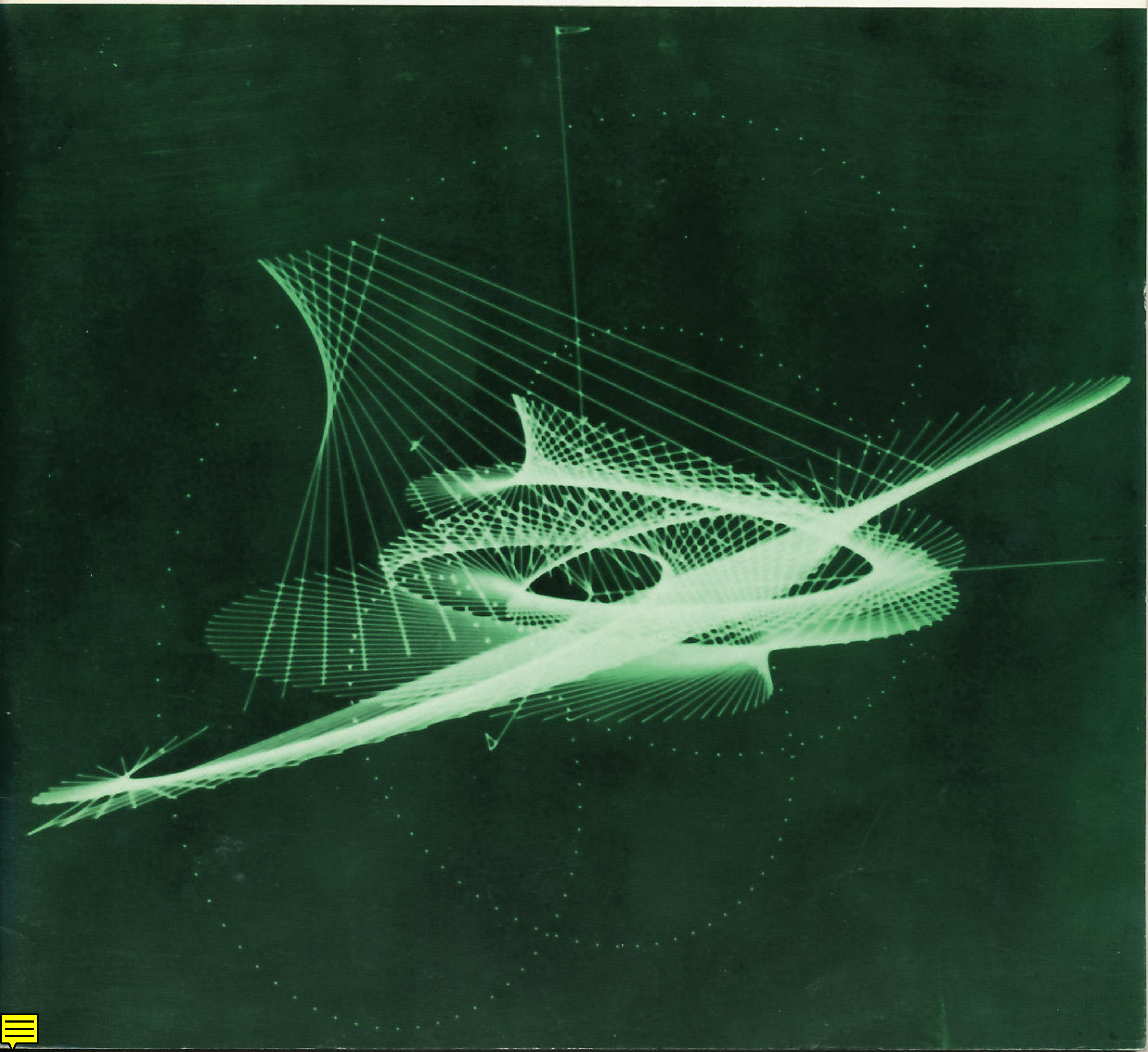
August, 1969

Vol. 18, No. 9

computers and automation

7th Annual Computer Art Contest — First Prize: "Circus"



computers and automation

Vol. 18, No. 9 — August, 1969

The magazine of the design, applications, and implications of information processing systems.

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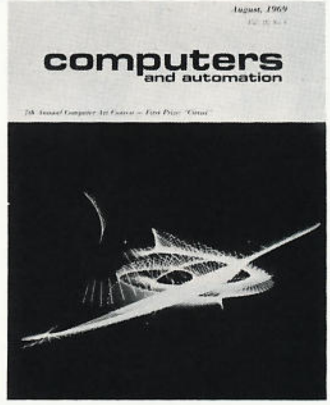

The front cover shows the entry which won first prize in the Seventh Annual Computer Art Contest of Computers and Automation — "Circus", photographed from an Adage Graphics Terminal by Tom Childs. A description of this picture, and other entries in the contest, are in the computer art section of this issue beginning on page 12.

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Edmund C. Berkeley
Editor

The Value of Computer People, and "Who's Who in the Computer Field"

In the computer field, something new has been happening:

> The value of a computer professional is beginning to exceed the value of a computing machine.

For over 20 years, the powerful computer and the large quantity of computing power which it provides, has tended to be worth far more than a computing professional. This is now changing.

The central processing unit, thanks to transistors first, then printed circuits, and currently large scale integration of circuit elements, is becoming relatively small and cheap. The peripherals are becoming less costly also. The cost of a good computer professional now is on the order of $30,000 a year (including fringe benefits needed to keep him in a job instead of having him move on to another job). A five-year capitalization of the professional's value comes to about $150,000. One can now obtain a great deal of computing power for $150,000—more than ten million million computing operations, enough to solve a large number of difficult problems.

As a result, it makes sense for the computer field to look with fresh eyes at computer people, to focus attention on them, to try to inventory the people, the professionals, in the computer field.

We, the editors of *Computers and Automation,* recognizing this fact, accordingly announce the reporting of the people in the computer profession in a new periodical publication.

Our Editions of *Who's Who in the Computer Field,* which began in 1952, will be published annually in three parts:

Part 1 — Systems Analysts and Programmers
Part 2 — Managers and Directors of Computer Installations
Part 3 — Other Computer People

These issues will also contain a variety of other information and supplements, such as: "Distinguished People in the Computer Field", "Lecturers in the Computer Field", etc. Whenever a person belongs in more than one category, we plan to publish his capsule biography in each category where it belongs.

We invite our readers to subscribe to this new periodical publication *Who's Who in the Computer Field* — see the information on page 47.

If you wish to be considered for inclusion in the Who's Who, please complete the entry form on page 44 or provide us with the equivalent information. If you have previously sent us an entry form, but some of the information that you sent us has changed substantially (such as your company connection or your address), please send us a corrected entry form. Please do not delay—deadlines are close at hand: the closing date for Part 1 is September 5, 1969. All aboard!

Computer Art — The Annual Contest

This year our 7th annual contest for computer art has set a new record: 165 pieces of computer art have been entered. With this profusion, we cannot print in one issue all that is worth printing.

So we plan to publish in later issues of *Computers and Automation* throughout the year, more examples of computer art.

The front cover of this issue shows the art to which we have awarded first prize. Also, in 25 pages of this issue we present what seem to be many of the most interesting, artistic, and significant pieces of art that we have found among the entries.

The computer and its associated graphic plotter make it possible to produce about half a dozen classes of interesting and beautiful art. These classes at present appear to include:

- Lines associated in patterns varying in angle and length;
- Areas bounded by contours;
- Mixtures of controlled and random elements repeated with variations;
- Copies of pictures (of persons, etc.), composed by lines of varying qualities or letters of varying density;
- Successive transformations of a single design by varying its elements (length, width, size, etc.).

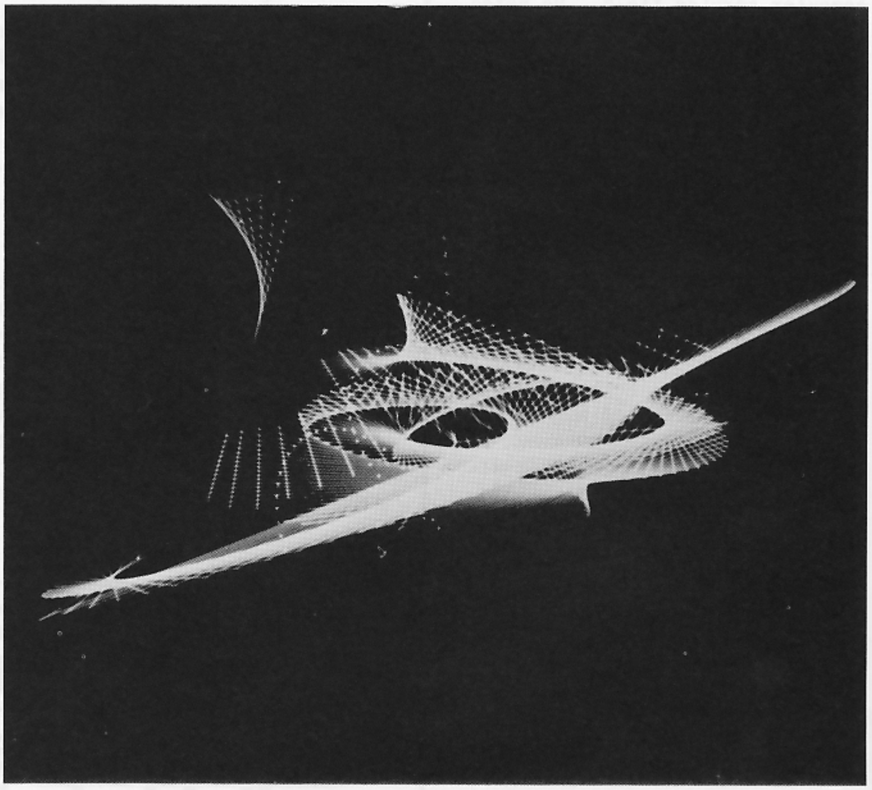
Many of these designs are beautiful and striking. But very little so far in computer art seems to have the profound interest and emotional appeal of the best paintings or photography.

Why not?

The degree to which art impresses a human being is, I suppose, closely related to the familiarity of the objects portrayed. Leonardo da Vinci's painting of Mona Lisa is famous because of the enigmatic expression in the face of a woman, something all of us often see and wonder about. Another example I think of is a picture of flowers in a vase, done in bright pastelle colors, by a French artist about 1914, on exhibit in the Museum of Modern Art in New York. The various kinds of flowers are recognizable; the colors placed there in imperishable colored chalk fifty years ago are still brilliant and gorgeous; the entire bouquet, skillfully arranged and balanced, is a lovely example of something I have often seen and enjoyed in the real world. I can't imagine a computer originating a picture like either one of these two without an enormously large amount of programming, which in these days is still impractical.

Yet computer art is one of the new kinds of art that we human beings will now become used to—and perhaps, in time, often find as pleasing as many examples of human art.

7th annual COMPUTER ART CONTEST



CIRCUS
— Tom Childs

The first prize in our 1969 Computer Art Contest has been awarded to the picture entitled "Circus", which was submitted by Adage, Inc. of Boston, Mass. The winning entry appears in color on the front cover of this issue. It was generated on the Adage Graphics Terminal and photographed by Tom Childs.

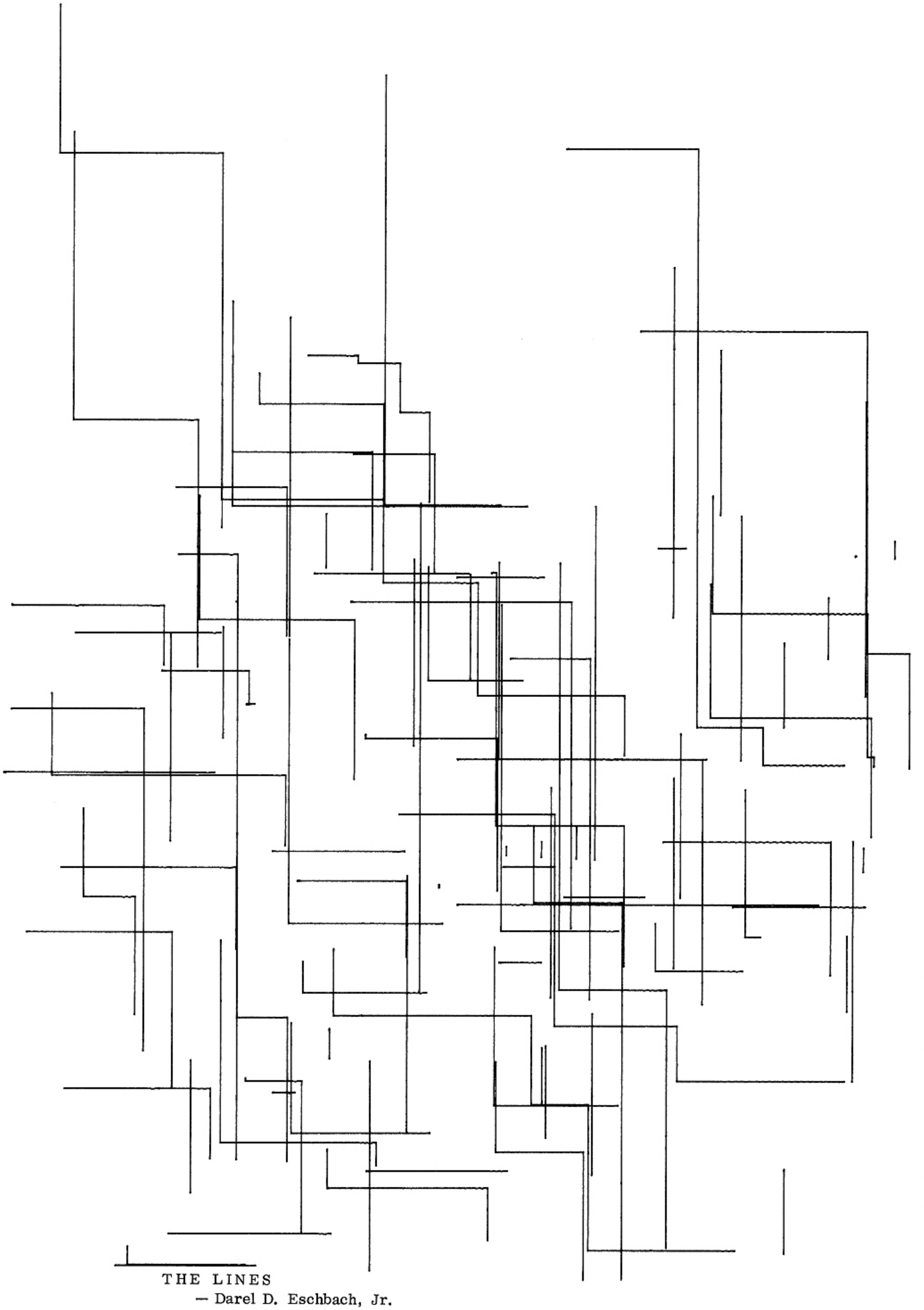
The line end points in the drawing were computed as various frequencies and phases of sine and cosine functions. In some cases, a dot was drawn at the computed point, and in other cases, lines were drawn between pairs of points.

The other computer art published in this issue receives honorable mention. For some of the drawings, the explanation is obvious or can be inferred easily; for others, explanations are given. In a number of cases, the computer and the peripheral equipment which produced the computer art have not been specified as much as we would like because the information did not reach us by the close of the contest, July 3. We would, of course, like to identify the equipment that produced the art. Supplementary information of this kind should be sent to us for publication in a future issue.

The responses to our Seventh Annual Computer Art Contest have been splendid. We are grateful to all those persons who sent us entries.

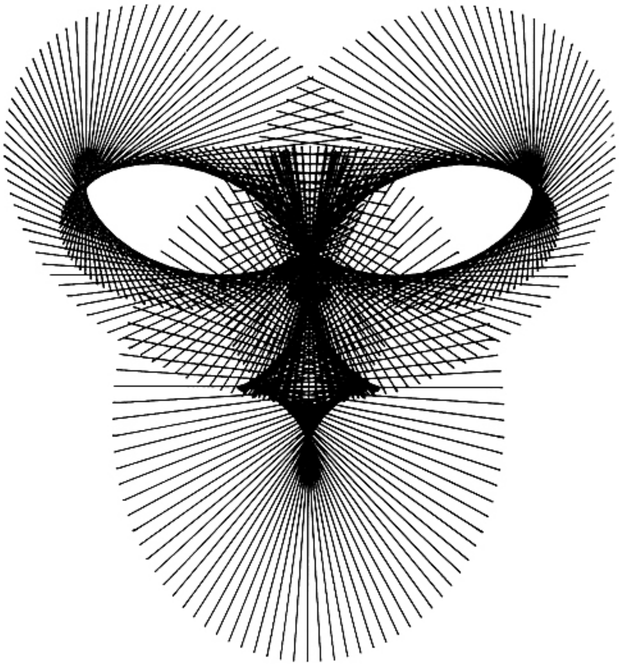
For August, 1970, we plan our Eighth Annual Computer Art Contest, and we cordially invite contributions of computer art from all our readers and others who are interested in computer art.

A complete alphabetical listing of the names and addresses of all persons whose art is published in this issue appears on page 32.



THE LINES
— Darel D. Eschbach, Jr.

A random number generator was used to determine the starting point, length and direction of each line segment. Drawn on an IBM 1620-1627 system.

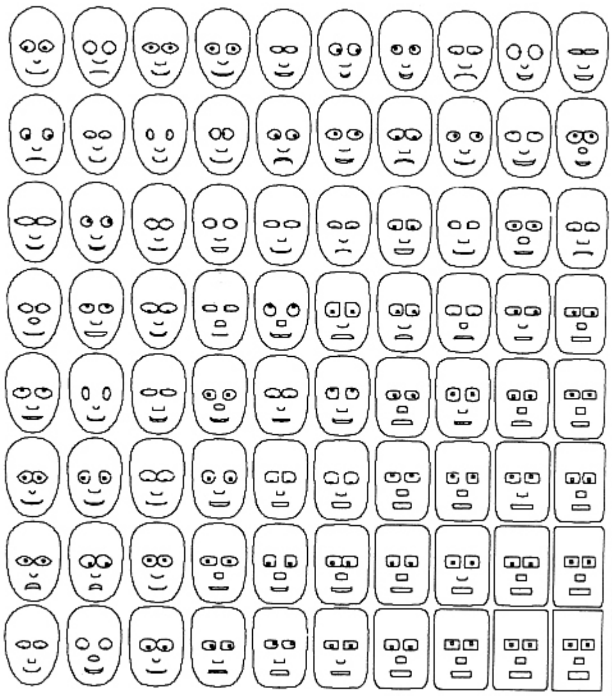


MASK
— Kerry Strand

The figure shows the pattern formed by a rod spinning about a closed looping curve. As the stick progresses along the curve, the stick's axis of rotation shifts in and out along its length. Drawn on a CalComp 718 flatbed plotter.

PROGRESS?
— George H. Meyfarth III and Philip F. Meyfarth

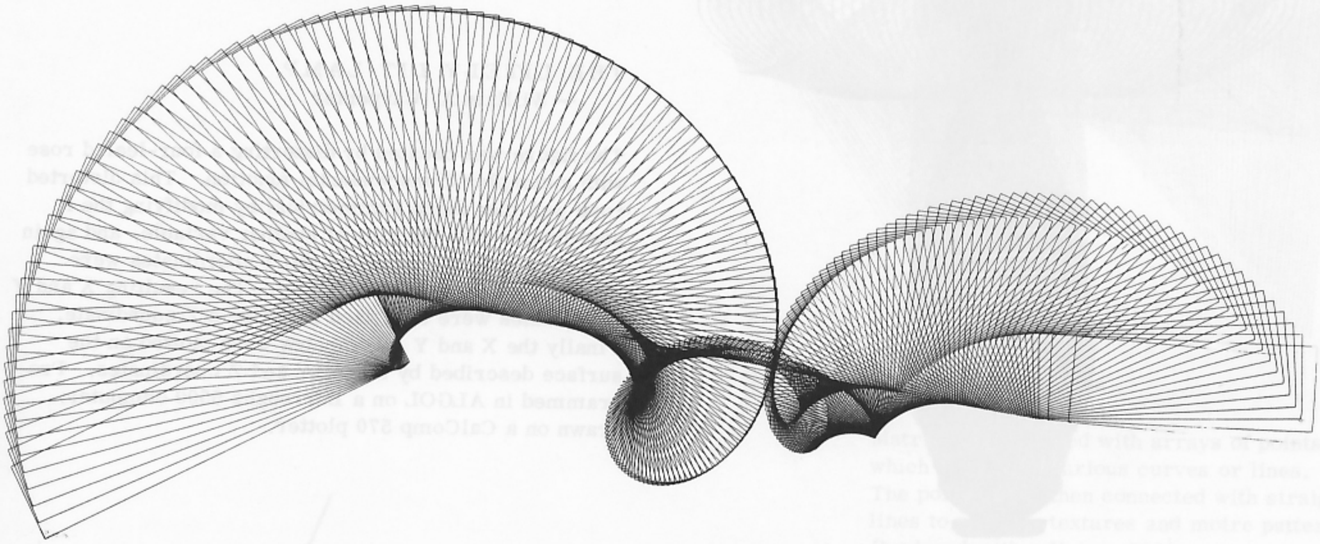
Each face is a composite of super-ellipse quadrants with exponents ranging from slightly less than 2 to about 400. The variations in location, size, and shape of the features are controlled by a Gaussian random number generator. The trend toward squareness and conformity in the lower right corner results from predetermined changes in the statistical properties. The mouth expression is correlated with eye position to suggest apprehension in those who see that they themselves are not far from total mechanization. Programmed in FORTRAN and plotted on-line on an IBM 1627 driven by an IBM 1130.



SKETCH FOR A MURAL

— A. M. France

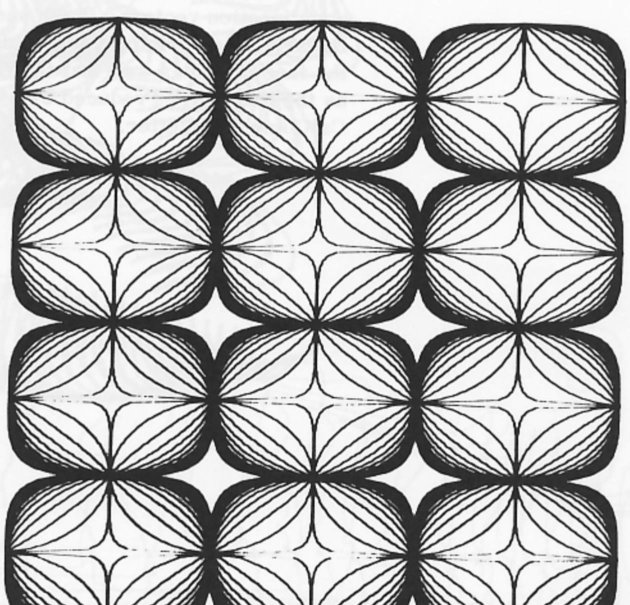
A basic shape was repeated while dimensions, angle, points of origin, etc. were altered by small, interrelated increments. Programmed in FORTRAN on an ICL 1905 computer; drawn on a CalComp 563 plotter.

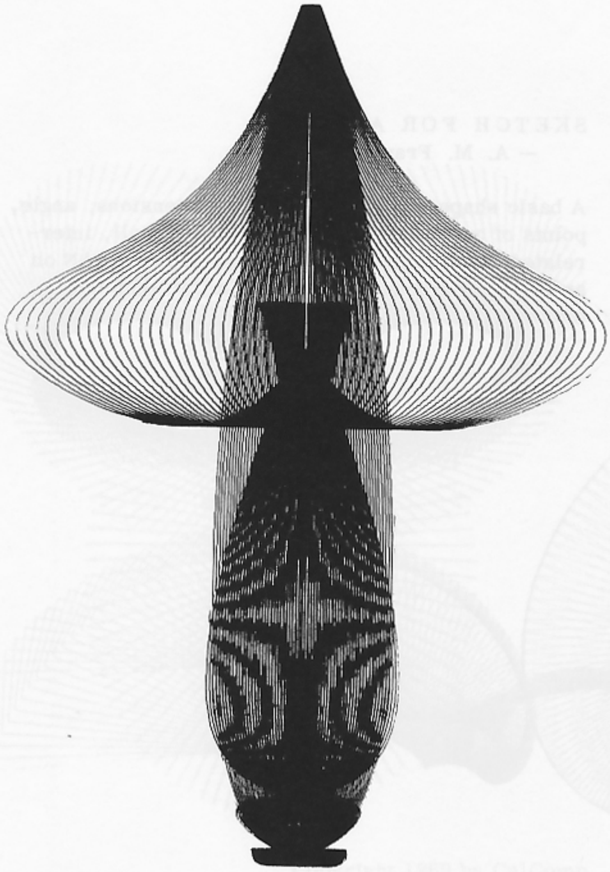


ELLIPSES

— (Mrs.) Leigh Hendricks

A variation of sub and super ellipses, plotted on a Stromberg Datagraphics S-C 4020 plotter.



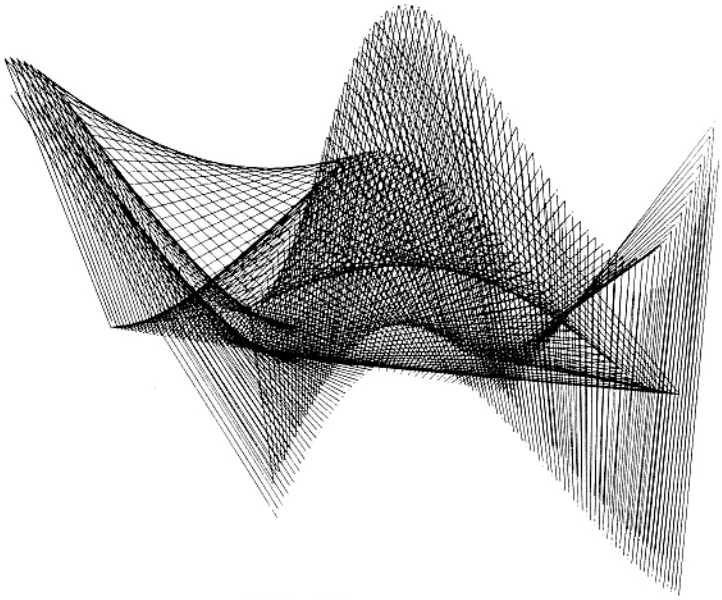


THE LITELY LIT LAMP
— William A. Carpenter

The figure was created by distorting a four-leafed rose with a complex transcendental function. This distorted rose was then made symmetrical by modifying the X coordinates with the sine of another variable, and again with the negative sine while the Y coordinates were modified with the variable itself. The resulting X and Y coordinates were then used to define a Z coordinate. Finally the X and Y coordinates were plotted on the surface described by the X, Y and Z coordinates. Programmed in ALGOL on a Burroughs 5500 computer; drawn on a CalComp 570 plotter.

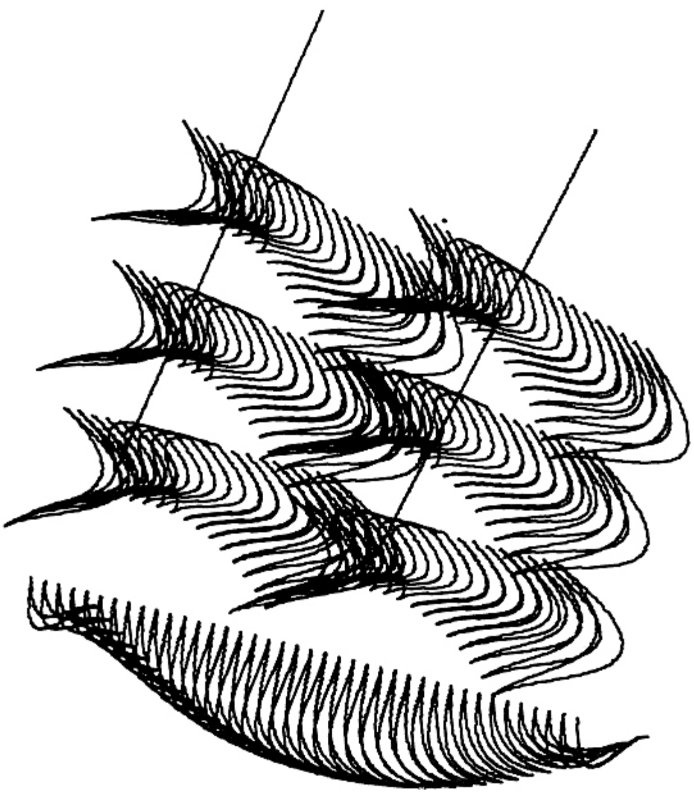
SCORPION
— Sidney Robertson

The face profile at the tail of Scorpian is defined with 17 points and direction vectors. Each successive profile results by linearly transforming the 17 points and direction vectors of the face in such a way that the final profile has the same shape as the original. Produced by a CDC 3600 computer and a CalComp 564 plotter.



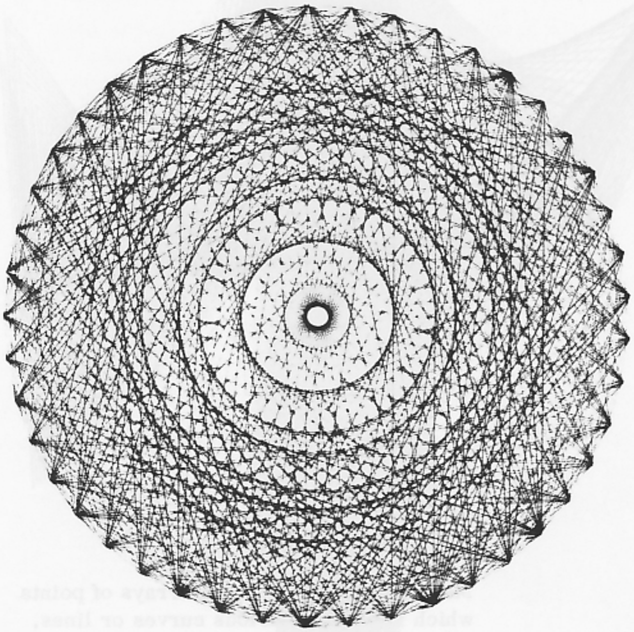
BILLOWS
— David Caulkins

Matrices were filled with arrays of points which represent various curves or lines. The points were then connected with straight lines to produce textures and moire patterns. Produced with a Univac 1108 computer and a CalComp plotter.



FLYING DUTCHMAN
— Michael Davis

Plotted on a CalComp plotter at Stanford University.

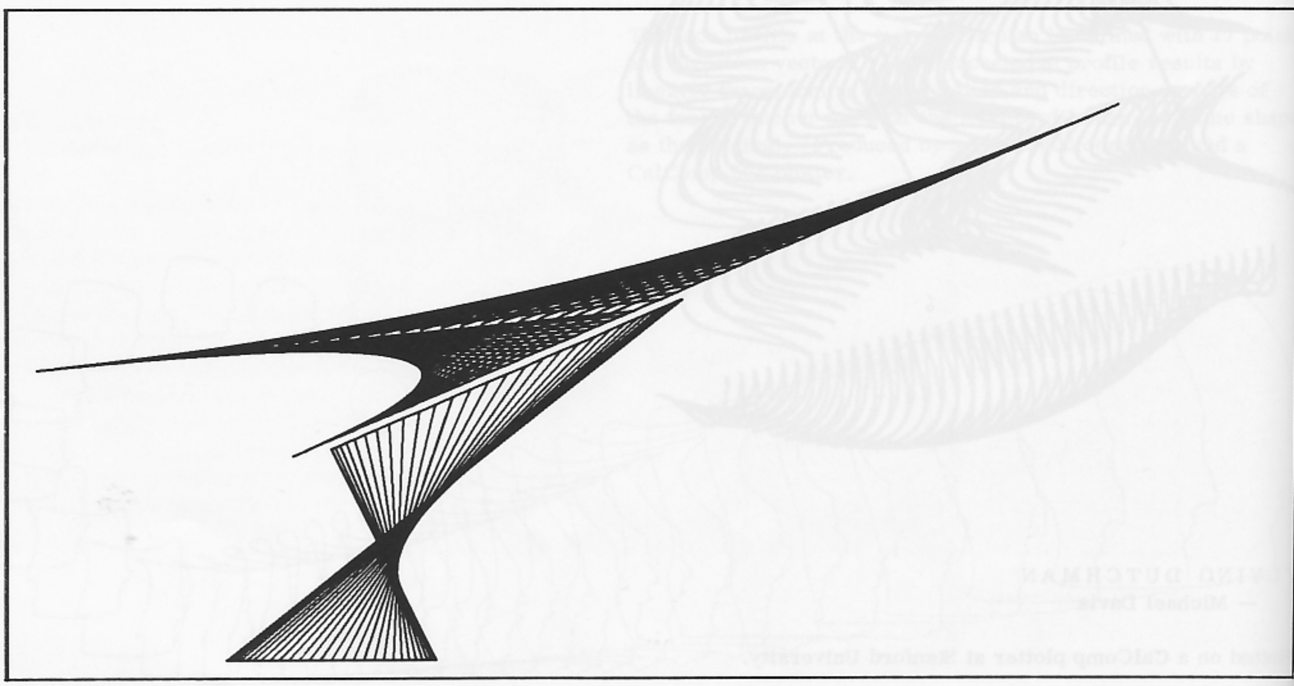


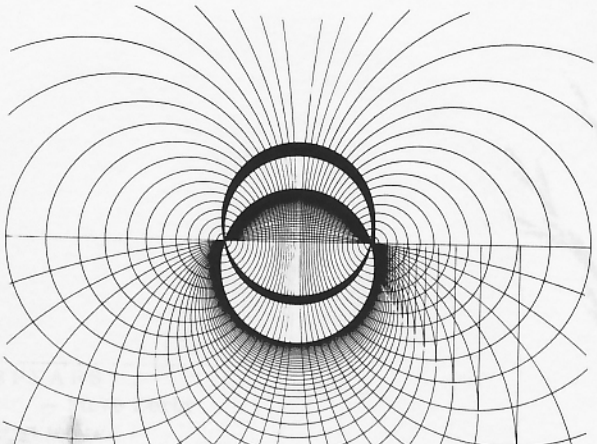
CONNECTIONS #3
— A. M. France

A series of vertices of a polygon are generated, and then linked. Programmed in FORTRAN on an ICL 1905 computer; drawn on a CalComp 563 plotter.

ASPIRATIONS
— James S. Lipscomb

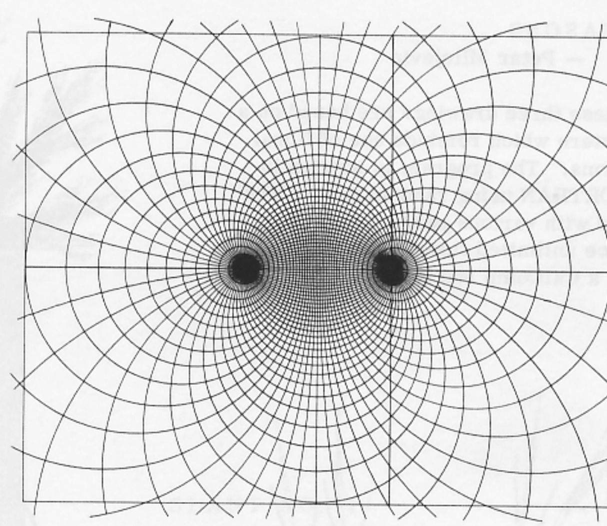
Programmed in FORTRAN on an IBM 1620 computer and drawn on-line by a CalComp 565 plotter.

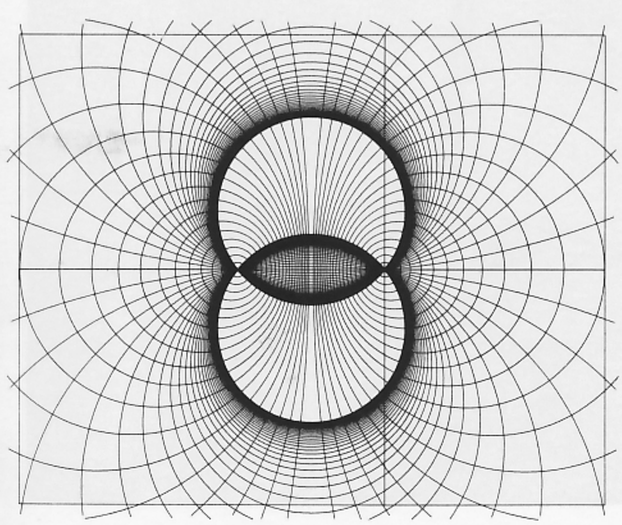


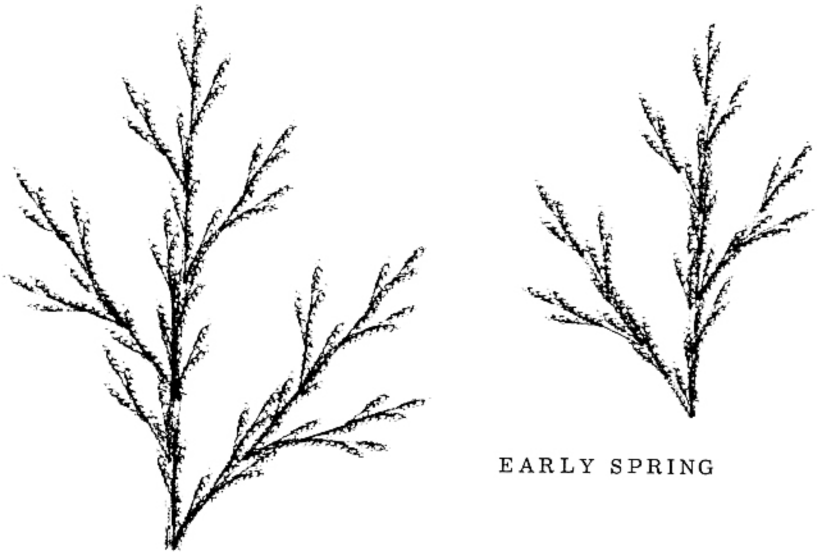


CONTROL THEORY
— E. M. Pass

The pictures above and below resulted from bugs in the program which eventually produced the picture below. Programmed on a Univac 1108 computer and drawn on a CalComp 770/763 offline incremental plotter with a stepsize of .005 inches.



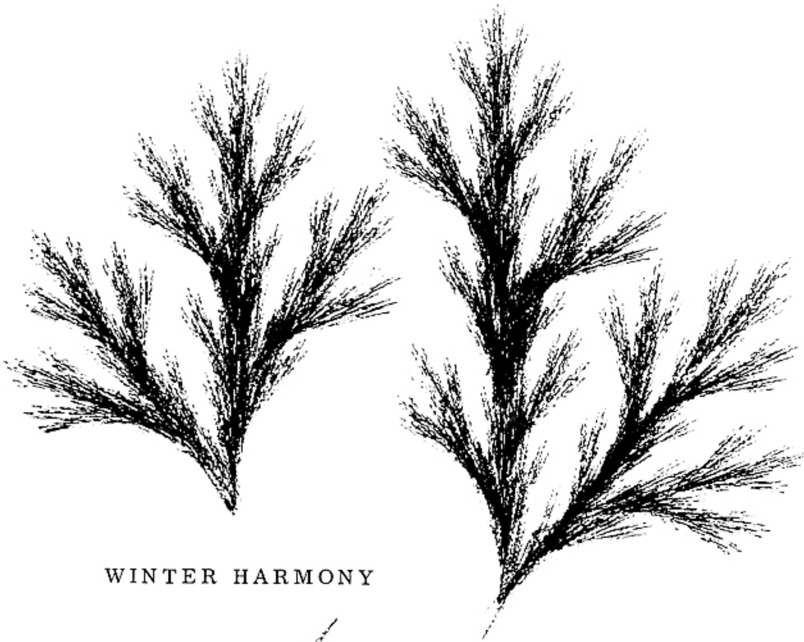




EARLY SPRING

SEASONS
— Petar Milojevic

These three drawings are based on a pattern which reminds one of floral forms. The program is written in FORTRAN using random generators and with various parameters can produce unlimited floral designs. Drawn on a CalComp 565 plotter.

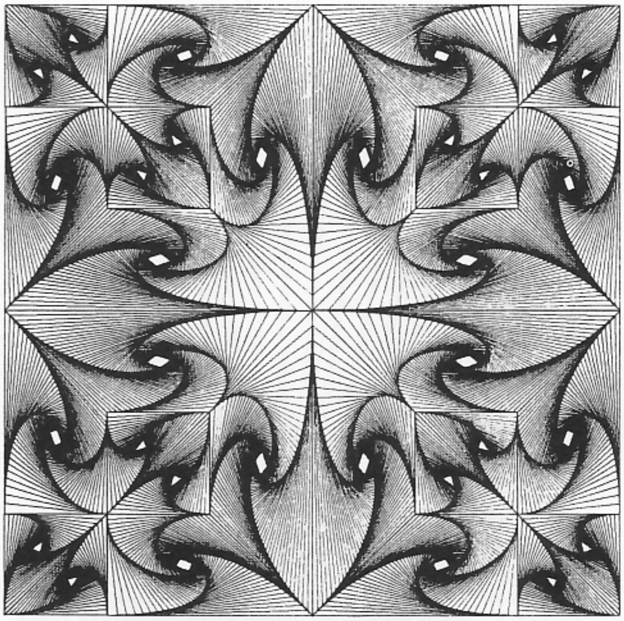


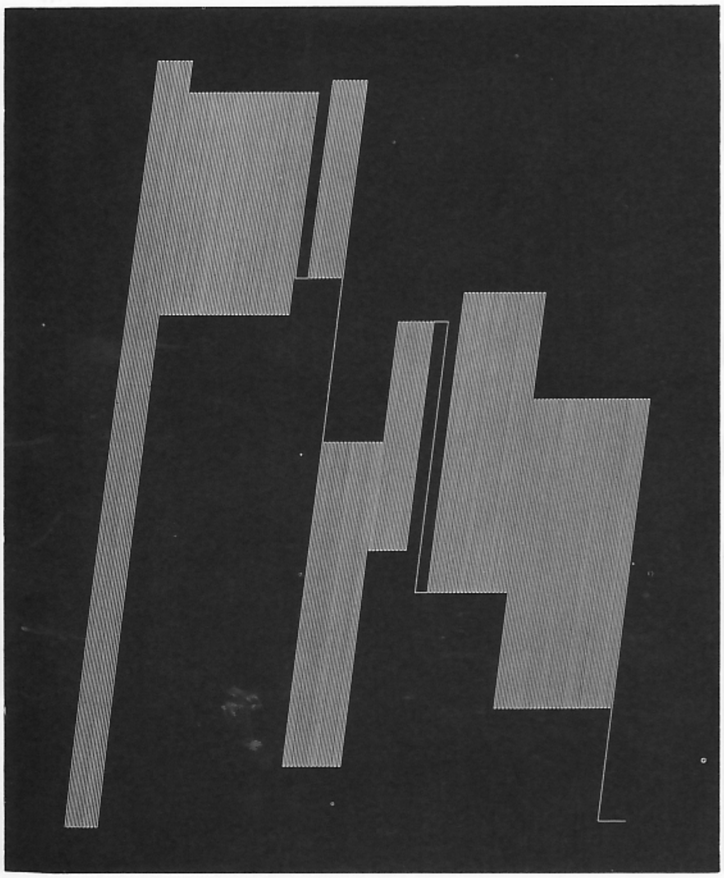
WINTER HARMONY

NATURE AT SLEEP

SPEARS
— Steve Derby

The algorithm for this drawing used spirals of a geometric figure inside itself. Produced with a CDC 3600 computer and a CalComp plotter.



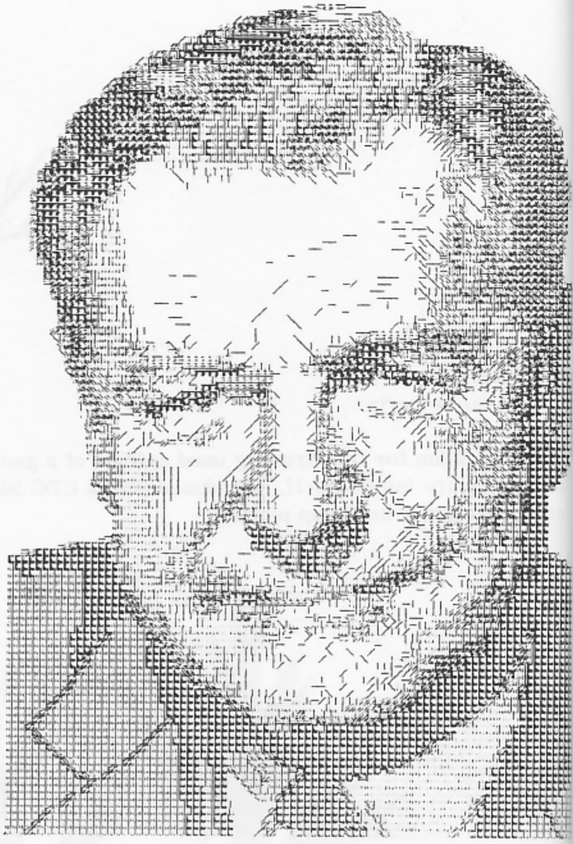


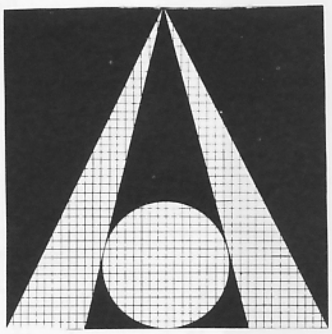
SLANT NO. 1
— Auro Lecci

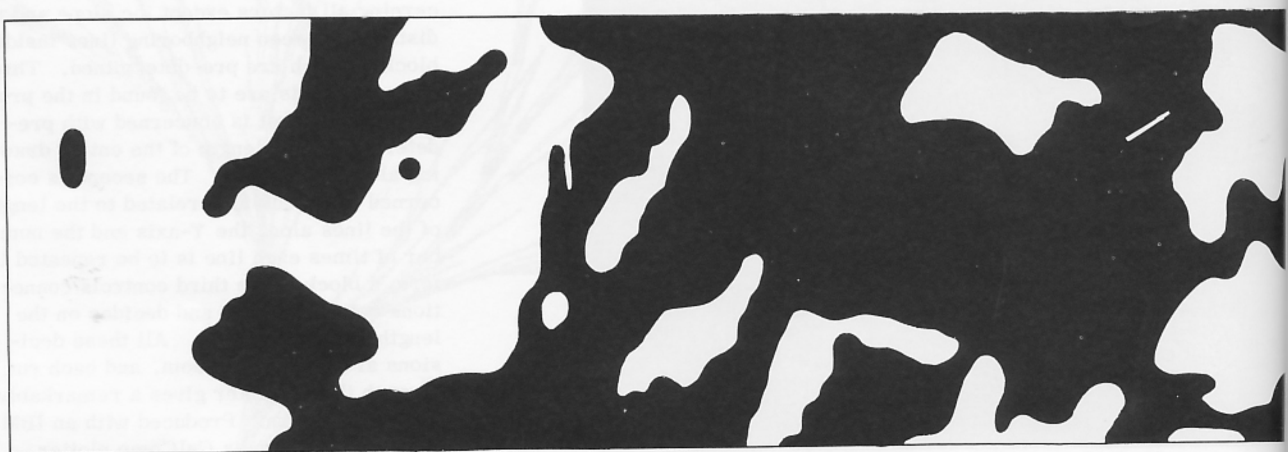
A subroutine provides random numbers that are used to influence decisions concerning all factors except the slope and the distance between neighboring lines inside blocks, which are pre-determined. Three decision levels are to be found in the program. The first is concerned with predetermining the length of the entire drawing along the X-axis. The second is concerned with decisions related to the length of the lines along the Y-axis and the number of times each line is to be repeated to form a block. The third controls connections between blocks and decides on the length of jumps, if any. All these decisions are taken at random, and each run through the computer gives a remarkably different pattern. Produced with an IBM 7090 computer and a CalComp plotter.

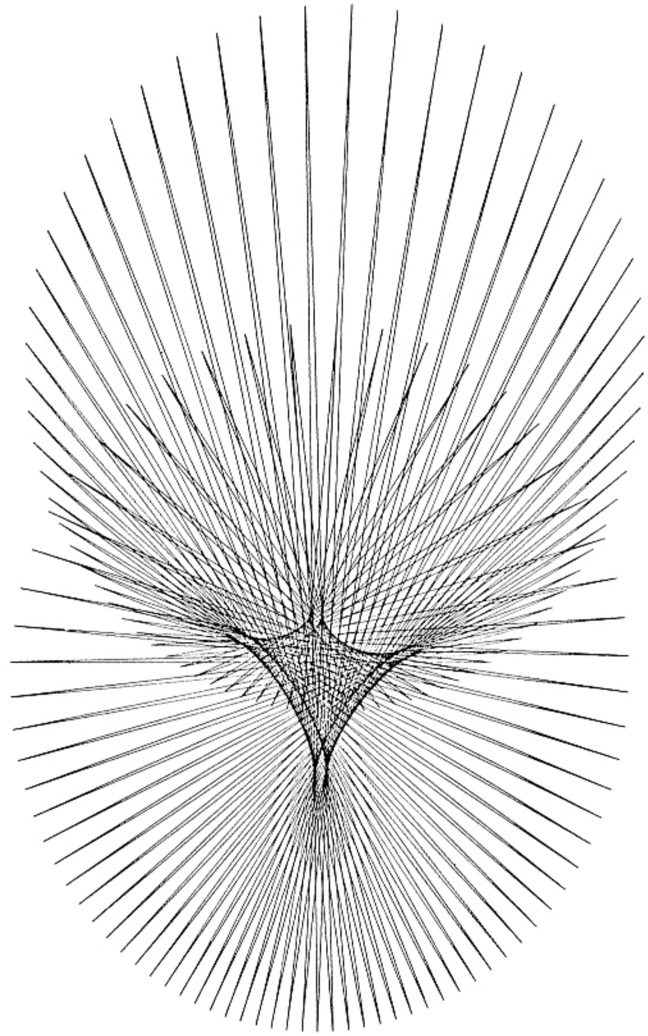
PORTRAIT (NELSON ROCKEFELLER)
— Anton G. Salecker

Input consisted of simple control data and thousands of pieces of digitized information. One of 16 preset patterns was plotted in each square of a large rectangular grid layout, according to the digitized input, to produce the final result. Programmed in ALGOL. Produced by a Burroughs 5500 computer and a CalComp 563 plotter.







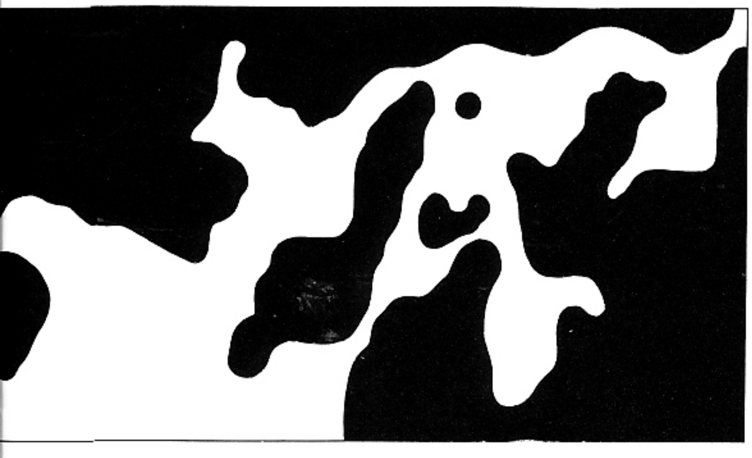


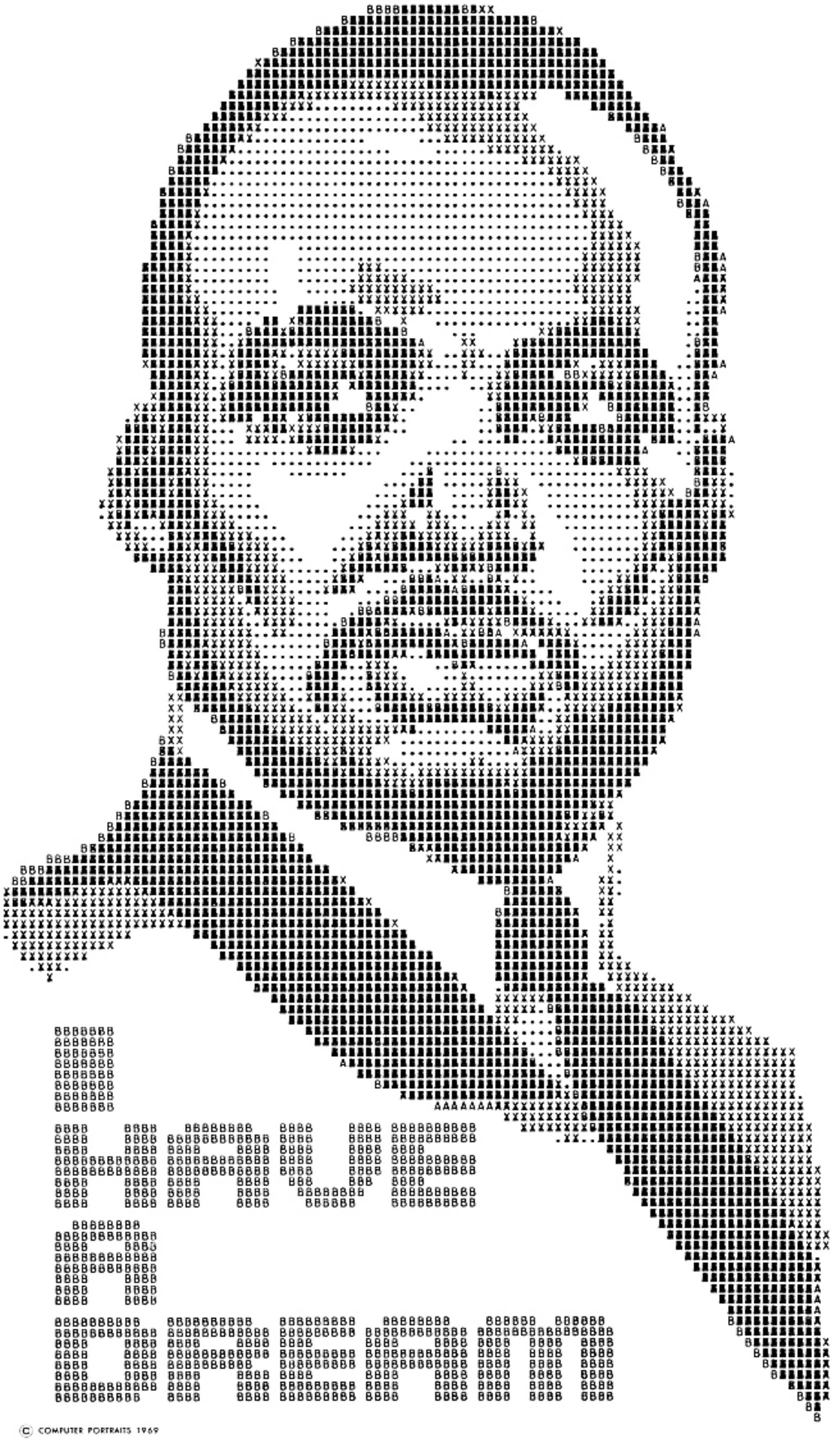
RESURRECTION
— William S. Maloney, S. J.

Circle and ellipse coordinates were calculated at various polar angles, and points were connected in several different ways. Programmed on a CDC 3300 computer; drawn on a CalComp plotter.

PATTERN OF FLOW
— Hiroshi Kawano

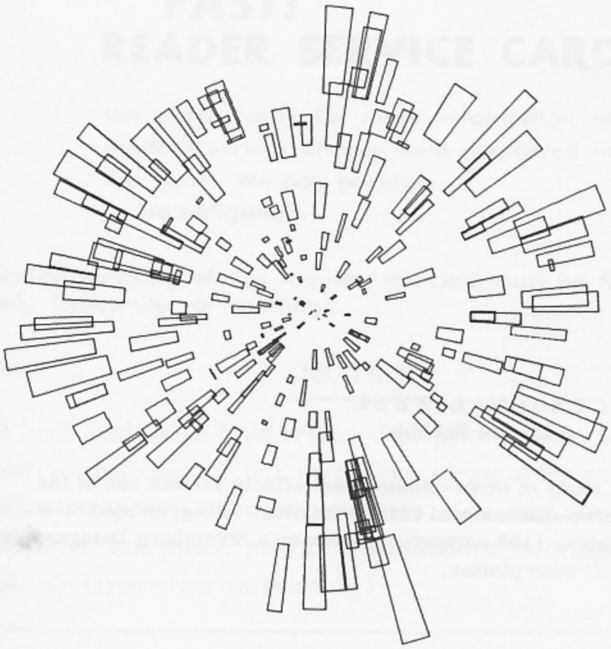
This work (below) consists of 8000 random number series arranged into a 40 x 200 format of two picture elements (white and black), which are generated from the transition probability matrix about all possible combinations of nine picture elements in the three pictures at the left, by means of the Monte Carlo method. Programmed in FORTRAN 4 on a HITAC 5020 computer. A line printer was used as an output device, and the final work was coded by human hand.





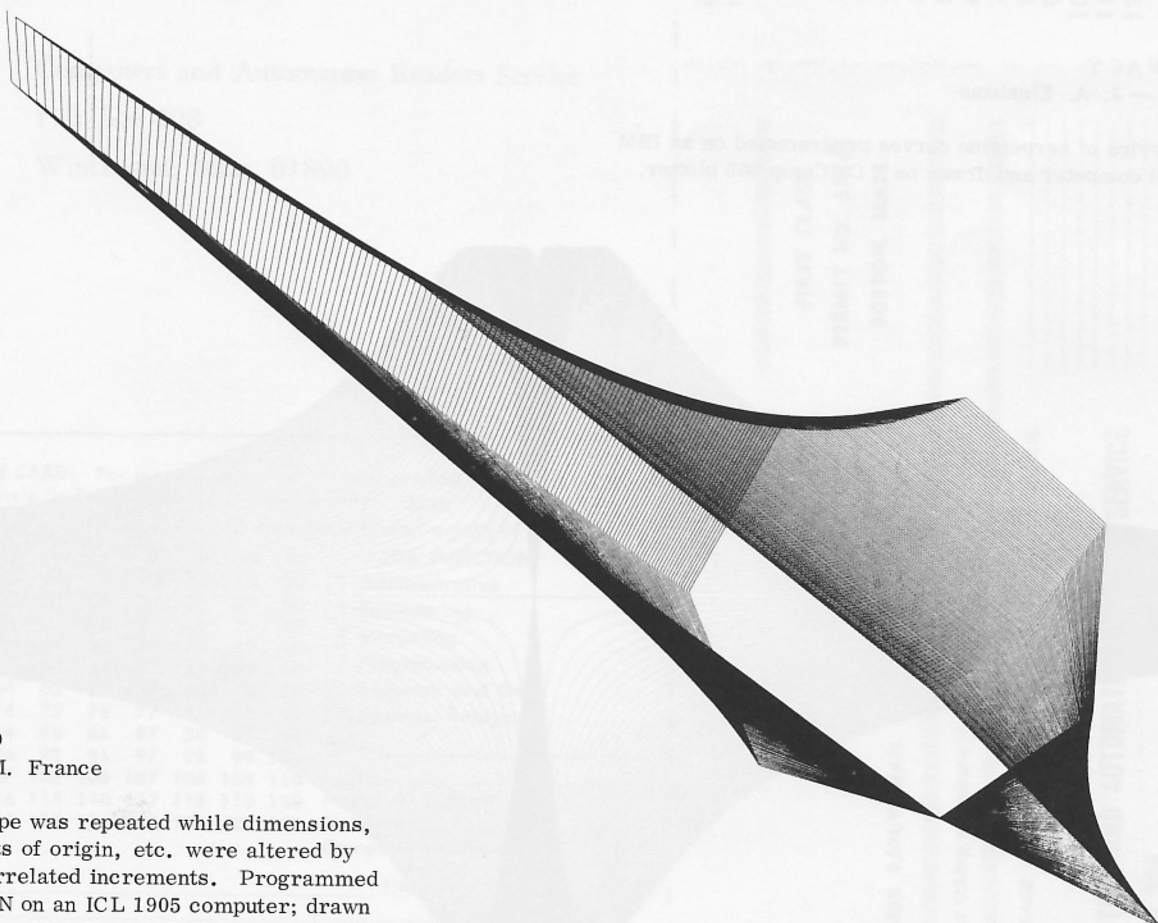
PORTRAIT (MARTIN LUTHER KING, JR.)
— Hendrikus J. Nolle and Emilio D. Rodriguez

Programmed and run on an IBM 1401 system.



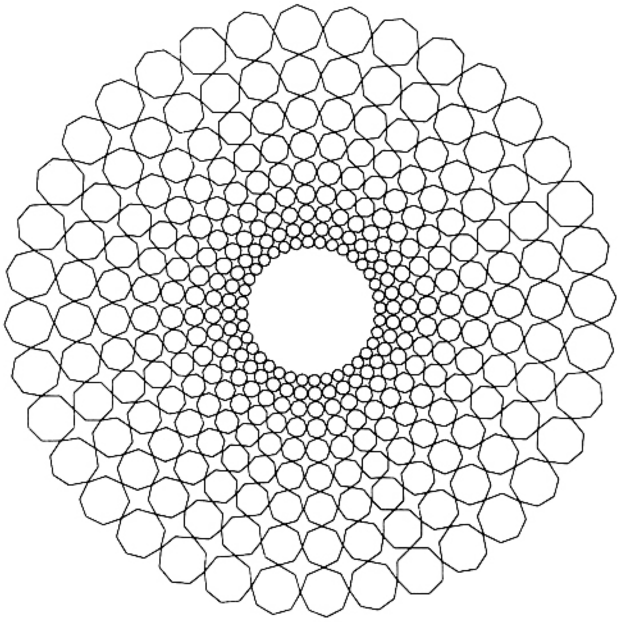
EXPANDING UNIVERSE
— Darel D. Eschbach, Jr.

Random numbers controlled the parameters of location, size of base, and ratio of height to base. Drawn on an IBM 1620-1627 system.



HOT ROD
— A. M. France

A basic shape was repeated while dimensions, angle, points of origin, etc. were altered by small, interrelated increments. Programmed in FORTRAN on an ICL 1905 computer; drawn on a CalComp 563 plotter.

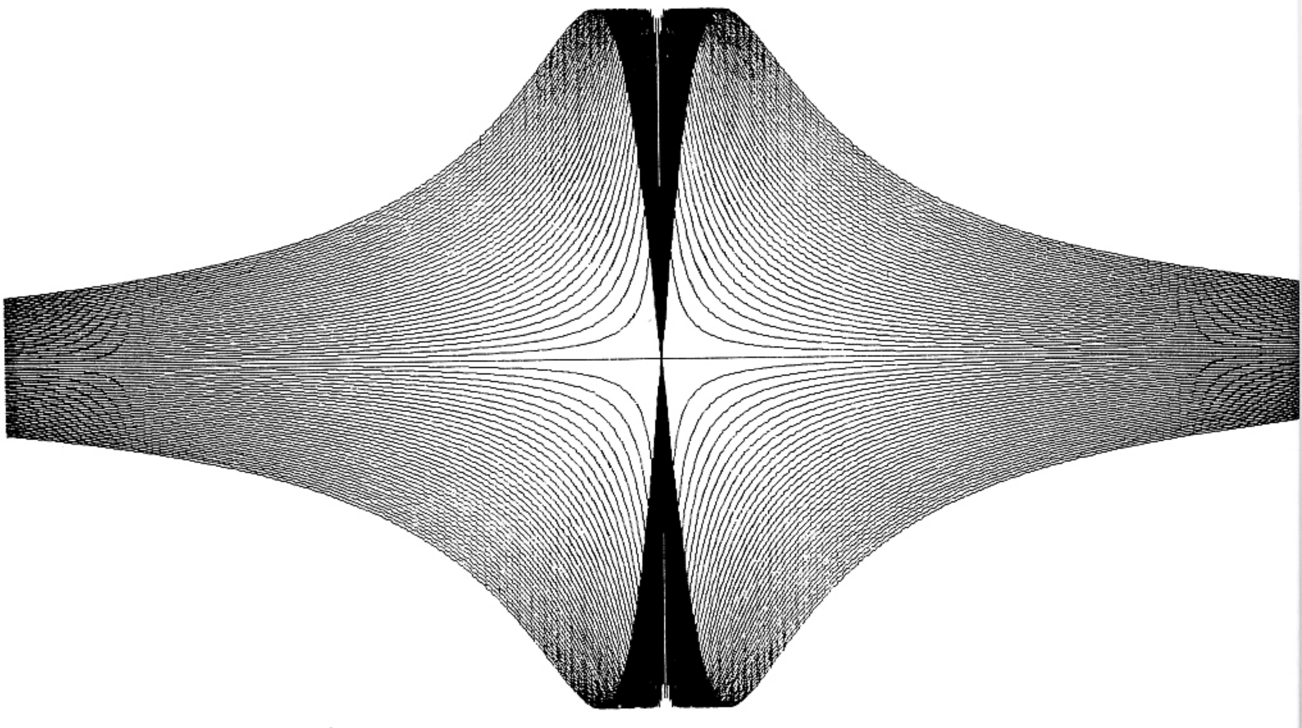


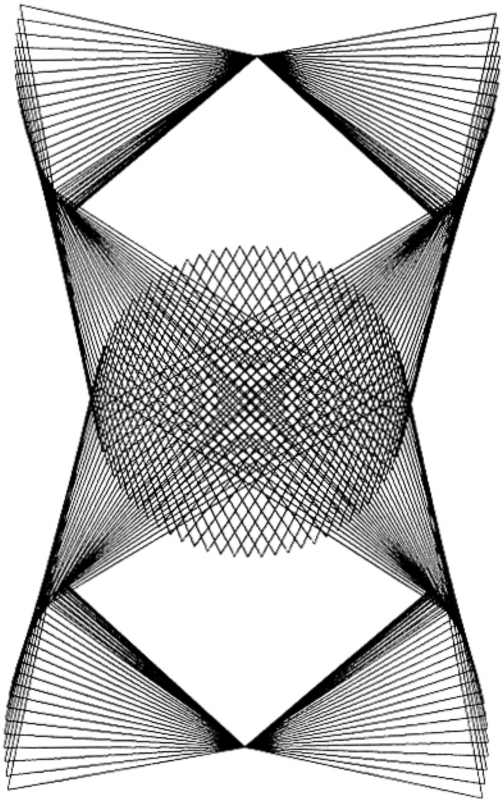
OCTAGONAL WELL
— Donald Robbins

A study of three-dimensional effects without use of the three-dimensional transformation. Programmed on a Univac 1108 computer; drawn on a Stromberg Datagraphics S-C 4020 plotter.

IMPACT
— J. A. Elenbaas

A series of serpentine curves programmed on an IBM 1130 computer and drawn on a CalComp 565 plotter.





LADY

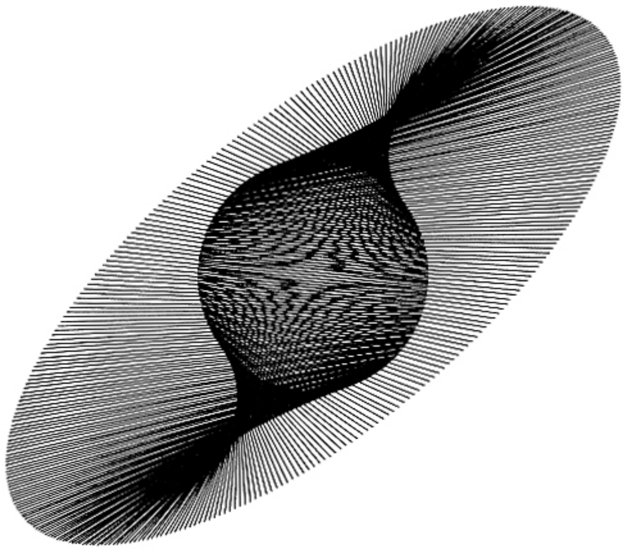
— John Cope and Ronnie Shiver

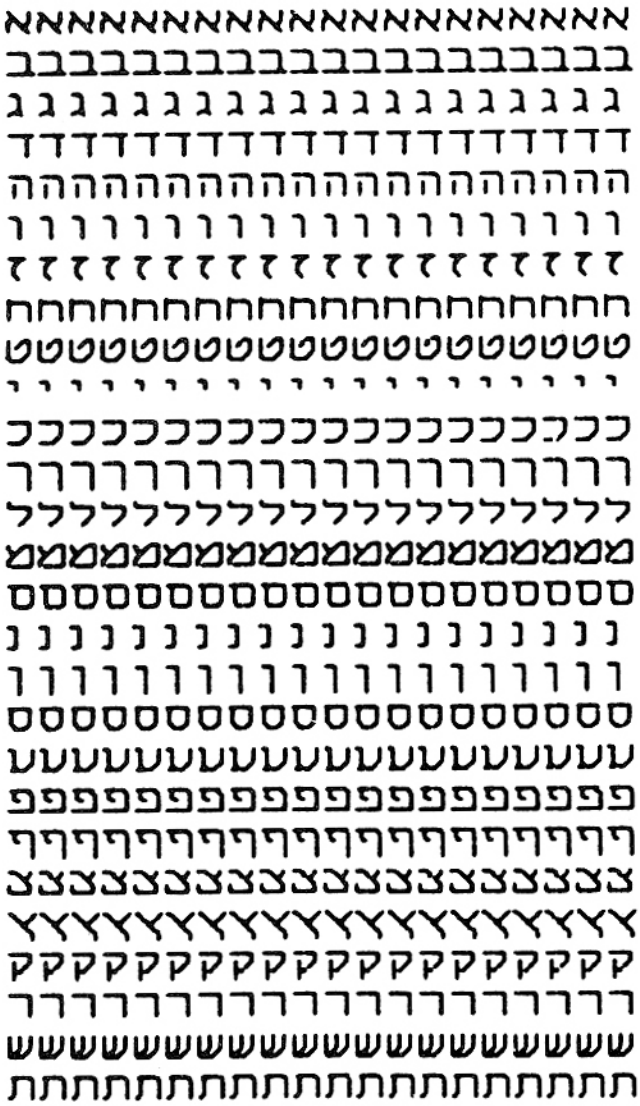
This is the motion of a four-bar mechanism that is propelled by its shortest side and then rotated in all four quadrants. Produced by an IBM 360/50 computer on a CalComp 663 plotter.

DISTORTED CIRCLE

— James Daly, S. J.

The figure consists of 360 straight lines connecting points from an inner circle to an outer circle, both circles having been distorted. Programmed in FORTRAN 4 and compiled and run on a CDC 3300 computer. Drawn on a CalComp 563 plotter.





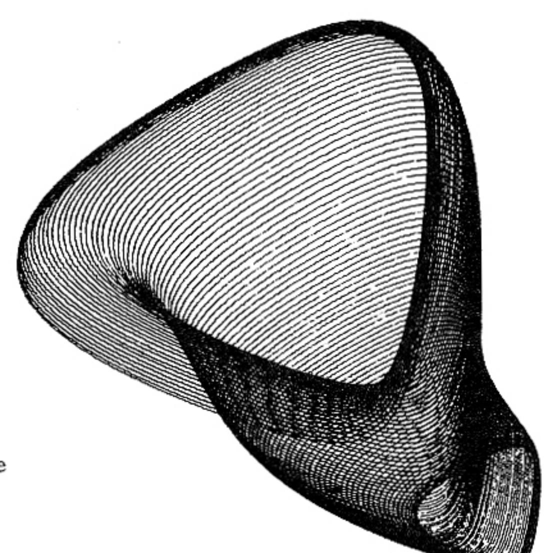
Copyright 1969 by CalComp

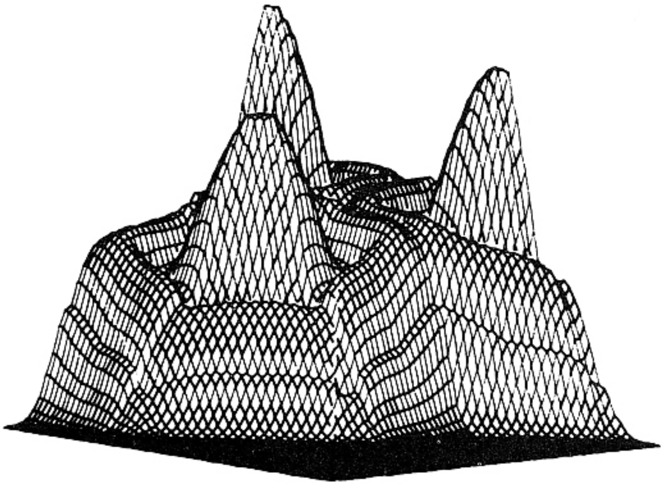
HEBREW ALPHABET
— Harold Minuskin and Bill Scott

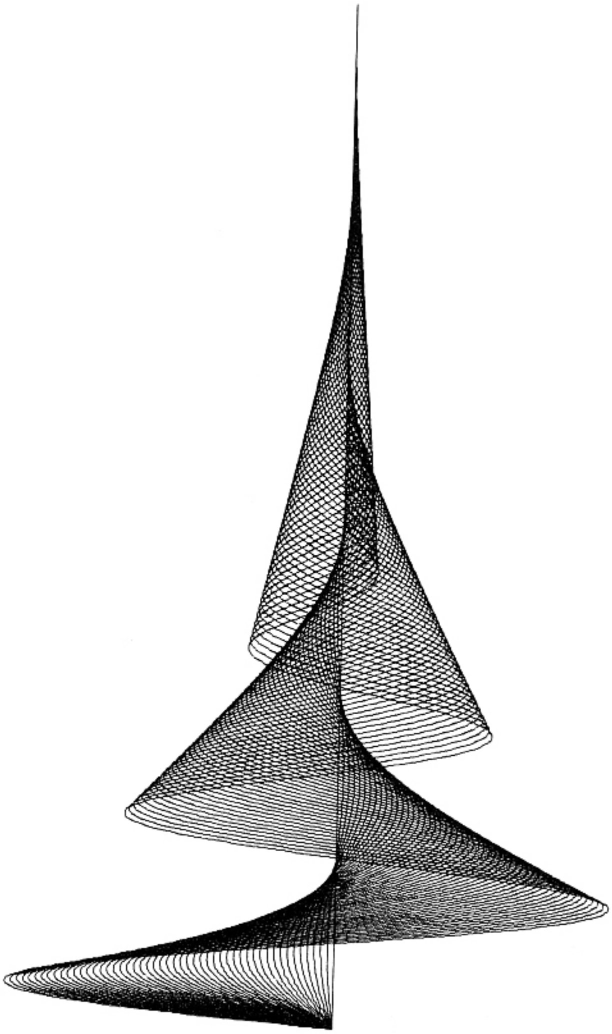
The Hebrew alphabet was generated and recorded on the CalComp Model CRT Microfilm Digital Graphics System. The program was written in DAP. Each character was generated using a ten by twelve matrix.

MOLLUSK
— William A. Carpenter

The drawing is composed of 101 figures of the form: exponential of sine of T versus the exponential of the cosine of T. Each successive figure is smaller than the last, and the centers of the individual figures fall on the curve given by: exponential of the sine of T versus the sine of T times the exponential of the cosine of T. Programmed in ALGOL on a Burroughs 5500 computer, and drawn with a CalComp 570 plotter.

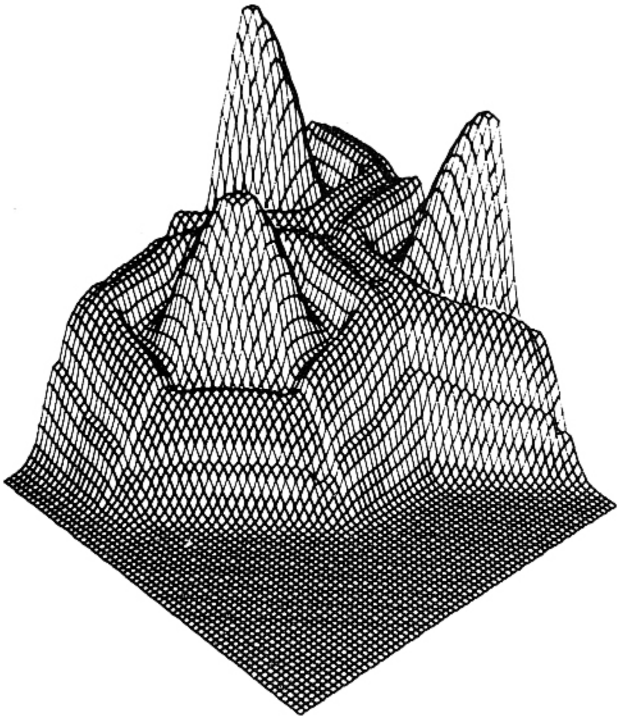






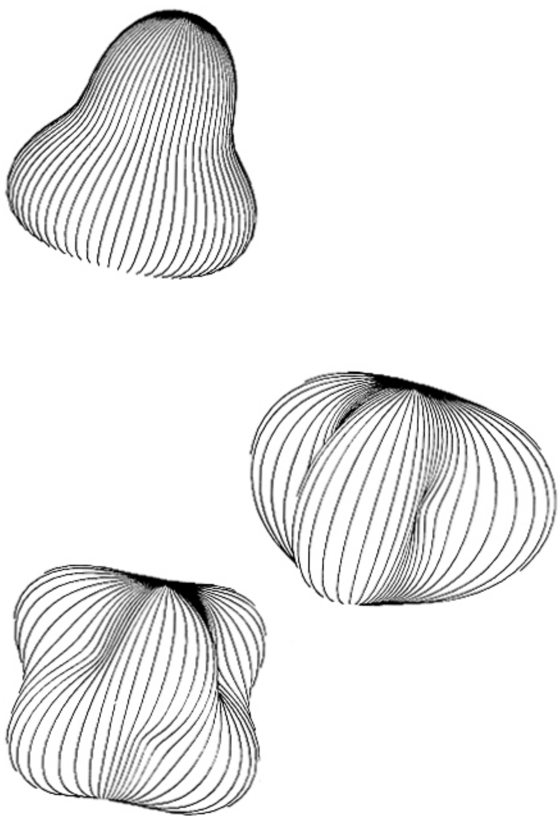
ERUPTION
— David J. DiLeonardo

Perspective views of data arrays, produced with a CDC Model 280 Microfilm Recorder and a CDC-6600 computer.



CHRISTMAS 2001
— J. A. Elenbaas

A series of damped sine curves, programmed on an IBM 1130 computer and drawn on a CalComp 565 plotter.



LEVITATION
— Sidney Robertson

Each figure is an oblique projection of a spherical harmonic with the hidden lines removed. The upper left harmonic is the so-called "pear-shaped" zonal. The lower left figure is a 4th degree tesseral and the rightmost figure is a 3rd degree sectorial. Produced with a CalComp 564 plotter and a CDC 3600 computer.

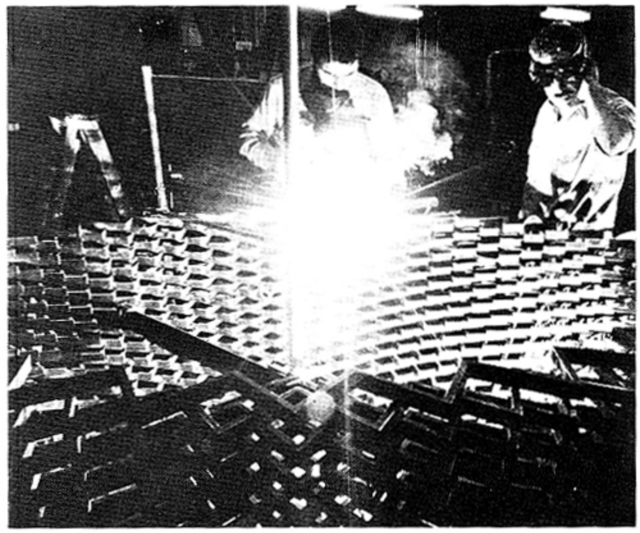
COMPUTER ARTISTS IN THIS ISSUE

The following is a list of persons whose art is published in this issue as part of the Seventh Annual Computer Art Contest of Computers and Automation.

Carpenter, William A., 10-6 Copeley Hill, Charlottesville, Va. 22903
Caulkins, David, Los Angeles, Calif.
Childs, Tom, c/o Adage, Inc., 1079 Commonwealth Ave., Boston, Mass. 02215
Cope, John, Computer Center, Auburn Univ., Auburn, Ala. 36830
Daly, James, S. J., St. Louis University, James Henry Yalem Scientific Computer Center, 3690 W. Pine Blvd., St. Louis, Mo. 63108
Davis, Michael, 3004 Dana St., Berkeley, Calif. 94705
Derby, Steve, 607 W. Kilbuck, Tecumseh, Mich. 49286
DiLeonardo, David J., Westinghouse Electric Corp., Bettis Atomic Power Lab., Box 79, West Mifflin, Pa. 15122
Elenbaas, J. A., 1394 Rumbaugh Lane, Midland, Mich. 48640
Eschbach, Darel D. Jr., University of Toledo, Toledo, Ohio 43606
France, A. M., International Computers Ltd., Bridge House, Putney Bridge, London, SW6, England
Hendricks, Mrs. Leigh, Sandia Corp., Advanced Techniques Div., P. O. Box 5800, Albuquerque, N. M. 87115
Kawano, Hiroshi, 3-16-1-15, Aoto, Katsushika-ku, Tokyo, Japan
Lecci, Auro, Centro Ricerche Estetiche F Uno, via Pagnini 31, 50134 Firenze, Florence, Italy
Lipscomb, James S., 26 Woodfall Rd., Belmont, Mass. 02178
Maloney, William S., S. J., Jesuit Faculty Residence, 221 N. Grand Blvd., St. Louis, Mo. 63103
Meyfarth, George H. III, Tufts University Computation Center, Medford, Mass. 02155
Meyfarth, Philip F., 322 Harvard St., Cambridge, Mass. 02139
Milojevic, Petar, c/o Control Supervisor, Information Science Ind. Ltd., 1755 Woodward Dr., Ottawa 5, Ontario, Canada
Minuskin, Harold, CalComp, 305 N. Muller St., Anaheim, Calif. 92803
Nolle, Hendrikus J., 22068 Tuscany, E. Detroit, Mich. 48021
Pass, E. M., Rich Electronic Computer Center, 225 North Ave. N. W., Atlanta, Ga. 30332
Robbins, Donald, Sandia Corp., Albuquerque, N. M. 87115
Robertson, Sidney, 8241, Adenlee Ave., Fairfax, Va. 22030
Rodriguez, Emilio D., 22068 Tuscany, E. Detroit, Mich. 48021
Salecker, Anton G., State of New York, Dept. of Transportation, 1220 Washington Ave., State Campus, Albany, N. Y. 12226
Scott, Bill, CalComp, 305 N. Muller St., Anaheim, Calif. 92803
Shriver, Ronnie, Computer Center, Auburn Univ., Auburn, Ala. 36830
Strand, Kerry, CalComp, 305 N. Muller St., Anaheim, Calif. 92803

COMPUTER-AIDED SCULPTURE

Roger Ives, Vice Pres.
Brown-Wales Co.
165 Rindge Ave. Extension
Cambridge, Mass. 02140



Final assembly of the multi-faceted metal sculpture was carried out under the direction of the artist, Alfred Duca (right), and an assistant in the plant of Ramsay Welding Research, Cambridge, Mass.

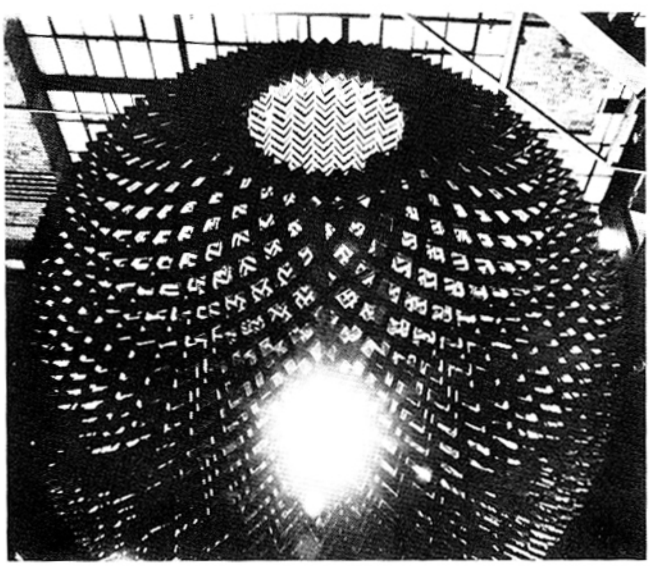
The spheroid sculpture in what will soon be a new postoffice building in Boston's Government Center is there because the computer made it a reality. It was designed by Alfred Duca, a sculptor and artist; it was created by a numerically-controlled flame cutting machine.

Mr. Duca was commissioned by the building's architects to design a sculpture to adorn the entrance to the new building. He conceived the idea of a massive steel structure made of Cor-ten steel, a product with built-in controlled rusting, which, within a year, would turn the spheroid a permanent deep red color. The shape would be like a many-sided jewel—and could be considered symbolic of that part of Boston which half a century ago was a melting pot for immigrant scholars and tradesmen alike.

The final design for the spheroid put its diameter at seven feet; there were eighty layers of one-inch thick steel, each layer punctuated by 32 points cut in a circular saw-tooth pattern. Because of the complexity of the design, Mr. Duca became convinced that the sculpture required the aid of a computer to attain its proper three-dimensional form.

Andrew Wales, President of Brown-Wales, a steel distributing company in Cambridge, Mass., developed and wrote a computer program for the cutting of the steel. It allowed for a maximum accumulated error per segment of 3.5 thousandths of an inch. The analyzed design then became a roll of punched paper tape.

It took four torches of a flame cutting machine, controlled by the punched paper tape, four days to bite through the steel plate. Then Mr. Duca and an assistant donned protective masks and spent the next two months welding the 2,460 points of the spheroid to each other—stretching, forming, and checking to make certain of each point's contribution to the total design balance.



The interplay of light and shadows gives Alfred Duca's computer-aided steel spheroid the desired jewel-like qualities the artist strove to convey by this work of art.

From its assembling point, the spheroid was transported to its permanent environment, where it was placed on a three-foot pole set into an open circle of a concrete rectangle.

Mr. Duca was asked if he would use the computer again in his work. His comments follow:

> Of course! In fact, I'm working on a new design right now—it will be 40 feet tall and require a half acre site. It should be made clear that a computer cannot be *forced* to be part of a design—it must be ascertained to be *necessary* to its success. Three years ago, I did a sculpture for the Castle Square Housing Project in Boston's South End—I thought I needed computer participation, but when the design problem was analyzed, it was found that the computer would provide no time or accuracy benefits over planning it manually. The computer was not necessary for that project's success.
>
> To me, the Brown-Wales computer and the numerically controlled cutting machine were tools, employed to solve the production technicalities of *my* design. The other approach to design by computer—the sophisticated, dehumanized version in which the computer itself originates the design parameters—does not interest me for my work. In the case of the spheroid, the computer was the only way to carry it out; I appreciate its help, but I don't want a 'made by computer' label on any of my sculpture.
>
> Will the public accept computer art? The layman will accept *any* kind of process. Do you know who were the most astonished over the computer's part in the fabrication? The tradesmen! . . . the carpenters and electricians and the construction people who were working on the new buildings . . . those who understood the physical problems of handling steel.
>
> There are other applications to design by computer, tying in the areas of art, engineering, and architecture . . . everything from bridge and building design to gear design. It is a new window on the world, if designers will only look out. They must retrain themselves, and they must also be kept aware that the computer's limitations are dependent solely on the frame that *they*—people—put up. □