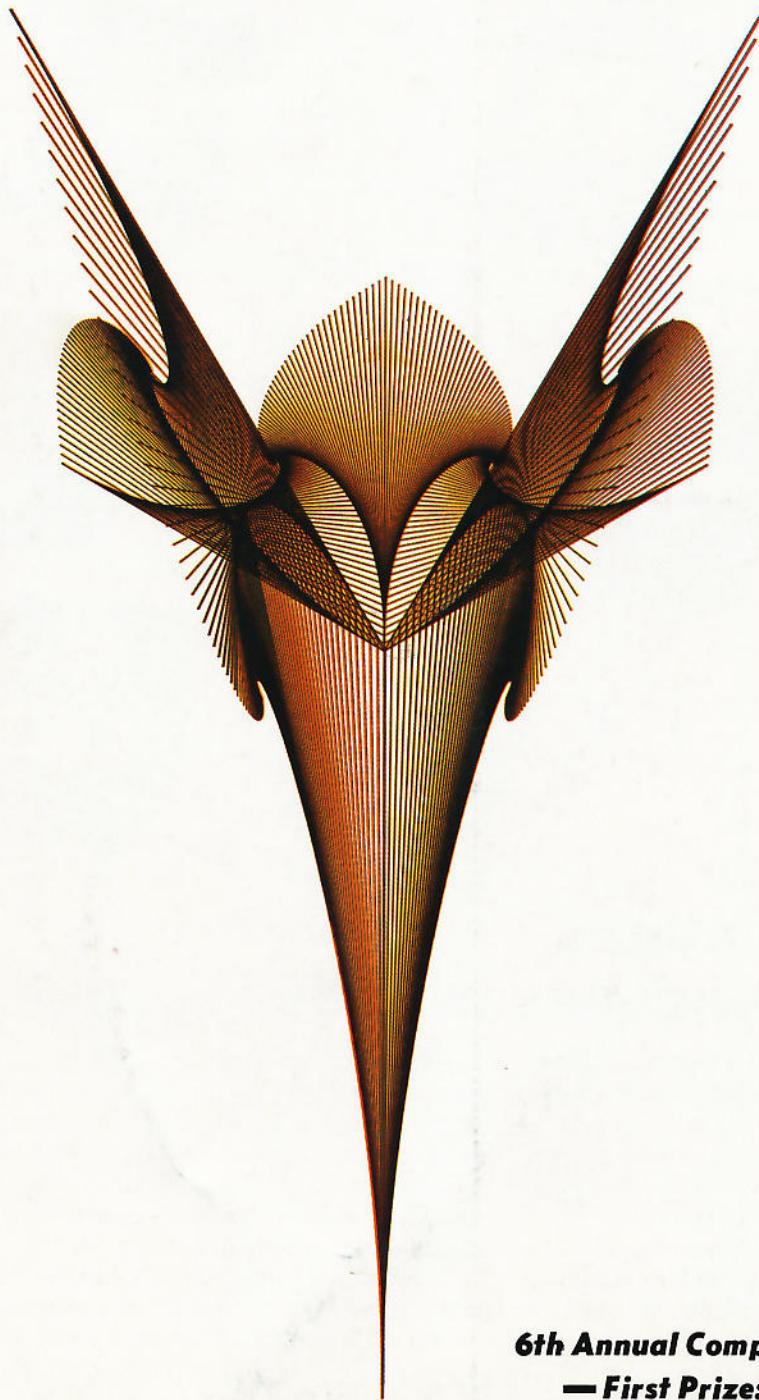


August, 1968

computers and automation



**6th Annual Computer Art Contest
— First Prize: "Hummingbird"**

computers and automation

August, 1968, Vol. 17, No. 8

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

Special Feature: Sixth Annual Computer Art Contest

8	Hummingbird	Kerry Strand and Gary Craigmire
9	The Fisherman	Kerry Strand
10	Labyrinth in Motion	Petar Milojevic
11	Spires of Contribution	Lloyd Sumner
12	Inspirilation	A. M. France
13	Tower of Babel	Leslei Mezei and David Payne
14	Idealized Brush Strokes	Dr. Evan Harris Walker
15	Plexus	Kerry Strand, Larry Jenkins and Gary Craigmire
16	Star Kennedy	Masao Komura and Haruki Tsuchiya
17	Monroe in the Net	Haruki Tsuchiya
18	Return to Square	Masao Komura and Kunio Yamanaka
19	Abraham Lincoln	Michael H. Craven
20	Christmas Wreath — Computer Style	Maughan S. Mason
21	Whirlpool	Mrs. Leigh Hendricks
22	Peek-a-Boo Circles	Petar Milojevic
23	Tragedy of Seven	Haruki Tsuchiya
24	Ring Motif	Petar Milojevic
25	Cybernumerics	H. Philip Peterson
26	The Sun Bather	Paul H. Sobel
27	March of Polygons	Haruki Tsuchiya
28	Sliced Nuclear Reactor	D. J. DiLeonardo
29	The Orbit Tree	Lloyd Sumner
30	Concentric Circles	Lawrence Nolan
31	Output Vs. Input	Bob Schultz
32	Lindy Star	L. David Anderson
33	Deformation of Sharaku	Haruki Tsuchiya, Koji Fujino and Kamoto Ohtake
34	Op Art Computerized	Donald Robbins
35	Upheaval Collection	Masao Komura and Kunio Yamanaka

34 COMMUNICATIONS DATA PROCESSING OR TIME-SHARING?

by Lester A. Probst

Some strong arguments why the requirements of most on-line commercial (and military) computer applications can best be satisfied with a communications data processing system rather than a time-shared system.

38 GAME PLAYING WITH COMPUTERS

by Donald D. Spencer

How a digital computer plays games, and why game playing with computers is so popular . . . and some examples of blackjack and chess played by a human being and a computer.

44 MACHINE TRANSLATION IN REVIEW

by Harry H. Josselson

A review of the progress that has been made toward: (1) compiling automatic dictionaries and developing efficient storage and retrieval of language data and translation rules; (2) encoding the grammar of words; (3) writing word order rules for sentence analysis; and (4) developing procedures for analyzing and codifying the meaning of words.

Regular Features

Editorial

6 How to Spoil One's Mind — as Well as One's Computer, by Edmund C. Berkeley

C&A Worldwide

48 Report from Great Britain, by Ted Schoeters

Fifteen Years Ago in "Computers and Automation"

50 Computers in the Factory (Part 2), by David W. Brown

Ideas: Spotlight

32 Although Computers Can Do Only What They Are Told To Do, It Is Not Possible Practically To Foresee All Of The Consequences, by Richard W. Hamming

Multi-Access Forum

28 Special Interest Committee for Social Science Computing of the Association for Computing Machinery is Proposed, by George Sadowsky

28 Congress Has Not Really Entered the Computer Age — and Should, by Congressman William S. Moorhead

29 National Academy of Sciences Establishes a "Computer Science and Engineering Board"

30 Verification of Computer Directory Information, by I. J. Kusel and the Editor

31 Is the Computer an Artist's Paintbrush?, by Daniel T. Langdale

31 Computers — A New Public Utility

31 Japanese Computer Industry is Growing Rapidly

32 4th Australian Computer Conference, Adelaide, South Australia, August 1969 — Call for Papers Contributions Welcome to "Who's Who in the Computer Field"



The front cover shows the entry which won first prize in the Sixth Annual Computer Art Contest of Computers and Automation — "Hummingbird", by Kerry Strand and Gary Craigmire. A description of this picture, and other entries in the contest, are in the computer art section of this issue beginning on page 8.

Departments

52 Across the Editor's Desk — Computing and Data Processing Newsletter

70 Advertising Index

70 Book Reviews and Notices

49 Calendar of Coming Events

4 Letters to the Editor

66 Monthly Computer Census

64 New Contracts

65 New Installations

69 New Patents

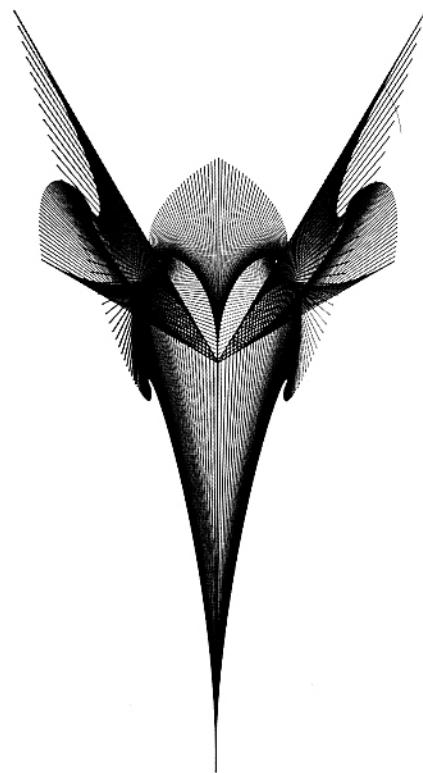
by Raymond R. Skolnick

51 Problem Corner

by Walter Penney, CDP

THE SIXTH ANNUAL COMPUTER ART CONTEST OF COMPUTERS AND AUTOMATION

HUMMINGBIRD
— Kerry Strand
Gary Craigmire



The first prize in our 1968 Computer Art Contest has been awarded to Kerry Strand and Gary Craigmire, both of California Computer Products, Inc., Anaheim, Calif. Their winning entry appears in color on the front of this issue, and is entitled "Hummingbird". It was designed and programmed by Mr. Strand; the color coordination and plotting techniques were executed by Mr. Craigmire.

The artists describe their work as follows:

The "Hummingbird" is an extension of the "three bug problem". The basic design produced by the "three bug problem" is modified by drawing only two sides of the triangle. This pattern is then mathematically manipulated into the desired position. Three different line widths, each with a different color, were plotted overlaying each other.

Mr. Strand and Mr. Craigmire submitted several more entries in the contest which are shown on the following pages.

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 5. We would, of course, like to identify the equipment that produced the art. Sup-

plementary information of this kind should be sent to us for publication in a future issue.

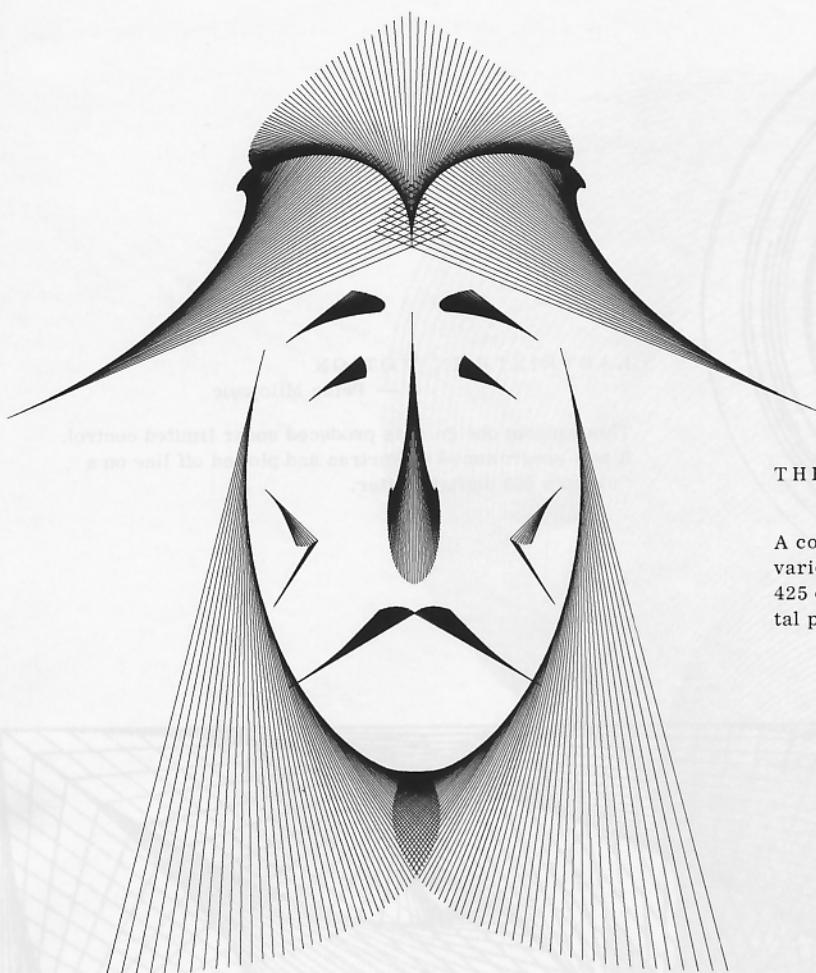
The responses to our Sixth Annual Computer Art Contest have been splendid. We are grateful to all those persons who sent us entries.

It is interesting to note the development in the computer art that we receive from year to year. As with computer technology itself, computer art is becoming more sophisticated, more creative, and more visually appealing. We now find a widespread use of color. We notice artists and professors, as well as technicians, working with the computer to learn more about design, color, and artistic techniques. We find groups being established to explore their mutual interests in computer art. One notable group is the Computer Technique Group (CTG) in Tokyo, Japan, which consists of eight individuals whose professions vary from architectural design to behavioral science to systems engineering.

For August 1969, we plan our Seventh 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 27.

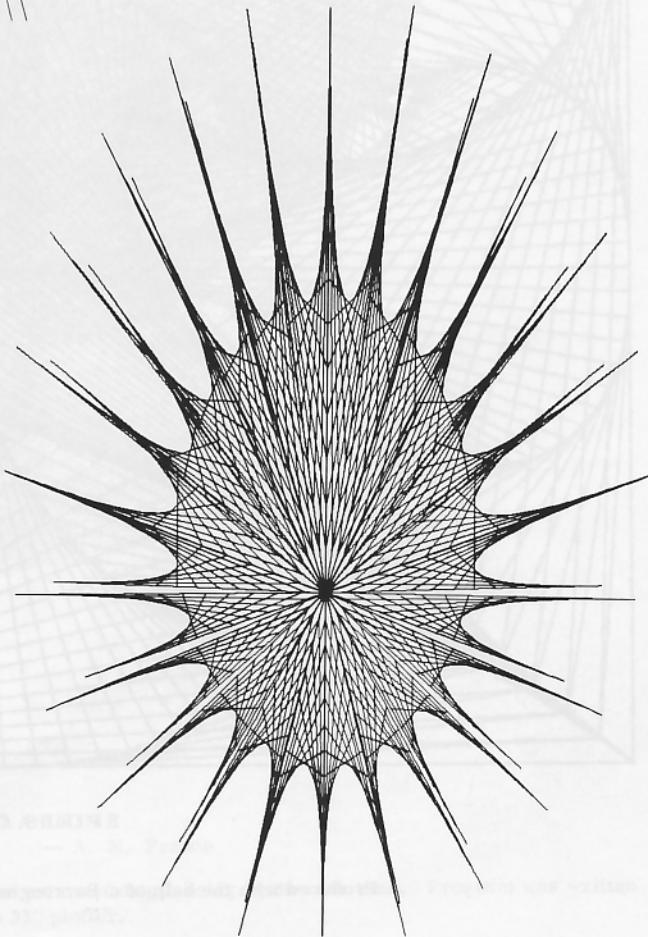
Sharry Langdale
Associate Editor



THE FISHERMAN

— Kerry Strand

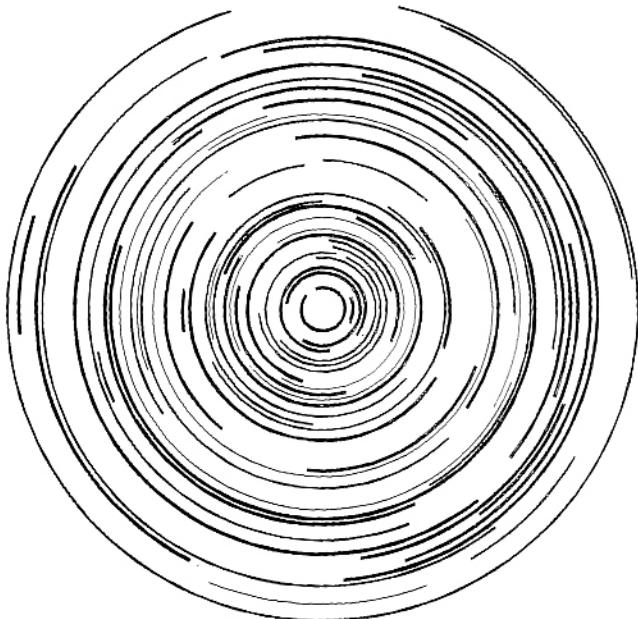
A composite of one basic design repeated in various positions and shapes. Done on a GE 425 computer and a CalComp 760/502 incremental plotter with a step size of 0.01 inches.



A SEA STAR

— Petar Milojevic

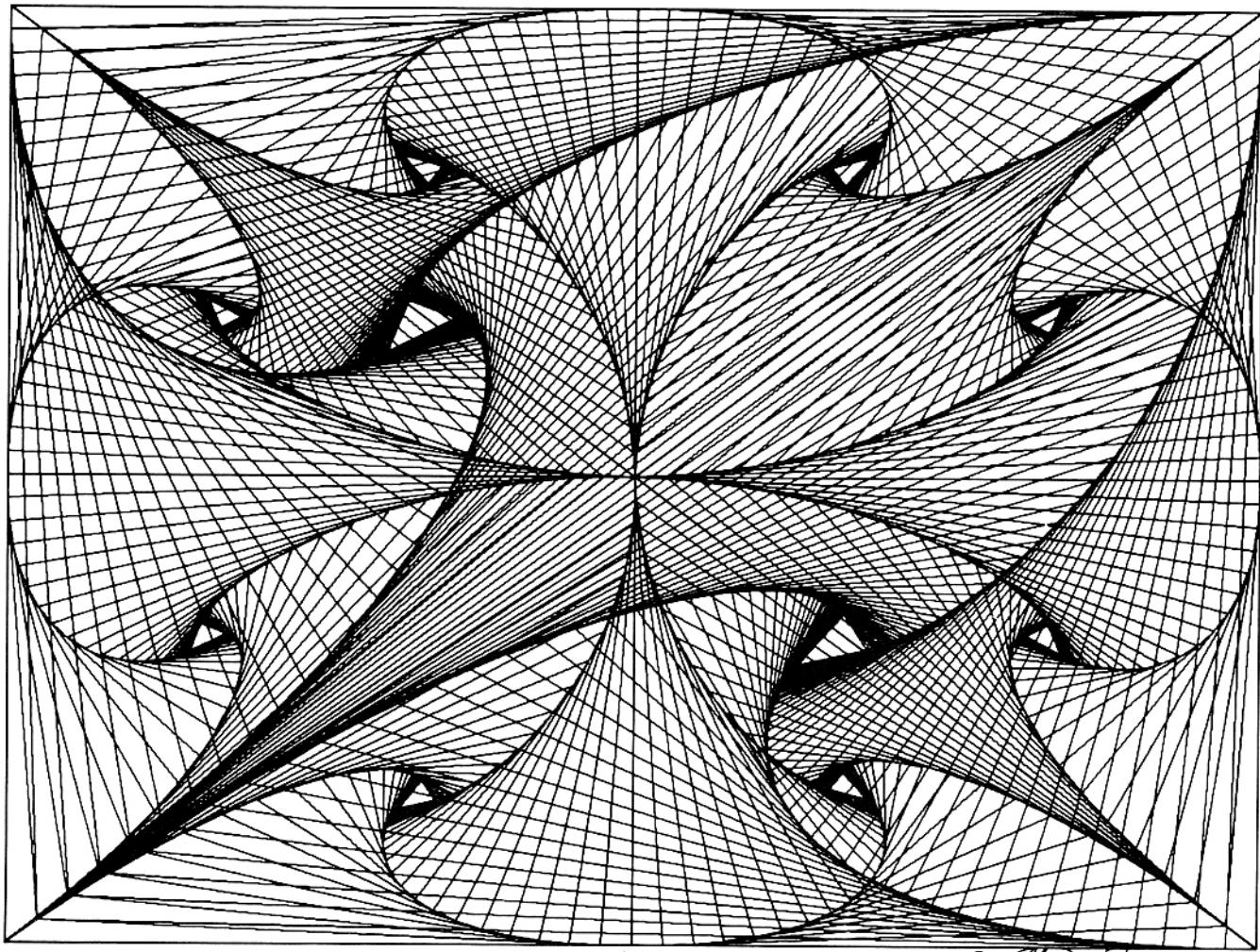
The three-point net technique is used to get a pleasing drawing through some elements for which computers are described as best performers. Programmed in Fortran, and plotted off line on a CalComp 565 digital plotter.



LABYRINTH IN MOTION

— Petar Milojevic

This random design was produced under limited control.
It was programmed in Fortran and plotted off line on a
CalComp 565 digital plotter.

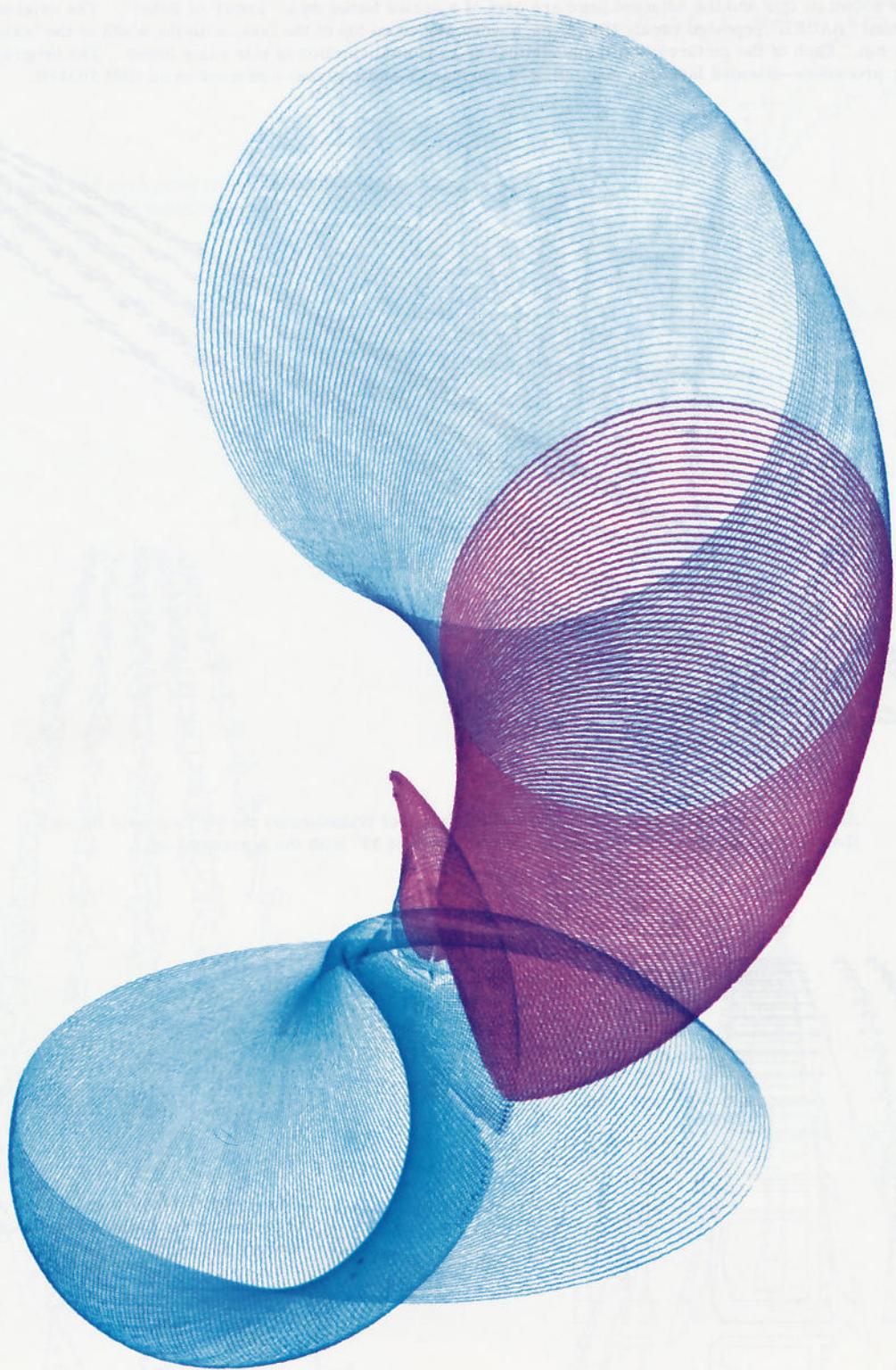


© Lloyd Sumner 1967

SPIRES OF CONTRIBUTION

— Lloyd Sumner

Produced with the help of a Burroughs B5500 computer and a CalComp 565 plotter.



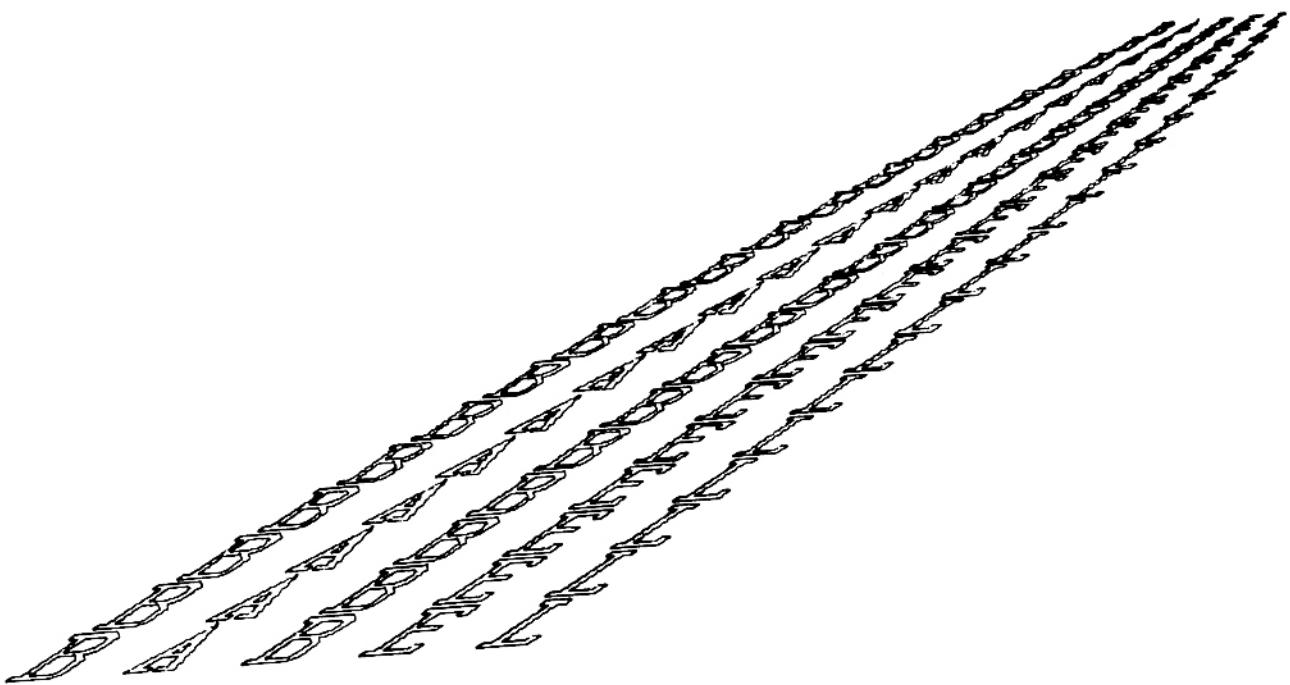
INSPIRATION
— A. M. France

Repeated ellipses were drawn, with small changes to axis lengths and points of origin being made each time. Program was written in Fortran and executed on an I.C.T. 1905 computer and a CalComp 31" plotter.

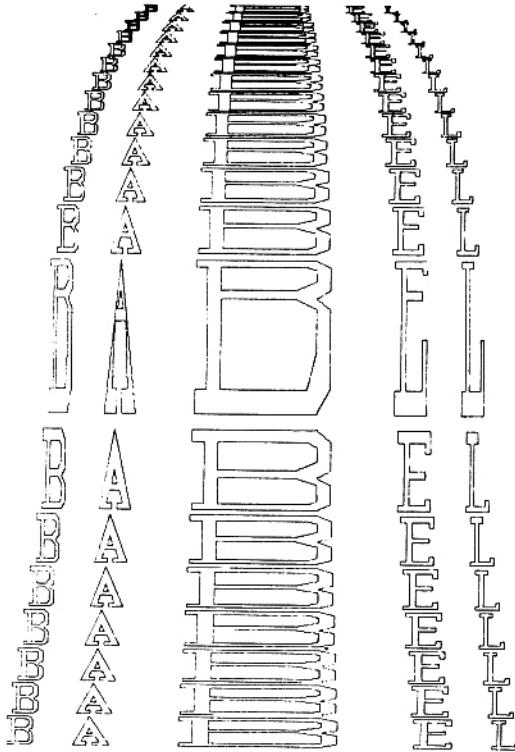
TOWER OF BABEL

— Leslei Mezei, Artist, and David Payne, Programmer

The five pictures shown on this and the adjacent page are part of a series based on a "Tower of Babel". The original tower was made up of the word "BABEL" repeated twenty times, each word placed on top of the last, with the width at the bottom being four times that at the top. Each of the pictures is a mathematical or random distortion of this same tower. The programming language Sparta (a graphic procedure-oriented language consisting of Fortran IV subroutines) was used on an IBM 7094-II.

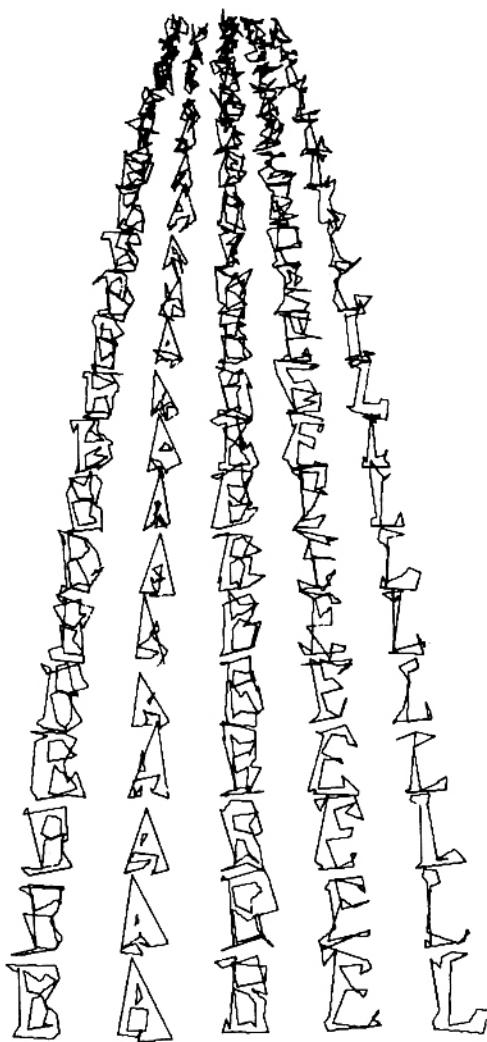
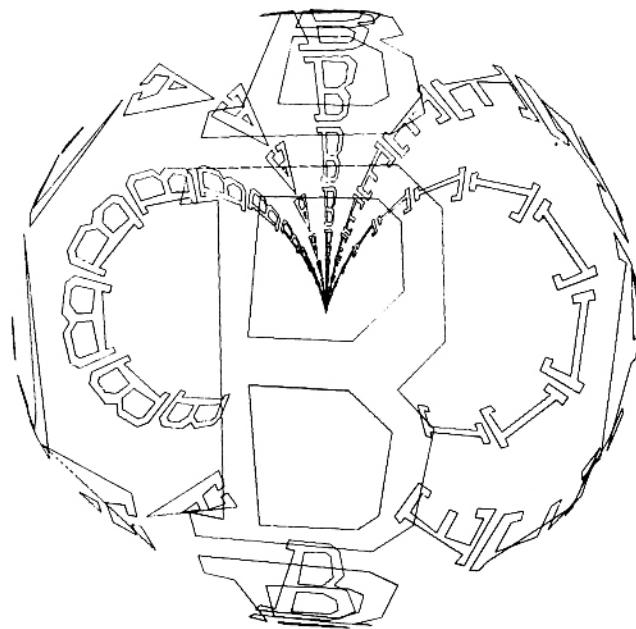


An oblique transformation was applied which in effect transformed the vertical axis through the center of the tower into a line making an angle of 30° with the horizontal axis.

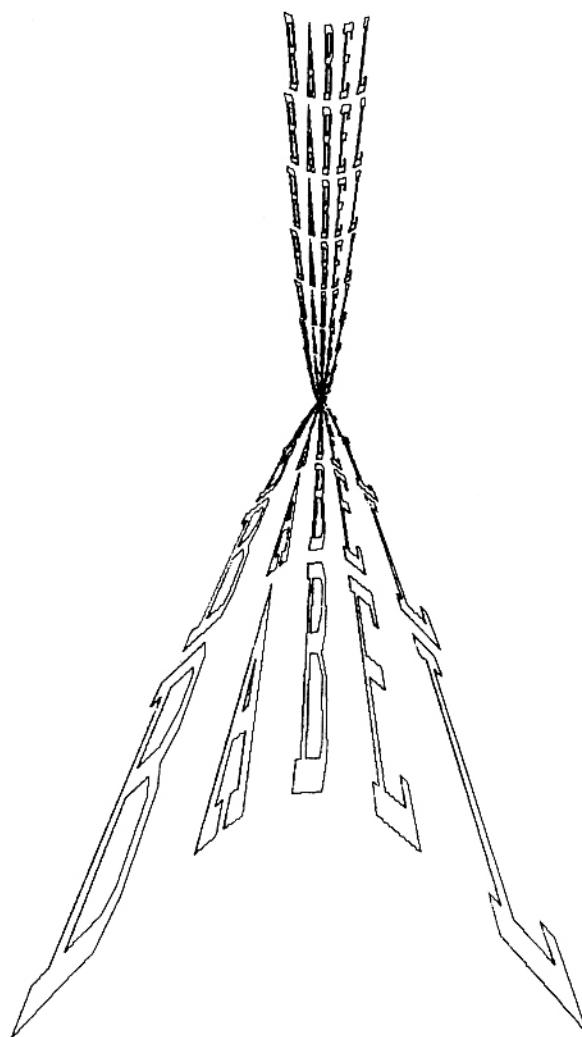


The x and y coordinates of each point (relative to the center of the tower) were replaced by \sqrt{x} and \sqrt{y} .

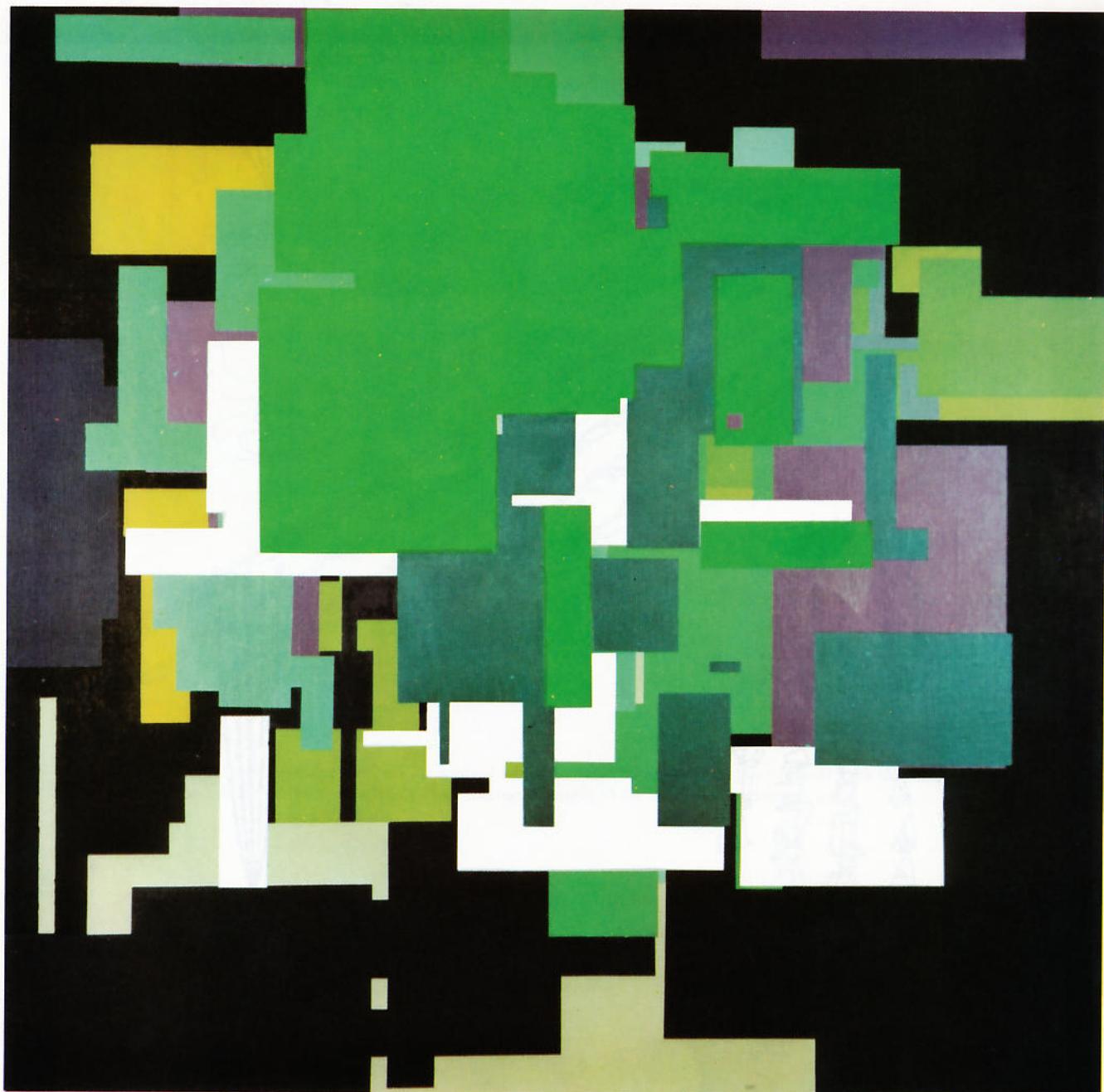
The distance r of each point from a point 1/5 of the way up the tower was replaced by re^{-r} .



Each point of the tower was displaced both horizontally and vertically by a random amount. The random displacement was obtained from a Gaussian distribution with a mean of zero and a standard deviation of 0.05. The maximum displacement allowed was 0.2 inches.



The distance r of each point from the center was replaced by re^r .



IDEALIZED BRUSH STROKES

— Dr. Evan Harris Walker

The idea behind this picture is that by studying mathematically the compositional elements employed by the great artists, one might discover artistic principles; and with the aid of a computer, these principles could be tested by using them to generate new examples of art. As a starting point, completely random arrangements of rectangles (idealized brush strokes) were examined. This picture makes use of several concepts that have been developed to produce organization in pattern and color.

The program was written in Fortran for an IBM 7040. The pattern of each sub-element is printed out to scale (using sixteen 9" square blocks of printout) together with the color designation in terms of the Munsell standard color notation. The printing is produced on canvas using acrylic paint.



PLEXUS

— Designed and programmed by Kerry Strand and Larry Jenkins
Color coordination and plotting techniques by Gary Craigmire

This is an example of the application of parametric equations. To generate the basic shape, T goes through one cycle of the cosine curve, from 0 to 2PI. The X-coordinate is then proportional to COS(5T) and the Y-coordinate is proportional to COS(11T). Three different line widths, each with a different color, were plotted overlaying each other.



STAR KENNEDY

— Designed by Masao Komura

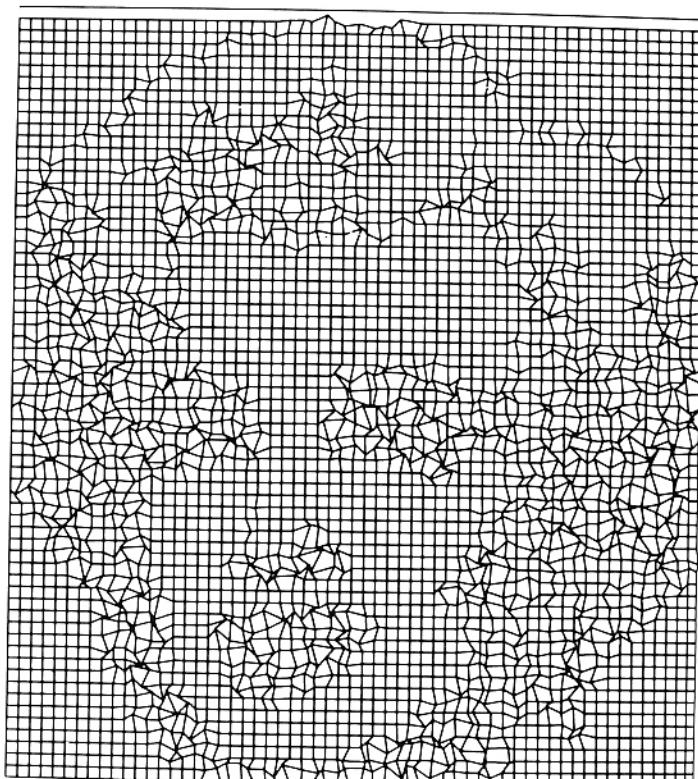
Programmed by Haruki Tsuchiya

A pattern deformation system was applied to a photograph of John F. Kennedy. Stars of random size were put on the point of data from the photo. An IBM 7090 computer and CalComp 563 plotter were used.

MONROE IN THE NET

— Haruki Tsuchiya

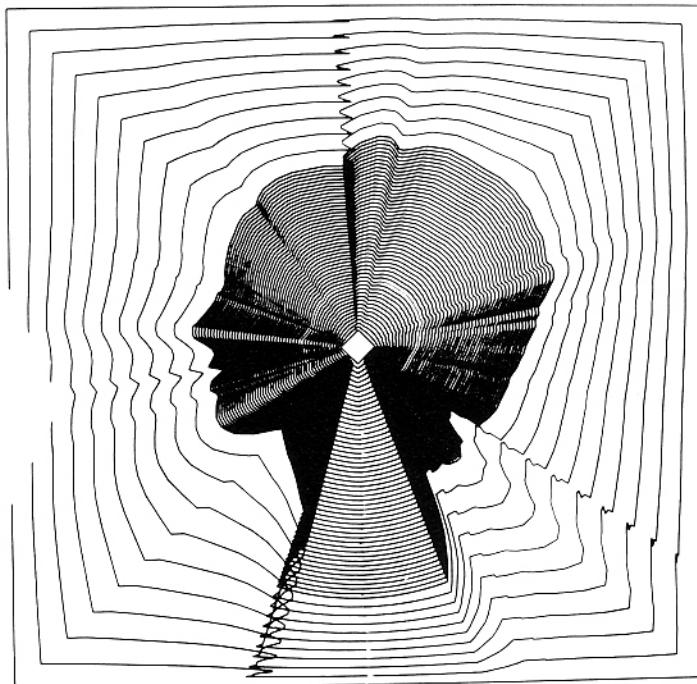
A pattern deformation system was applied to a photograph of James Monroe. The canvas was first set as a net ready for deformation. The data from the photo actuated each element of the net by random number. An IBM 7090 computer and CalComp 563 plotter were used.



RETURN TO SQUARE

— Designed by Masao Komura
Programmed by Kunio Yamanaka

This is a computer metamorphosis. A square is metamorphosed into a profile of a woman, and then returned to a square again. The profile is input data. The process of metamorphosis is visualized as a movement; and metamorphosis itself is presented as an object. An IBM 7090 computer and CalComp 563 plotter were used.



ABRAHAM LINCOLN

— Michael H. Craven

This picture was first digitized by hand, then programmed in 1200 APT statements. One subroutine calculated the tool motion to black in any rectangle when the four sides were defined. A second subroutine assisted in calculating the tool motion for the shadowing made up of .005" lines .02" apart. The picture was drawn directly onto mylar film using a beam of light of varying size.

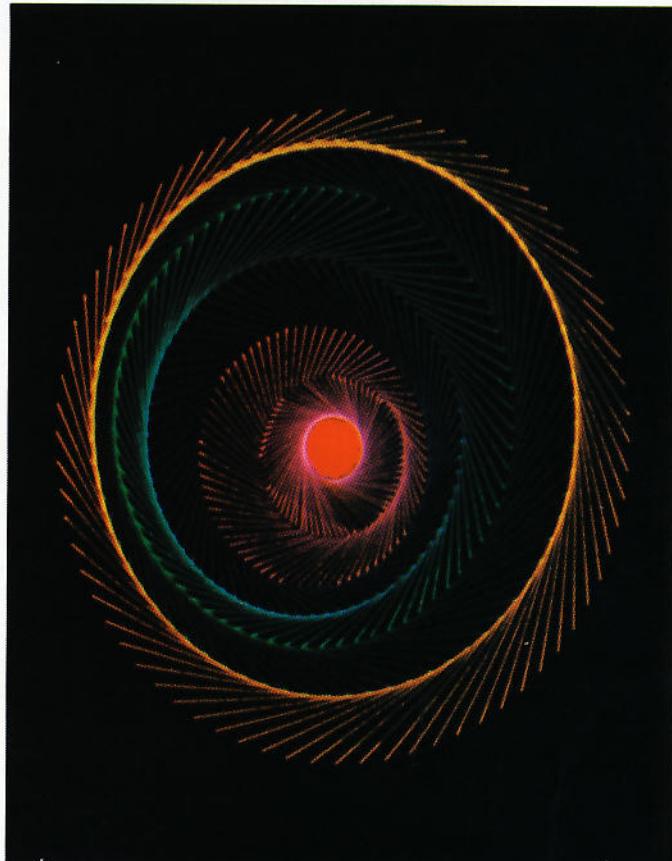


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CHRISTMAS WREATH — COMPUTER STYLE
— Maughan S. Mason

WHIRLPOOL
— (Mrs.) Leigh Hendricks

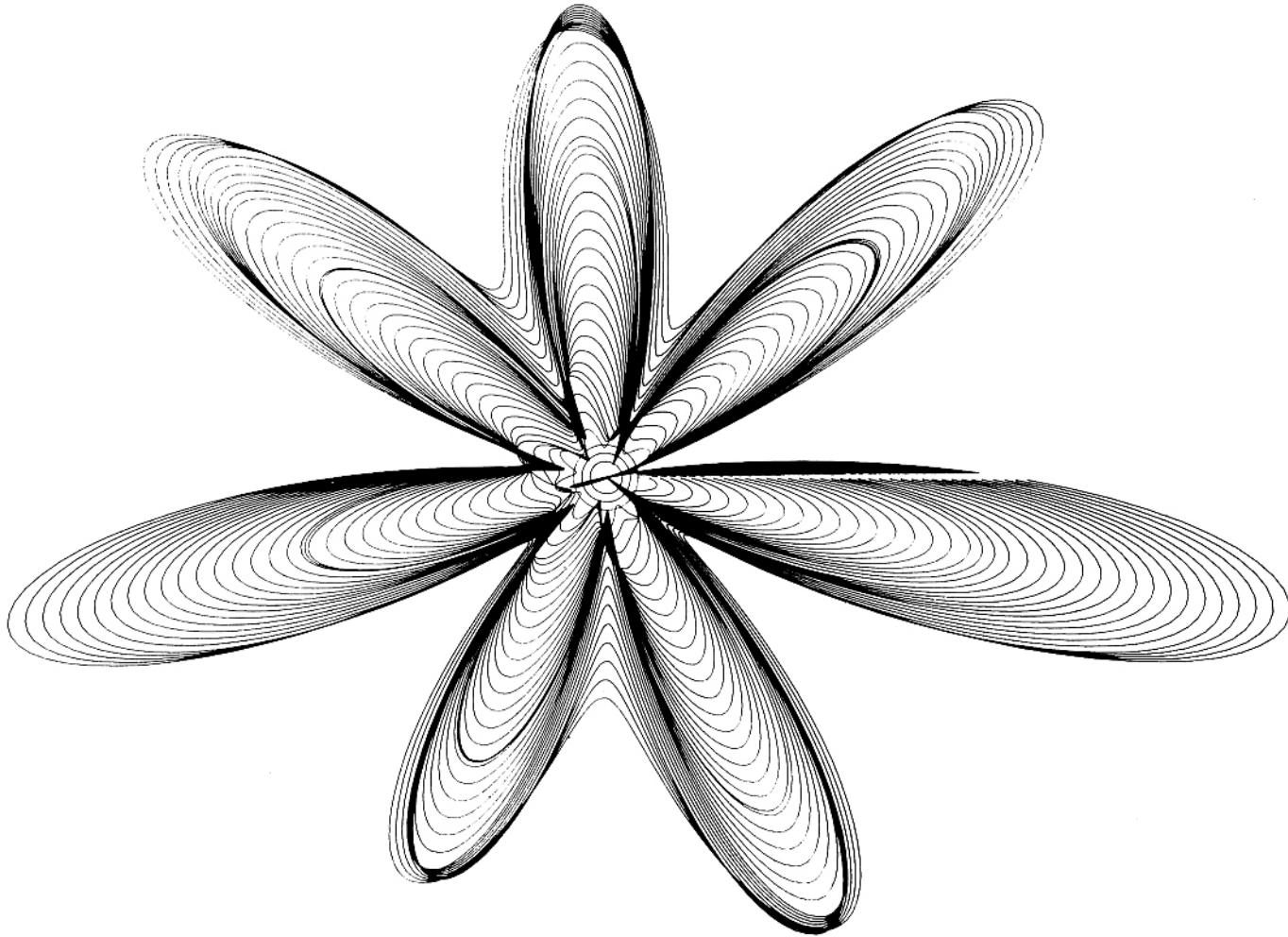
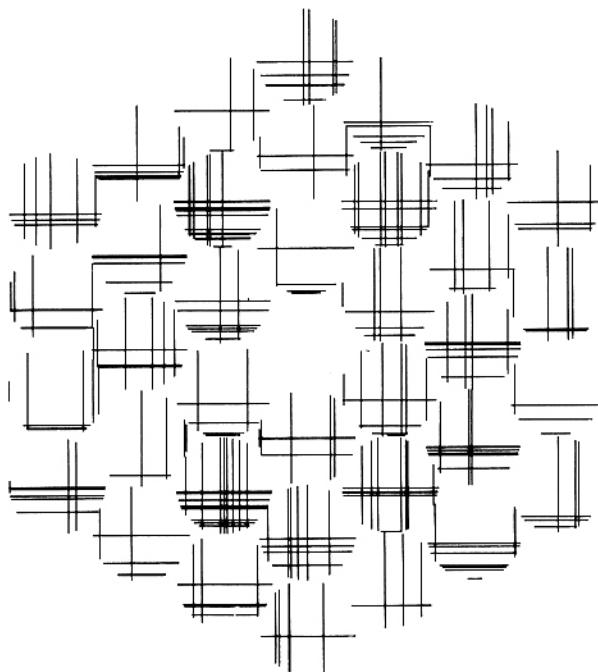
This design resulted from a programming bug in a polar equation using a Fortran program. Initially the coordinates were exposed on black and white film from a CRT (S-C 4020). For the picture shown here, a 35 mm slide was exposed directly on color film on an S-C 4020 which has been modified for color work.



PEEK-A-BOO CIRCLES

— Petar Milojevic

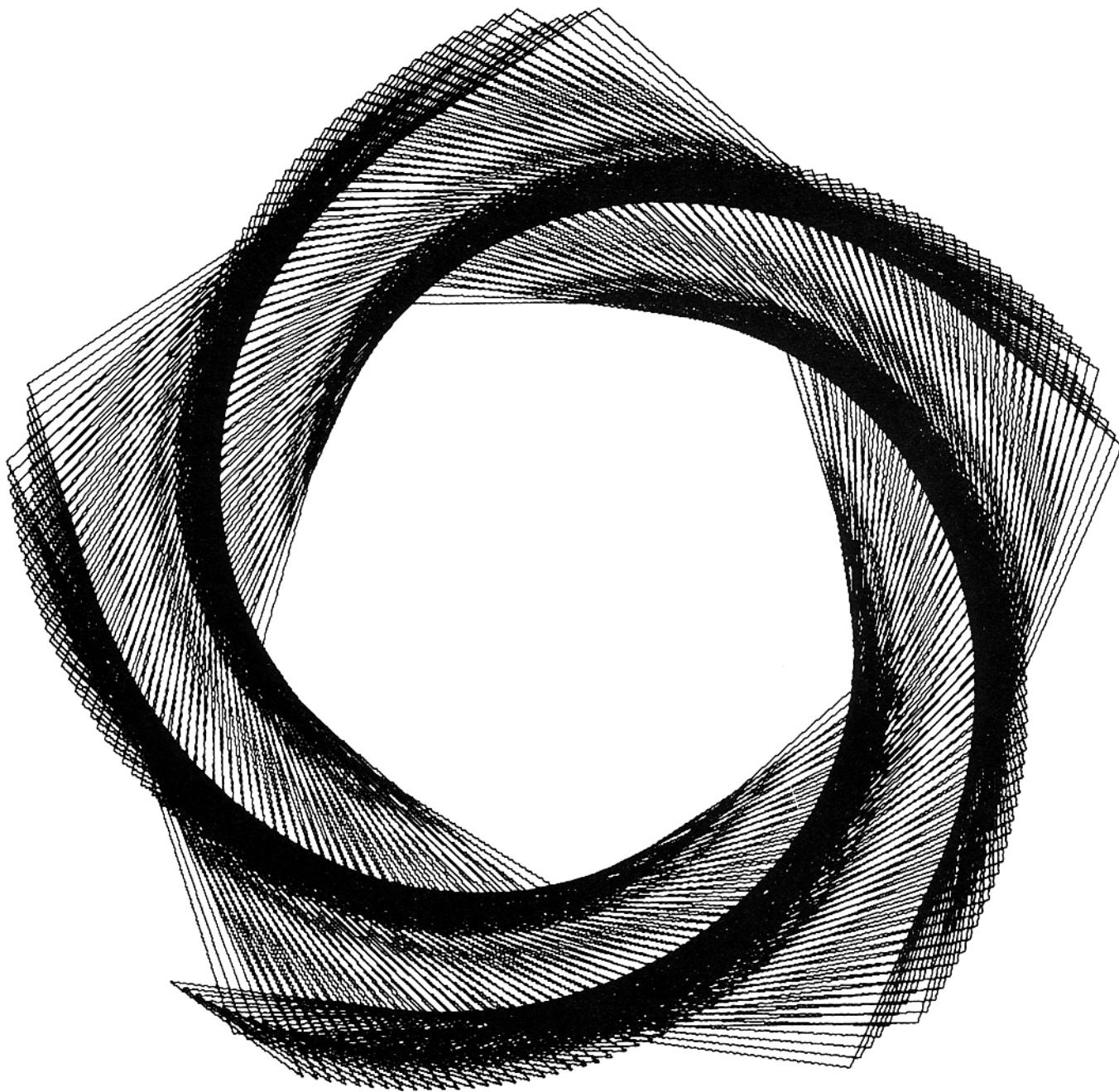
A drawing with random elements exhibiting visual illusions.
It was programmed in Fortran and plotted off line on a
CalComp 565 digital plotter.



TRAGEDY OF SEVEN

— Haruki Tsuchiya

This is a mathematical pattern including computer improvisation by random number. The computer program indicates only the rough process of the painting; in this case, to plot 50 closed curves which grow mainly in seven directions. Under this condition, the computer calls a random number and increases or decreases the radius of the closed curves by the value of the random number repeatedly. An IBM 7090 computer and CalComp 563 plotter were used.



RING MOTIF

— Petar Milojevic

This drawing is done without lifting the pen from the first to the last point. It was programmed in Fortran and plotted off line on a CalComp 565 digital plotter.

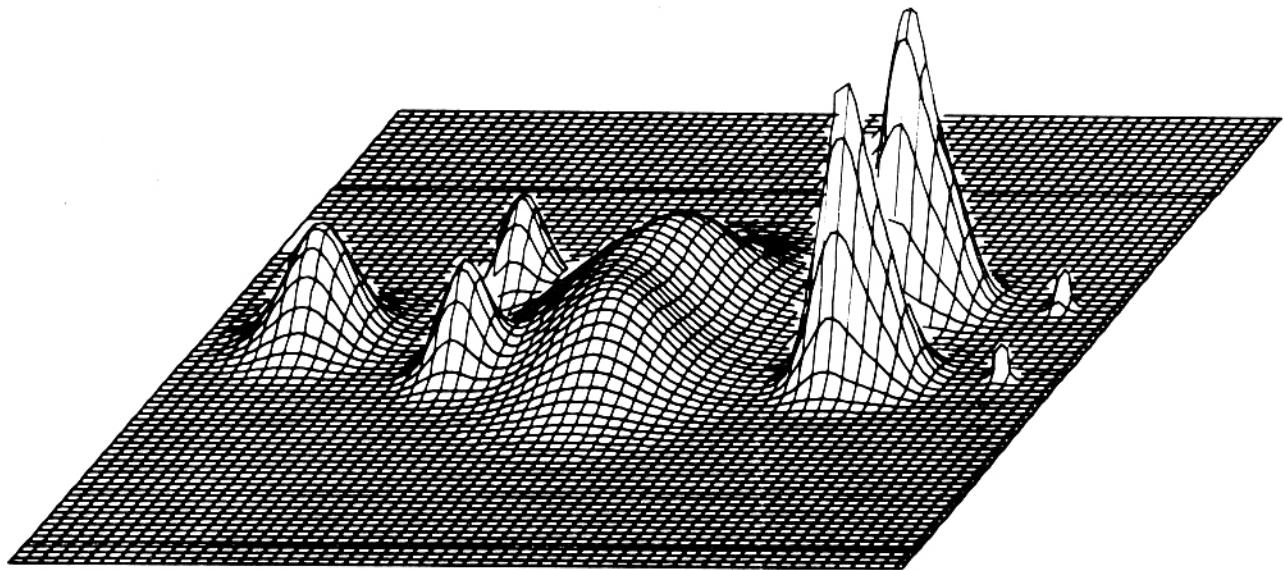
CYBERNUMERICS

— H. Philip Peterson

Preprocessing for this digigram of Prof. Norbert Wiener involves correcting the Gamma curve of the film to the "Gamma" of the shaded number set for plotting. A histogram of the scanned numbers (NS) is computed and the low (L) and high (H) ends of the distribution are detected. The number plotted (NP) is calculated in one version as follows: $NP(I, J) = (NS(I, J) * (99/H-L))$. The computer can easily simulate unnatural Gamma curves that no photographer's chemicals can implement.



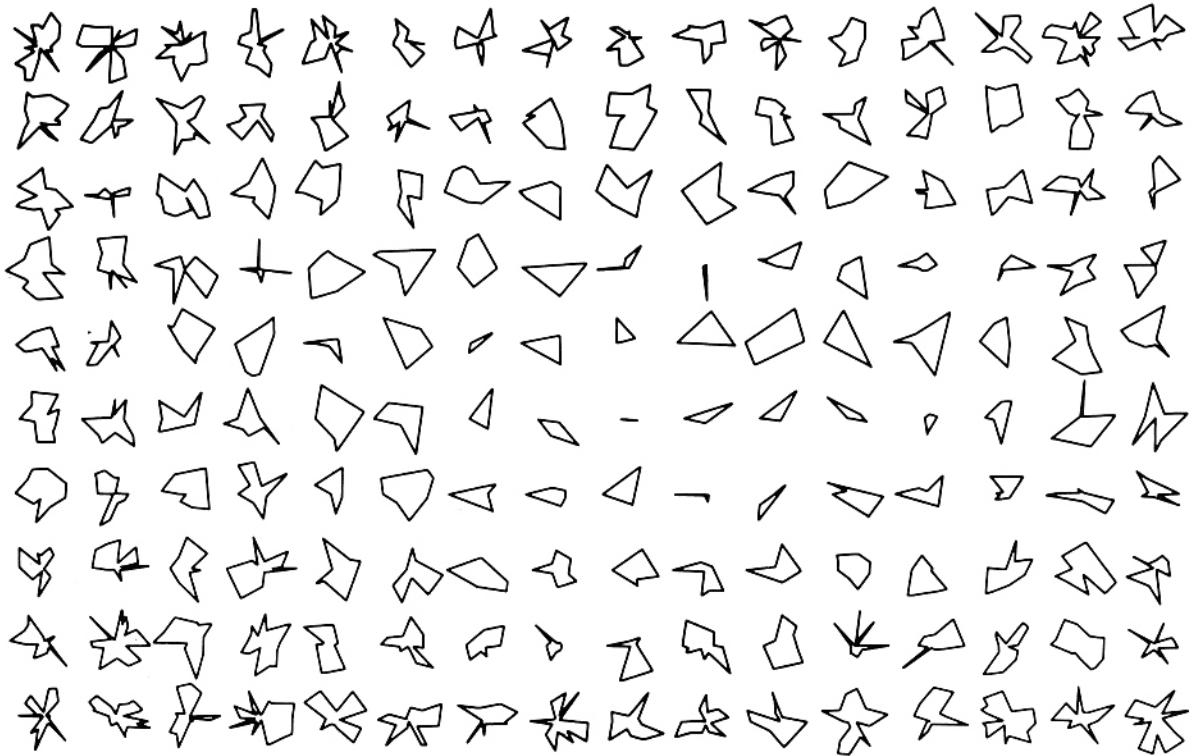




THE SUN BATHER

— Paul H. Sobel

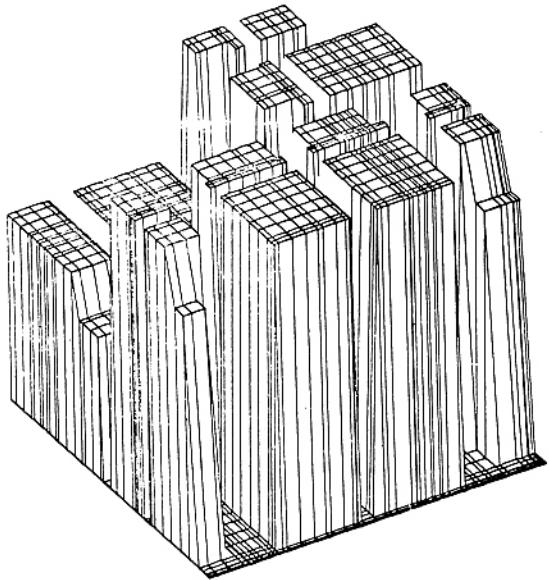
Using a Fortran program on an IBM 7094, a tape was generated for off-line use on an SC 4020, which made the plot. The plotting subroutine interpreted a matrix as the dependent height variable. An angle of 40 degrees was specified, and hidden lines were tested for and removed. The figure is generated by sums of Gaussian functions.



MARCH OF POLYGONS

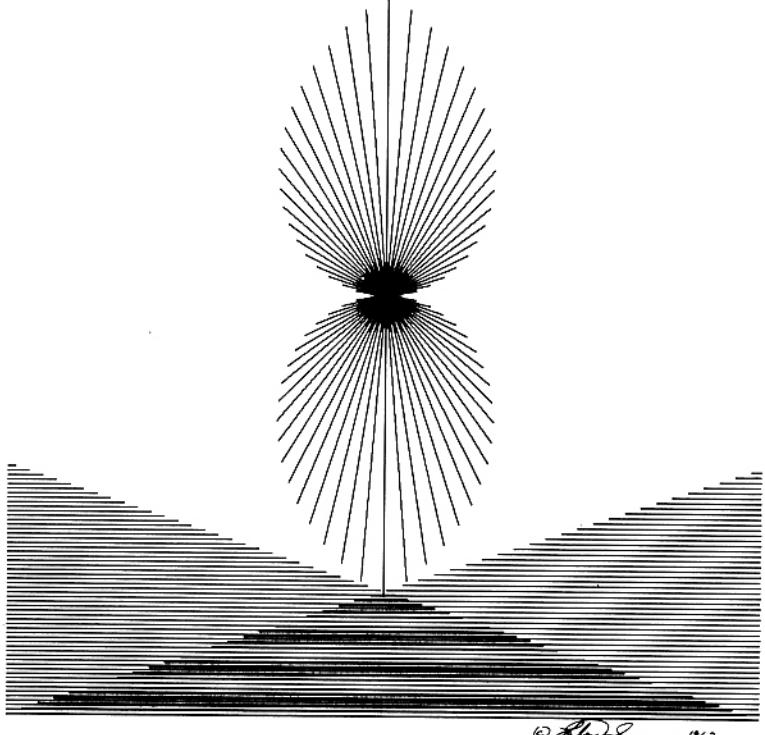
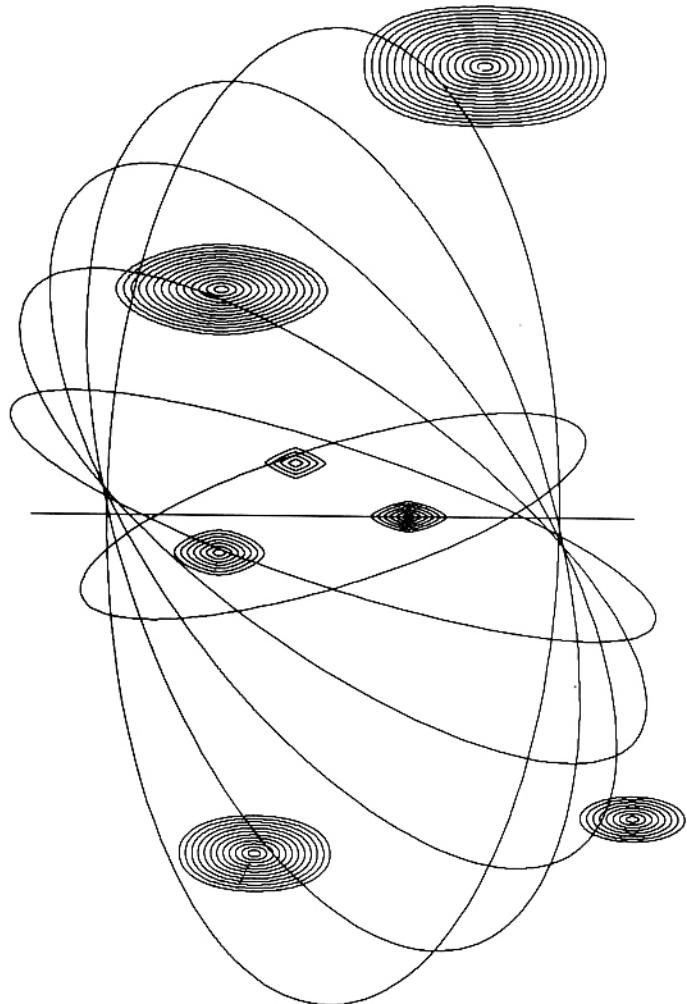
— Haruki Tsuchiya

This is a mathematical pattern which includes computer improvisation by random numbers. Each polygon is determined according to: (1) number of vertexes from the position; and (2) distribution of vertexes from the random number. An IBM 7090 computer and CalComp 563 plotter were used.



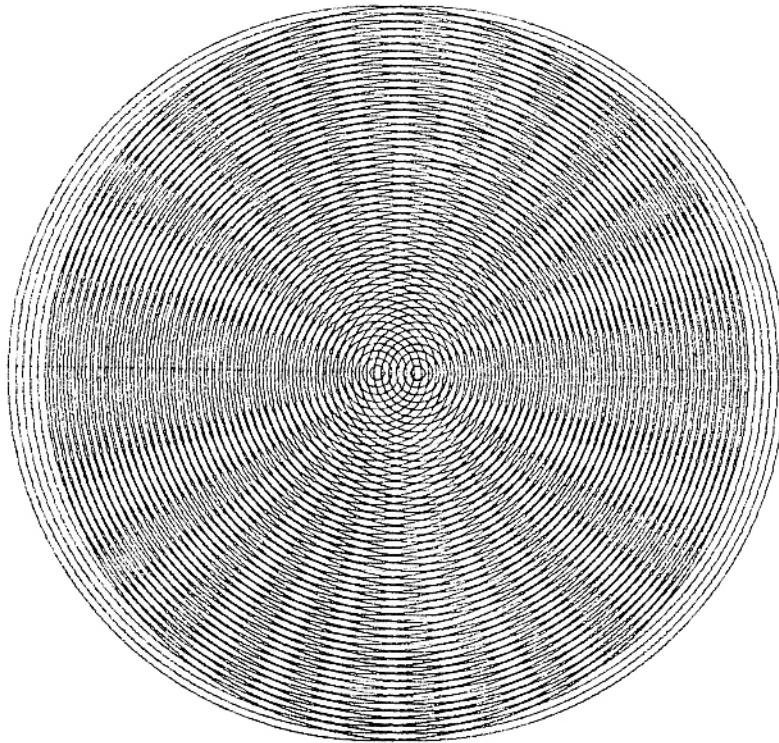
SLICED NUCLEAR REACTOR
— D. J. DiLeonardo

A perspective of the fuel material distribution in a slice through a nuclear reactor. Drawn on a CDC Model 280 Microfilm Recorder using contour and perspective routines run on a CDC-6600 computer.



THE ORBIT TREE
— Lloyd Sumner

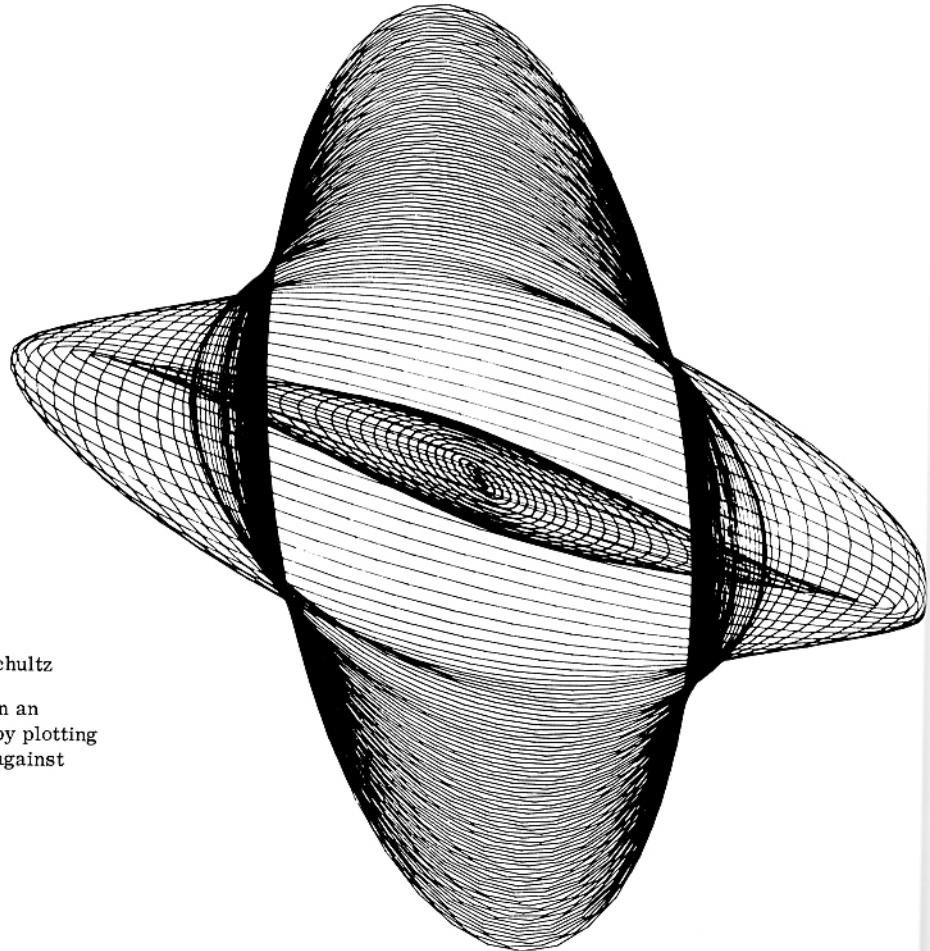
Produced with the help of a Burroughs B5500 computer and a CalComp 565 plotter.



CONCENTRIC CIRCLES

— Lawrence Nolan

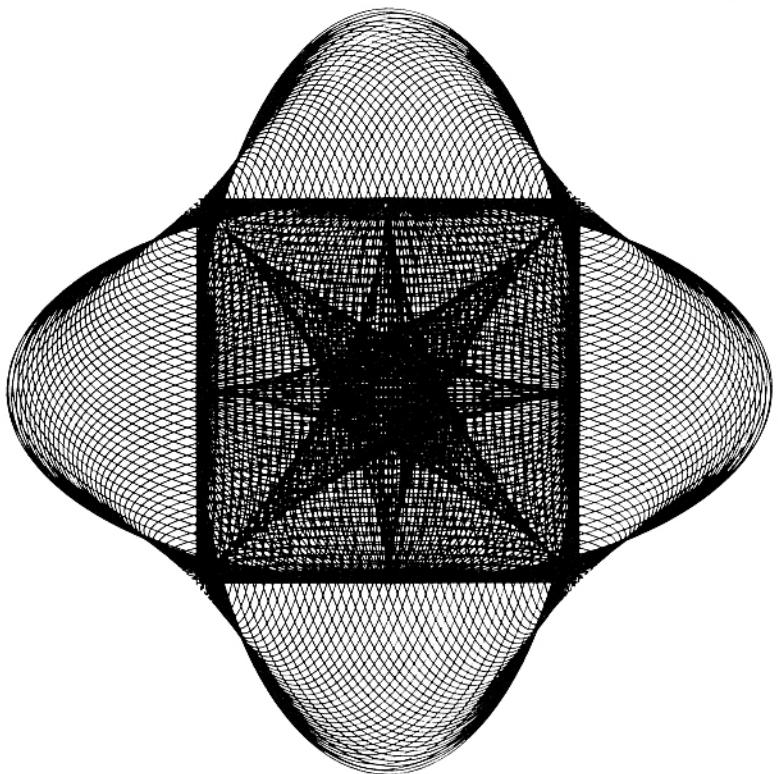
This plot shows two families of concentric circles, producing a moire¹ or nodal pattern, such as would be caused by two point wave sources in a ripple tank. The plot was produced by a Fortran IV program using an IBM 360/50 computer and a CalComp 750 off-line magnetic tape unit with a CalComp 566 plotter.



OUTPUT VS. INPUT

— Bob Schultz

This design was generated on an IBM 360/50 and an SC 4020 by plotting the output of a digital filter against its input.



LINDY STAR

— L. David Anderson

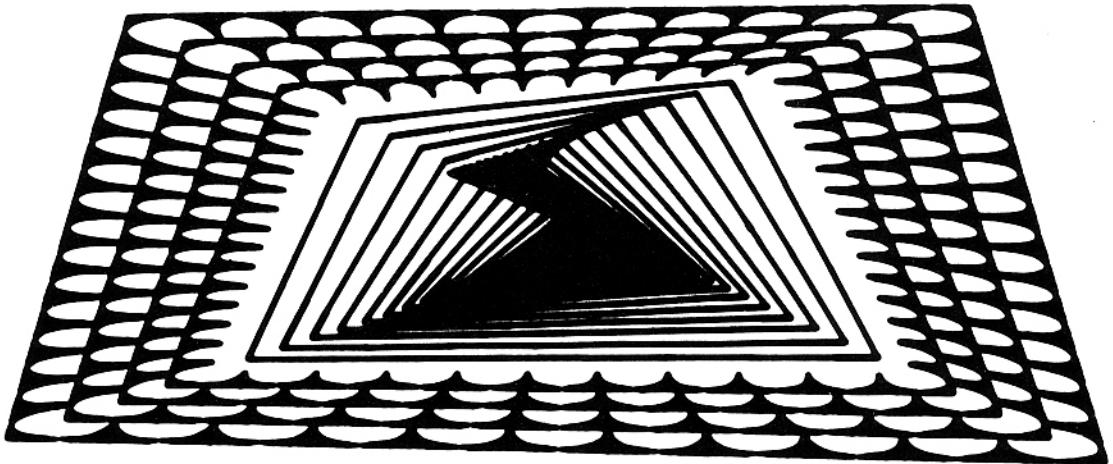
A composite of one basic design which is repeated in various positions and shapes to produce the final drawing. Computer used was a GE 425, with a CalComp 770/702 incremental plotter with a step size of 0.002 inches.



DEFORMATION OF SHARAKU

— Idea by Haruki Tsuchiya, Program by Koji Fujino,
Data by Kamoto Otake

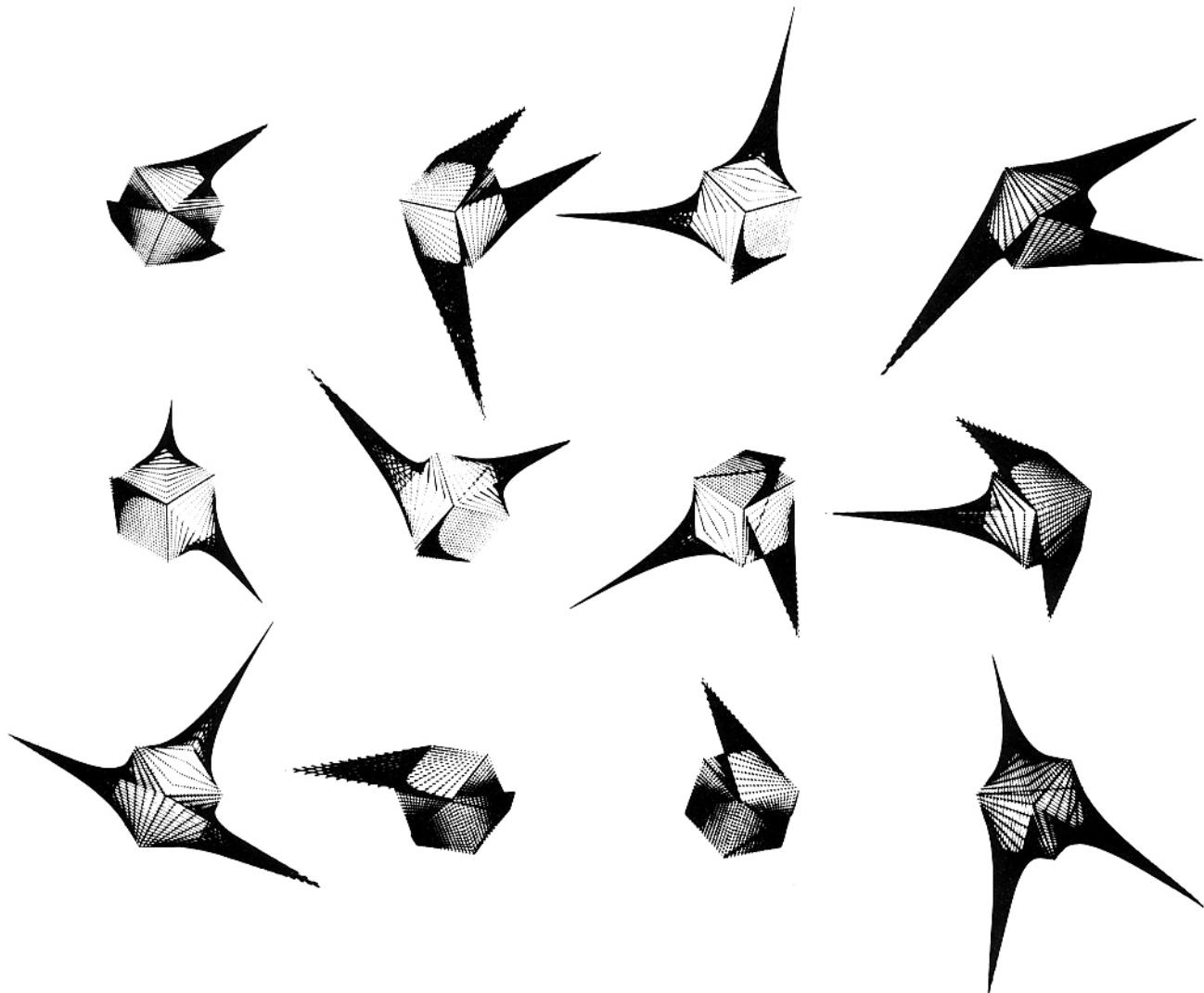
A pattern deformation system was applied to a Ukiyoe of Sharaku. Five kinds of purely mathematical exchanges of coordinates are shown.



OP ART COMPUTERIZED

— Donald Robbins

Here an op art picture by Jeffry Steele (which appeared in Time magazine in 1961) was turned into a subroutine in an investigation of some perspective properties, without actually going through the perspective transformation. Arguments to the subroutine consisted of the length and height, the number of spikes per side, the number of bands, the interior rotation, etc.



UPHEAVAL COLLECTION

— Idea by Masao Komura, Program by Kunio Yamanaka

This is a mathematical pattern including computer improvisation by random numbers. Four rhombics upheaved into random direction at random distances are gathered to represent a cube. An IBM 7090 computer and CalComp 563 plotter were used.

COMPUTER ARTISTS IN THIS ISSUE

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

- Anderson, L. David, California Computer Products, Inc., 305 N. Muller St., Anaheim, Calif. 92803
Craigmile, Gary, California Computer Products, Inc., 305 N. Muller St., Anaheim, Calif. 92803
Craven, Michael H., 718 N. State, Apt. #4, Kent, Wash. 98031
DiLeonardo, D. J., Westinghouse Electric Corp., Bettis Atomic Power Laboratory, Box 79, West Mifflin, Pa. 15122
France, Alan M., International Computers and Tabulators, Ltd., Bridge House, Putney, London, SW 15, England
Fujino, Koji, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Hasegawa, Takeshi, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Hendricks, Mrs. Leigh, Sandia Corp., Sandia Base, Albuquerque, N. Mex. 87115
Jenkins, Larry, California Computer Products, Inc., 305 N. Muller St., Anaheim, Calif. 92803
Kakizaki, Junichiro, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Komura, Masao, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Mason, Maughan S., 18910 Cyril Place, Saratoga, Calif. 95070
Mezei, Leslie, Associate Professor, Dept. of Computer Science, University of Toronto, Toronto, Canada
Milojevic, Petar, McGill University Computing Center, Montreal, Quebec, Canada
Niwa, Fujio, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Nolan, Lawrence, 2620 Delmar, Granite City, Ill. 62040
Otake, Makoto, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Payne, David, Institute of Computer Science, University of Toronto, Toronto, Canada
Peterson, H. Philip, Control Data Corp., Northwest Industrial Park, Third Ave., Burlington, Mass. 01804
Robbins, Donald, Div. 9424, Sandia Corp., Sandia Base, Albuquerque, N. Mex. 87115
Schultz, Bob, Polytechnic Institute of Brooklyn, Dept. of Electrical Engineering, 333 Jay St., Brooklyn, N. Y. 11201
Sobel, Paul H., Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, Calif. 91103
Strand, Kerry, California Computer Products, Inc., 305 N. Muller St., Anaheim, Calif. 92803
Sumner, Lloyd, Computer Creations, P. O. Box 1842, Charlottesville, Va. 22903
Tsuchiya, Haruki, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan
Walker, Dr. Evan Harris, National Aeronautics and Space Administration, Electronics Research Center, 575 Technology Square, Cambridge, Mass. 02139
Yamanaka, Kunio, Computer Technique Group, 7-26, 4chome, Kitasuna, Koto-ku, Tokyo, Japan

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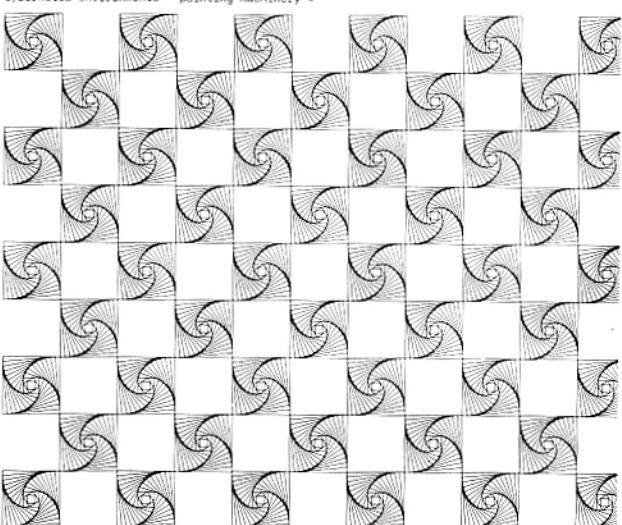
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CYBERNETIC SERENDIPITY

An International Exhibition exploring and demonstrating the relationship between technology and creativity

computer generated graphics - computer animated films - computer composed and played music
computer verse and texts - cybernetic devices as works of art - remote controlled robots -
cybernetic environments - painting machinery -



Institute of Contemporary Arts

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