man shops. They all rely on **Volk** art to beat budgets and deadlines.

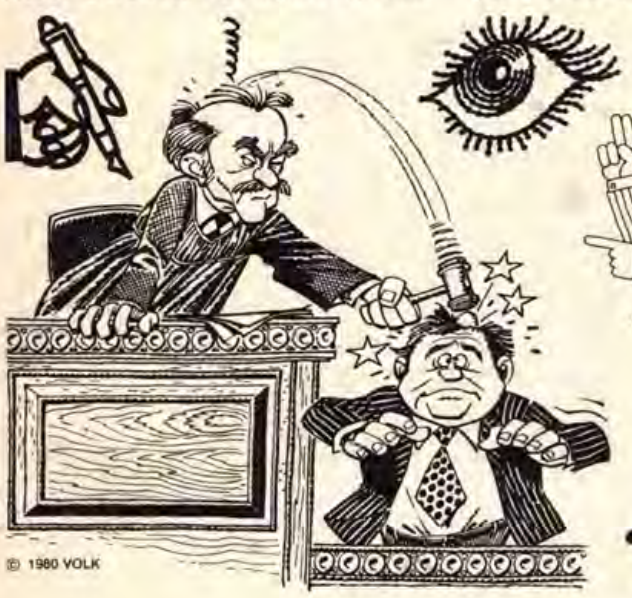
We operate out of a pleasant little town in South Jersey but our art is rendered by freelancers all over the country. California, Texas, Florida, North Carolina, Pennsylvania, New York. We believe in the star system simply because it works. We even had **Herb Lubalin** do our logo.

If you're not familiar with what we do and how well we do it, perhaps you should look into it. There's a very good chance we can save you both time and money and give your graphics a lift in the bargain. We'll provide you with about 1,000 fresh illustrations a year at an average cost of less than $3.00 a week.

The quality of the art is superb and likely superior to the custom art you may buy from time to time. Each illustration comes to you in two different sizes and is in pure black-and-white line, ready for immediate paste-up and a simple line negative.

We work with hand-made line negatives, prepared by the still development method and then lithograph the art impeccably on **"Kromekote"** reproduction stock. Quality art deserves quality treatment.

We're much too low-budget to be able to afford sales-persons but if you write me, I'll be delighted to mail you the full story and gift you with one of our **"Clip Books."** Simply send your business card or letterhead to Jeanne Kirby, 1401 North Main Street, Pleasantville, New Jersey 08232.


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What difference will it all make?

If you've battled your way through all the information in this Vision '80's report, you must be feeling a little bewildered.

And, as a type specifier, you may well feel alienated by it all.

How will these changes affect the way you do your job?

Will your job still exist?

How will you come to terms with the sort of levels of flexibility which are in-built with the new equipment?

We'd like to illustrate the answers to some of these questions by telling you a couple of stories.

Guinness is good for you...

We installed our first diatronics in late 1973 or maybe early 1974.

Some time during the first year, we landed the job of setting a newspaper for the Guinness company. It told about their export successes. Staff changes. Local news. It was to be distributed to their entire overseas export operation.



Quite a prestige job by any account.

As far as we remember, it was set justified, in something like 8key Times Roman, across 60mm or so.

It ran to either eight or twelve pages, tabloid-size, and although quite heavily illustrated there was a lot of setting – about 12 or 15 hours.

Sorry to be so vague, but it was rather a long time ago.

Or maybe it isn't.

We set it on days, and most of it was set by the same operator. We tend to prefer to keep a job to the same machine, and anyway we only had one Times Roman fount.

Now we don't know whether you know (it certainly had never occured to us!) but 'Guinness' is one of the more difficult words in the language to spell. Perhaps because it's of gaelic descent.

Our proofreader didn't notice.

The client didn't notice.

When the client submitted the work to Guinness, Guinness noticed.

We had spelt it Guiness, with absolute consistency, so the other 'n' had to go in every time the word appeared.

And it appeared, needless to say, rather frequently.

No argument. The reset was down to us, fair and square.

But there was nothing we could do to avoid everyone concerned missing schedules. Re-doing the artwork. Getting involved in pretty endless hassles and recriminations.

It took another four days to get the reset through. We didn't get another job from them, as you would expect.

You'll probably agree that it's the sort of thing that could happen to anyone.

But the point is, if it happened now, no problem.

It wouldn't involve us in more than a couple of hours work.

Softly, softly, catchee monkey.

There is a facility on our new System 3000 equipment to instruct the computer to search through for a word- or character-string, and whenever it occurs to replace it with something different: Search Guiness, replace with Guinness.

Automatically.

Keeping the other copy exactly the same, with the same linebreaks and everything.

It's a facility that isn't just useful for putting right mistakes, though.



A sense of humus.

Every year, Barclays Bank produce a major report on the current agricultural situation, called 'Finance for Farmers and Growers.'

It has information on government aid for farmers. New European legislation affecting farming. Statistics on crop yields and livestock production averages.

All compared across the European community. (Fascinating reading, as it happens.)

It runs to about 60 A5 pages, and is fairly solid text with charts and tables.

Until last year, it has been completely newly set every year. Although only about 30% of the copy changes, it's more economic to reset rather than strip it all up.

Last year we put it on floppy disc. When it recurs we'll simply run the existing version through our ADS making all the necessary changes.

There'll be something like a 60% saving, we estimate.

There'll be a dramatic improvement in the time taken to produce the job.

There'll be a lot of time saved at the bank. The proofreading won't be so heavy, for example.

It's a far more logical way of working. But let's go back to Search & Replace.

Suppose that Barclays changed their name before next year's Farmers & Growers. We'd just run it through on automatic search & replace.

CARBLAYS

Even if they changed their name to be much longer: say to 'Barclays Bank United Kingdom', it still wouldn't be that much of a problem to generate the new line-ends that this would create.

Let no man put asunder...

We've often pointed the finger at computer hyphenation programmes–we still do, you'll be glad to hear.

But if we had to re-run Farmers & Growers with both Search & Replace *and* Auto Hyphenation for the new line-ends that the longer name would cause, our operators



would feed in maybe five or six lines at a time. This way, they'd be able to check the computer's every decision, and over-ride them when we disagreed.

From what we've said so far, we're saving you both cost and time.

So far, so good.

But, you may argue, these aren't the average jobs.

Fair enough. We'll play dirty.

How many times, then, have you had that nasty tightening sensation when you've glanced at the setting, next morning?

Made a panicky grab at the copy to find out whether it was you or the setter who's set it in 12key rather than 9key?

And how many times have you *forced* it to work, by pro-ing it down?

How many times have you cut copy, praying that the writer won't notice? Anything rather than pay for a reset.

Those days are gone.

It's a difficult concept to get across, but you can change anything or everything, without re-keyboarding.

You can be as critical as you like.

Slightly open up the inter-character spacing.

Or maybe open the inter-line spacing. Or both.

Take it up a size, holding the measure. Or widen the measure. Or keep the breaks the same.

Take it a size down. Or four sizes down. Change the face, even. And the size.

Make the underscores a little bolder. Drop them another 0.25mm away from the type.

Oh, and perhaps put the product name into sized-down caps rather than u/lc.

All without re-keyboarding. We just run it through with your new instructions. And, of course, we'll still charge you for the privilege.

But at a fraction of the cost of the original setting. And at a fraction of the time you'd expect it to take.

Bigger, smaller, fatter, thinner.

There are many other benefits, too.

Like kerning that happens automatically, rather than manually. Which saves us time. And therefore saves you money. But also leads to more consistent setting.

A just-about unlimited range of sizes. System 3000 size range is 5-36key but we can get to all the whole sizes and all the inbetweenies, too.

And as System 3000 uses the same founts as diatronic, you're getting the same quality and integrity of design that you've come to expect from Berthold faces.

And, if you like, you can specify in millimetre cap heights–as you can in line feeds, too–as you know if you've specified rule forms for setting on diatronic machines.

We can even put rules down in any of three ways: Centred on the area. Outside the area. Or inside the area.



By the way, we just had one of our rule forms measured by a very special measuring device. It came out within the limit of the instrument, at 0.05mm of the indicated value.

Which is just about perfect.

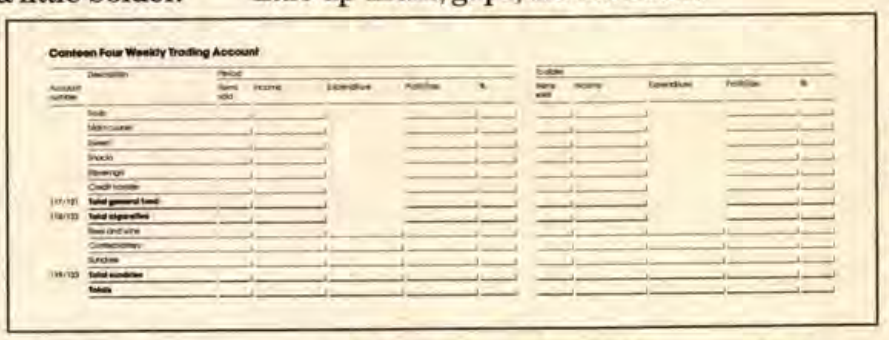
Rules are made to be broken.

The immense ruling capability of our System 3000 is worth an ad of its own.

But a brief tale anyway.

Design Research Unit came up with one of the most complex forms designs we'd ever seen.

Not just straight-across rules, but little up-kicks, gaps, the lot. Look:



We investigated, and discovered after some head-scratching that with a bit of ingenuity we were able to set them. Much more accurately than an artist could manage with a rapidograph.

And further, we discovered that on both time and cost comparisons it was marginally more economical to set rather than to draw.

But we come into our own when the client makes a change: it's all stored on our old friend, the floppy disc.

The repeated elements of the DRU forms are put onto multicode, which means that with two keystrokes we can store a complete character or command string.

Two keystrokes recall the string whenever we need it.

The magic multicode.

D&AD were also impressed by the time savings that we managed with multicode, on the captions for the 1980 D&AD Annual.



You know, the bit where it says 'Art Director:' 'Designer:' etc. From the experience that we gained setting European Illustration earlier this year, the coding was included right at the earliest stage–as the copy was prepared at the D&AD offices.

Where D&AD decided that 'Art Director' should be coded A, the system was followed as far as our operator keying multicode A to call it out, and so on.

Designer, know thy system.

All these techniques are happening now, and they are nothing to be scared of.

They are saving you time and money.

They are bringing you higher quality.

They are allowing flexibility that ten years ago none of us dreamed possible.

The over-riding consideration is that now, more than at any other time, you must be familiar with the system with which you are working.

If there's something you're unsure of, just talk to us.

Speak to our contact people, or go through to our keyboard managers.

Even take the time to come down and have a look for yourself. You've got to get as close to it as you can.

We're in this crazy situation of knowing just about everything our equipment will do, but not really knowing what functions are really important to you.

The Design Research Unit forms are a beautiful example. Without really close communication, we'd never have guessed that those forms were about for the doing, and they'd never have guessed just how quickly and easily they could be done.

It's textbook 'mutual exchange of benefits'.

Filmcomposition.

6–10 Valentine Place, Blackfriars Road, London SE1 8QH.
Telephone 01-261 1598 (Telecopier). Studio: 01-928 7575.

Headline: GST-Polo 3.4. Text: 3mm/5mm feed Madison Light and Italics, Subheads: 3mm Syntax Medium, all FC Plus spacing. We'd like to thank Barclays Bank Limited, Design Research Unit and D&AD for their co-operation in the production of this advertisement.

You probably know our reputation for superb headlines, special effects and Spectrakrome process. But now we're much more than that.

Photo-Lettering, Inc. knows that the real nitty-gritty of your type needs is text composition. The technology of text setting has grown tremendously. So when we decided to get into text composition we went first class. After all, it's only what you'd expect from us.

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Our new system is designed and tested to provide the highest quality. It is geared to meet the high standards of advertisers. We combine the expertise of the latest in computer typesetting technology with the sophistication and taste you already know us for.

Along with the basics our selection of typefaces includes our own exciting, exclusive designs. We can also tailor a typeface just for you. For all your type needs think Photo-Lettering, Inc., your one-stop all service studio.

Photo Lettering Incorporated

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THIS AD WAS SET IN FAUST 8994 (TEXT AND DISPLAY).

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each fantastic letter
designed by a different
famous illustrator.

It can be yours,
as a beautiful 25x38
four-color poster,
on heavy Kromekote.

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D Dick Hess
E Charles Slackman
F Wilson McLean
G Milton Glaser
H Bob Alcorn
I Gil Stone
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L Jim McMullen
M Marie Michal
N Norman Green
O Roy Carruthers
P Francois Colos
Q Roger Hane
R Bob Grossman
S Jim Spanfeller
T Simms Taback
U Murray Tinkelman
V Heather Cooper
W Charlie White
X Jerome Snyder
Y Marvin Mattelson
Z James Grashow

This poster was designed by Herb Lubalin for International Typeface Corporation on the occasion of the opening of the ITC Center.

To obtain one: Visit our offices and pick it up. In a protective tube, it is **$8.50.** If you want it mailed, please send payment of **$10.00** with your order. This includes postage. Approximately 1,000 posters are available. Order right away while the limited supply lasts.
U&lc, 2 Hammarskjold Plaza, New York, New York 10017



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Zipatone Dry Transfer lettering section is displayed as an idea manual. Each typeface has been set in a headline illustrating good usage of that typeface.

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歓迎

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Word Processing

[[dm0,1,8,8,9,13p]][[m0]]

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1. Note underscores, centered lines, quotes, symbols, etc.
2. For your free copy, write or call Intergraphics.

(Typed on a Qyx typewriter. Communicated over telephone lines to an InterCom 100 connected directly to a VIP phototypesetter. No editing was required. Total time to set: 15 seconds.)

InterCom100

INTERGRAPHICS, INC., 106-A South Columbus Street, Alexandria, Virginia 22314 (703) 683-9414

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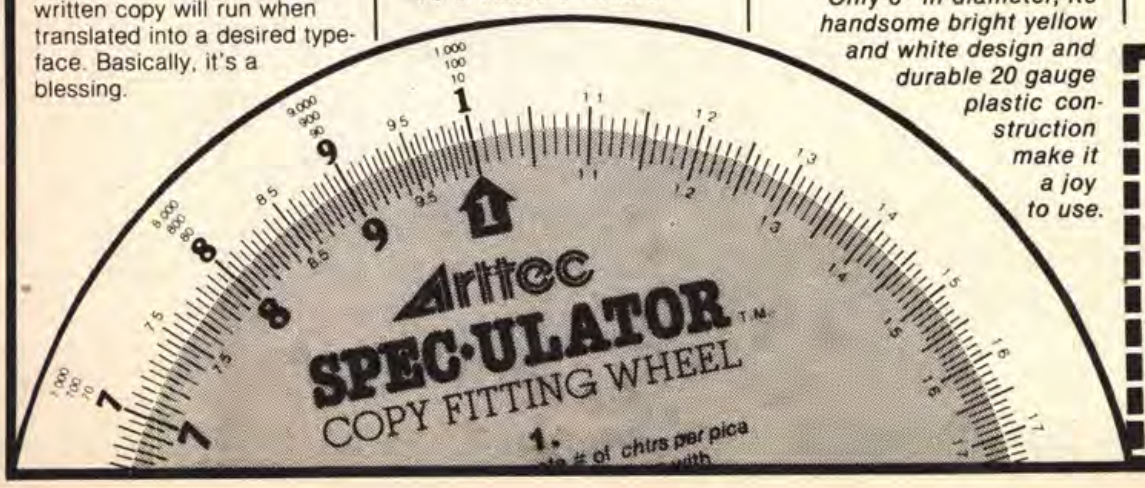
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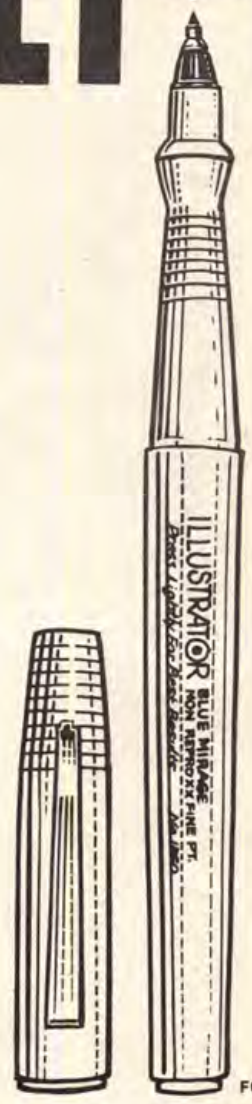
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Art Directors' Index to Photographers, No. 6

Presents work of 483 professional photographers from 20 countries. Beautifully color-printed. The leading showcase of all styles and techniques of professional photography. Gives address/phone/agent for all photographers. John Butsch & Associates, 415 West Superior, Chicago, Illinois 60610. 230mm x 320mm. 763 pages (620 in color). 3,000 photographs. $65.00 plus $2.50 shipping.



Encylopédie
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The 18th-century Diderot encyclopedia was famous for containing all of human knowledge and thought to date as well as more than three thousand detailed illustrations and thoughtful dissertations by Diderot, Voltaire, Rousseau and others. The dated text has been condensed but the articles of enduring interest (in French) and all the illustrations are retained in this 17-volume facsimile edition. One volume, an English guide to the encyclopedia, is written by contemporary scholars. Printed on hand-made Fabriano paper, the sets are numbered and have an ex-libris in each volume with the name of the owner. Brown silk binding with gold tooling of the period, $3,240 per set. There are 300 leather-bound sets at $5,400. For descriptive literature or orders, Fine Books, Inc., 160 East 92nd Street, New York, New York 10028.

Mergenthaler V-I-P Typeface Catalogs
Compiled by Volk & Huxley

A two-volume set of type specimen catalogs showing 562 faces. Showings enable a designer to compare legibility, characters, and composition of different type styles. Each face shown in all sizes from 6 to 36 points plus a full-font showing and sample alphabet set in three different choices of spacing. Van Nostrand Reinhold, 135 West 50th Street, New York, New York 10020. 576 pages each. 9 x 12. $24.95 per volume. Set, $40.00.

Manuale Tipografico, Oratio Dominica
by Giambattista Bodoni

Bodoni was the printer to the court of Parma in the 18th century. In 1770 he published a catalogue that included all the types he had designed. The *Manuale* showed some 54,000 typefaces and ornaments and became a classic, a collector's item. Today a fine quality reprint on hand-made Fabriano paper has been made available by the Italian editor/publisher Franco Maria Ricci. Ricci has also reprinted Bodoni's *Oratio Dominica*, which includes the Lord's Prayer printed in every language in a Bodoni-designed typeface. Like the *Manuale*, it is exquisitely printed and bound and is on Fabriano paper. These books, or literature describing them, are available in the United States from Fine Books, Inc., 160 East 92nd Street, New York, New York 10028. A set of the three-volume *Manuale* is $750. The two-volume *Oratio* set, leather bound, is $750. In silk it is $400.



Activa 25
Paul Ibou

A selection of the author's design and art created over the past 25 years. Artist/designer Ibou was born in Antwerp and works out of Belgium. His designs have been honored in numerous international exhibits and publications. Paul Ibou, Uilenhoeve, Legebaan 135, B-2260 Niglen, Belgium. 11¾ x 11¾. 120 pages. 250 illustrations. $50.



Printing Types: Their History, Forms and Use
by Daniel Berkeley Updike

This is the definitive work on print types from the 15th century through the early 20th. It is based on a series of lectures Updike gave at Harvard in 1922. This unabridged paperbound reprint of the now classic original is in two volumes. Covers every period and style of printing. Over 300 illustrations. Dover Publications, 180 Varick Street, New York, New York 10014. Total of 1,072 pages. 5⅜ x 8½. $8.95 per volume.



Graphis Annual 1979/1980
Ed. Walter Herdeg

Like its 27 predecessors, this edition is beautiful to behold and is the standard work reflecting the latest international trends in all design fields. Covers advertisements, booklets, editorial design, annual reports, book jackets, magazine covers, calendars, trademarks, letterheads, packaging, record covers, film and television commercials in 29 countries. Hastings House, 10 East 40th Street, New York, New York 10016. 9½ x 12. 248 pages. $49.50.

The New Secretary's Deskbook
Ed. Betty Martin Carson

A practical guide to standard office procedures, policies, problem-solving methods. Has great topical range from how to prepare smooth-running conferences to dealing with office wolves; from telephone etiquette and efficiency to lists of commonly misspelled words. Includes a 65,000-word, 247-page dictionary and a glossary of business terms. Morgan & Morgan, Inc., 145 Palisade Street, Dobbs Ferry, New York 10522. 8¾ x 5¾. 1,128 pages. Hardcover. $16.95.



Top Symbols and Trademarks of the World
edited by Franco Maria Ricci and Corinna Ferrari

This collection consists of a seven-volume set covering work in 30 countries. Each volume includes comments by leading critics of design. The set covers the work of over 1,200 designers and shows more than 5,000 marks. There are indexes for nation of origin; designer, studio, agency, and field of activity. Since the publication of the seven-volume set the publisher has issued annual updates. The set is $175, the updates (1977, 1978) are $25 each. Hardbound. 8¼ x 4½. Fine Books, Inc., 160 East 92nd Street, New York, New York 10028.



Designing with Type, Rev. Ed.
by Jim Craig

A basic course in practical typography, possibly the best book of its kind. Updated with data on phototypesetting and an expanded glossary. Excellent for students and in-office typographists. Clear, authoritative. Indexed. Watson-Guptill Publications, 2160 Patterson Street, Cincinnati, Ohio 45214. 176 pages. 9 x 12. 200+ illustrations. Spiral binding. $15.95.

Pocket Guide to Color Reproduction
by Niles Southworth

Concise but authoritative. Covers color theory, halftone photography, standard viewing conditions for transparencies and proofs, choosing a transparency for reproduction, color separation methods, evaluating materials, color proofing, color language, printing processes limitations, press sheet control devices. Graphic Arts Publishing Company, 3100 Bronson Hill Road, Livonia, New York 14487. 4 x 7. 12 pages. Paper. $6.95 including shipping.



Type Caster, Universal Copyfitting
by Stanley Rice

A flexible, easy, and universal approach to copyfitting. Tells how to fit any typeface to any specifications, using traditional or modern typesetting systems. A unique, time-saving tool. Reviews the three major components of area copyfitting: number of characters to be set, area to be covered, and type specifications. Tells how to determine any one when other two are known. Includes easy-to-use tables and work in inches, centimeters, picas, and fractional picas. Van Nostrand Reinhold, 135 West 50th Street, New York, New York 10030. 96 Pages. 5⅞ x 8 15/16. $14.95.



The Design of Books
by Adrian Wilson

Adrian Wilson is an award-winning book designer, a teacher and lecturer, the proprietor of a studio and press on Telegraph Hill in San Francisco. He's also articulate, has a sense of humor, and a definite viewpoint about the role of a book designer. The result is a book that is at once charming and informative. The text, augmented by nearly 250 illustrations, covers the art of layout, typography, printing methods, paper, the anatomy of the book, design approaches, binding, jackets and paperback covers, trade book design, textbooks, and limited editions. This is a paperback reprint of an earlier edition. Peregrine Smith, Inc., P.O. Box 667, Layton, Utah 94041. 8½ x H. 160 pages. $9.95.

Errata

Two gremlins crept into our December (Vol. 6 No. 4) book reviews. The comments on the Stanley Morison and D. B. Updike book implied that Morison was the proprietor of the Kelmscott Press. Morison was probably the greatest typographic historian of this century. William Morris was the proprietor of the Kelmscott Press. And our review of "Goudy's Type Designs" dropped a line and thus credited our friend Ben Lieberman with being the "founder" of the Goudy Thirty face, which, of course, he was not. He was the founder of the Goudy Society as well as the American History Printing Association.

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JULY 7—AUGUST 22, 12 NOON—5:00 PM (CLOSED AUGUST 11)

Family fun exhibition (rated GP) featuring animals by Ron Witt, Bloomingdale's, and posters, posters, posters: Polish circus posters by the artists Urbaniec, Gòrka, Majewski, Swierzy and others, on loan from Poster Originals. Also shown will be the original 1952 poster from Paramount Pictures' Academy Award winning "The Greatest Show on Earth." Posters of the circus sculpture of Alexander Calder have been contributed by the Whitney Museum of American Art; and Circus World Museum in Baraboo, Wisconsin has provided Ringling Brothers and Barnum & Bailey posters, old and new.

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SEPTEMBER 2—OCTOBER 3, 12 NOON—5:00 PM

THE FINE BOOKS OF FRANCO MARIA RICCI

Franco Maria Ricci was a 26-year-old geologist with an interest in graphic design when he discovered a rare original Bodoni book of typefaces in the Palatine Library in Parma. Becoming increasingly interested in the "famous publisher-typographer who lived from 1740 to 1813 (and who) gathered together 54,000 typefaces and ornaments engraved in steel," Ricci decided to reprint Bodoni's Manuale Tipografico. Ricci says, "It was the act of a madman, since the book ended up costing 70 million lire ($81,000)." Collectors fought over the copies, however, and Ricci went on to produce Bodoni's Oratio Dominica and Diderot's and d'Alembert's Encyclopédie. All eighteen volumes of the Encyclopédie, the two volumes of Bodoni's Oratio Dominica and the three volumes of Bodoni's type specimen booklets will be on exhibition at the Center. Ricci's books on Isadora Duncan, Morris Hirshfield and Erté, printed on hand-made paper and bound in silk with gold ornaments, will also be on display together with others in the series Ricci called "The Signs of Man." Enlargements will be available for a closer look at some of the exquisite etchings, type and photographs which appear in the books.

OCTOBER 13—NOVEMBER 28, 12 NOON—5:00 PM

INTERNATIONAL CALLIGRAPHY TODAY

Kalligraphia: Greek, from kalli (beautiful) and graphia (writing). This exhibition of outstanding calligraphy from all over the world was chaired by Hermann Zapf, the internationally known calligrapher and type designer. The calligraphy in the exhibition was selected from works submitted through a "call for entries" in U&lc and by personal invitation. The jurors were Philip Grushkin, Herb Lubalin, Jeanyee Wong and Hermann Zapf.

12 NOON—2:00 PM

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