

OSCILLONS

ELECTRONIC ABSTRACTIONS

by Ben F. Laposky



A NEW APPROACH TO DESIGN

Dept of D & Id
RS 11/20/74

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Book design, text, photography (except photo of oscilloscope by Phil Salsbery, P. 2), and electronic circuitry construction used in producing the oscillon designs in this book and the Electronic Abstractions exhibit are all by the author.

(For information regarding purchase of prints of the designs in this book or the exhibit, write the publisher at address below, mentioning numbers of the designs.)

(COVER ILLUSTRATION FROM EXHIBIT GALLERY NOTES)

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Title Panel of Exhibit

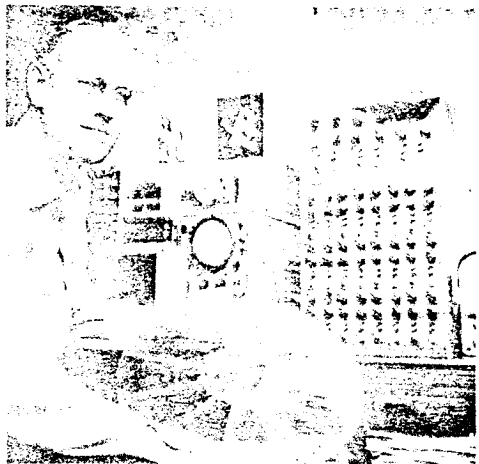
and the designs appearing in it make up the major part of this book. The following paragraphs are all from the introductory panels of the display.

"Electronic Abstractions" are abstract art forms, traced by intricate electrical waves on the screen of a cathode-ray oscilloscope. They are originated and fashioned by electronic circuits and displayed by the glowing beam of the electronic picture tube. While the elements which make up these creations are basically geometrical and mathematical, the resulting design forms are abstract in that they are not meant to depict any recognizable objects. They are compositions of electrical vibrations in light as pleasing to the eye as compositions of sound vibrations in music are pleasing to the ear. These beautiful visual rhythms and harmonies of electronic abstract art may be recorded by means of photography. The fifty pictures of abstractions in this exhibit are photographs—none were drawn by hand or made in any other way. All were composed as far as possible for design by the selection and control of the electronic instruments involved.

The device for displaying electronic abstractions is the cathode-ray oscilloscope, an instrument widely used by radio and television technicians, as well as by electronics en-

Science and art may sometimes be combined to produce visual effects of strange beauty. In this book is a brief account of such a combination—the composition of abstract designs by means of electronic forces. While mathematics, electronics and photography are involved in this endeavor to various degrees, its main object is the creation of forms of artistic appeal.

Since the travelling exhibit, *"Electronic Abstractions,"* is about these electrical compositions, the explanatory material



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WORLD PREMIERE EXHIBITION

The Sioux City Art Center presents - - -

BEN LAPOSKY

demonstrating

ELECTRONIC ABSTRACTIONS

an exciting 20th Century Art Form

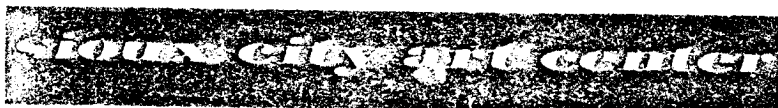
3:00 p.m.

Sunday, June 5, 1960

Reception follows

COMPANION EXHIBITION:

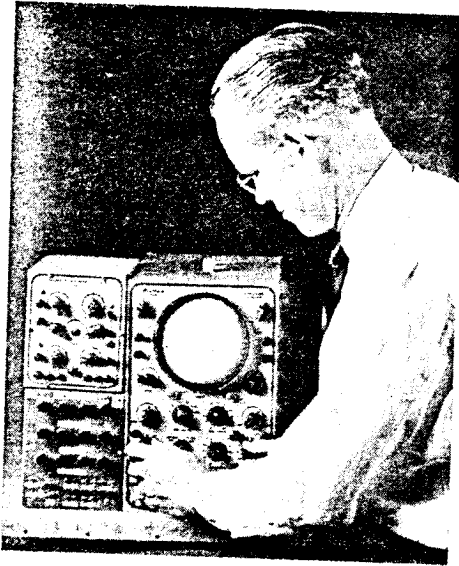
THIRD ANNUAL EXHIBITION OF
ADVERTISING AND EDITORIAL ART



COLOR EXHIBIT

COMMERCE BUILDING

SIOUX CITY 1, IOWA



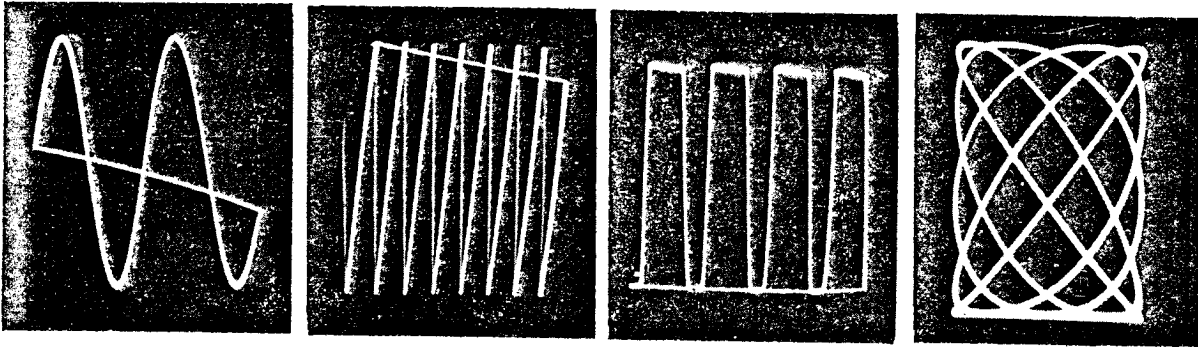
Laposky operating an oscilloscope, showing a simple "abstract" trace. Other instruments are two of the many used to compose Electronic Abstractions, or oscillons—that is, electronic oscillogram designs. (From introductory panels of exhibit. Reprinted from DESIGN, 1953.)

the nature of the screen a continuous line or form is seen by the eye or camera.

The circuits within an oscilloscope itself would produce only a very limited variety of wave shapes, so other electrical and electronic circuits are connected to it to create the almost infinite variety of forms it will display as electronic abstractions. These circuits may be simple or very complex—they are all similar to circuits of radio, TV, radar and other applications of electronics. "Oscillators" are basic since they produce the electrical waves which are the fundamental forms in electronic abstractions. One type of oscillator makes "sine waves" which are identical with the circular curves of trigonometry—they are also like the 60-cycle per second waves of house current. Another kind of wave is the "saw-tooth"—this is also used as the sweep circuit of the oscilloscope and television set, sweeping the electron beam across the face of the tube and back again. A number of other wave forms is possible, including even a "square wave." All these may

PAGE TWO

engineers and other scientists. It is utilized to study electrical wave-forms, voltages, current and so on. The oscilloscope is similar in many ways to the "picture" part of a television receiver, since it uses a cathode-ray or picture tube; the indicator screens of radar are forms of oscilloscopes, too. Oscilloscopes are used in atomic research and some kinds of mathematical computers use them to show results of computations. The oscilloscope is highly versatile and has a number of controls which modify the size, shape, brightness and position of the traces which appear on the 'scope screen. This trace is formed by the impact of a beam of electrons on the inside of the phosphorescent face of the picture tube. It travels very fast across the screen, but because it retraces itself many times a second and because of



Sine-wave

Sawtooth

Square Wave

Lissajous Figure

Traces shown in introductory panels of exhibit

be combined and modified in many ways by electronic instruments to form designs or patterns, so that the operator of the variously assembled setups has a large measure of creative control over the resulting traceries which appear on the oscilloscope screen.

Most electronic abstract forms as seen on the face of the picture tube are dynamic—that is, they are in some way moving, shifting or pulsating within themselves. In some cases the fine wave lines undulate across the pattern—in others parts of the outlines of the form may recede or expand or otherwise change harmoniously as the electrical and magnetic fields interact. Because of this factor, and others, fast camera lenses are required to record the design forms at their best balance or composition. (The photographs in this exhibit are all enlargements of single-frame 35mm negatives—except for pictures of oscilloscope. To obtain the best contrast all were photographed without any other light on the scope screen—which explains why none of the oscilloscope itself shows up in them.)

Electronic abstractions are related to other kinds of designs traced by oscillations and waveforms. Such are the mathematical graphs known as "cyclic-harmonic curves," formed by the combinations of rolling circles and other polar curves. The geometric engraving lathe, which uses somewhat similar movements, traces out lacy network patterns sometimes used on currency and bonds. A swinging pendulum describes intricate patterns of curves—these have been recorded photographically, too, either by a

camera or by a light ray from a pendulum exposing photographic paper directly. Both the oscilloscope and a compound pendulum will trace almost identical patterns known as "Lissajous Figures." These are the result of two sine-wave forces acting on each other at right angles. Some of the designs of electronic abstract art in this exhibit are variations or distortions of Lissajous Figures. There is a very much wider variety of form and texture possible by use of electronic circuits than by any of the mechanical means mentioned above, however, and a greater amount of choice in shaping the final compositions.

(End of exhibit explanatory text.)

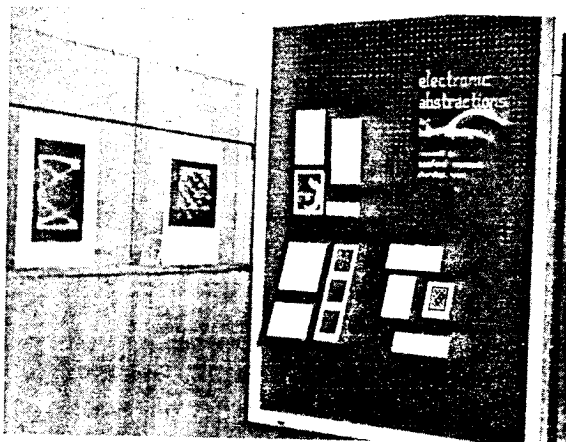
(In the illustration on page 2 reference is made to "oscillons." This is an alternative name for electronic abstract designs, or electronic abstractions. Oscillons are defined as electronic oscillograms composed for design, and may be photographed, drawn or otherwise depicted. This is to distinguish them from other oscillograms observed by scientists, engineers and technicians for various theoretical or practical reasons.)

Each of the pictures in the actual exhibit is an 11x14 inch photographic enlargement in a 16x20 inch salon mount. The picture below shows the arrangement of the introductory sections and mounting of the photographs. Fourteen of the designs are presented horizontally—twelve of these are grouped together on two pages of the

following section, and two others are marked by asterisks in the vertically numbered groups.

The exhibit was organized and mounted by W. D. Frankforter, director of Sanford Museum, and by Laposky.

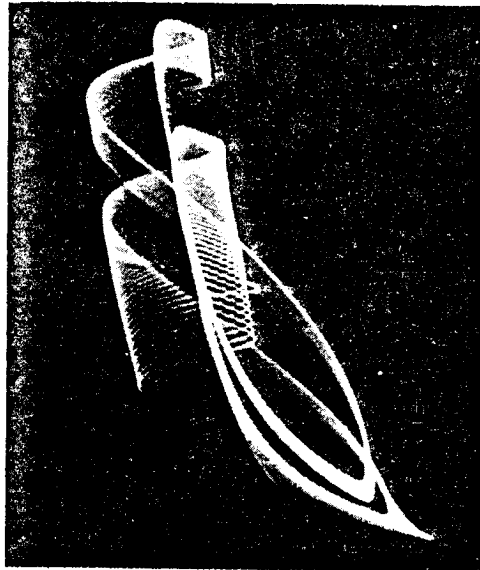
The first 50 designs, or oscillons, on the following pages are from the exhibit. (Numbers correspond to the print numbers in the display.)



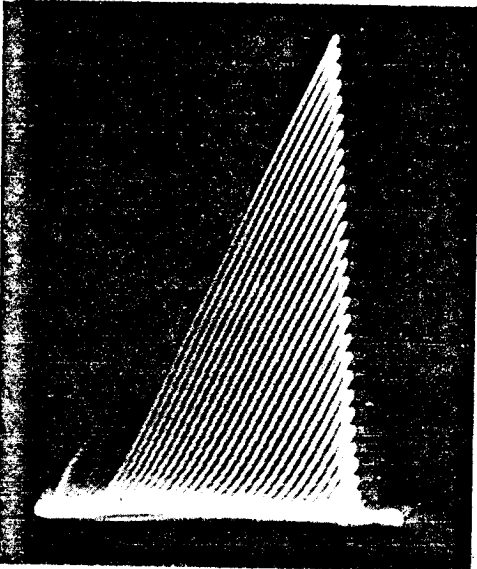
A part of the Electronic Abstractions Exhibit as shown at the Des Moines Art Center, March-April, 1953.



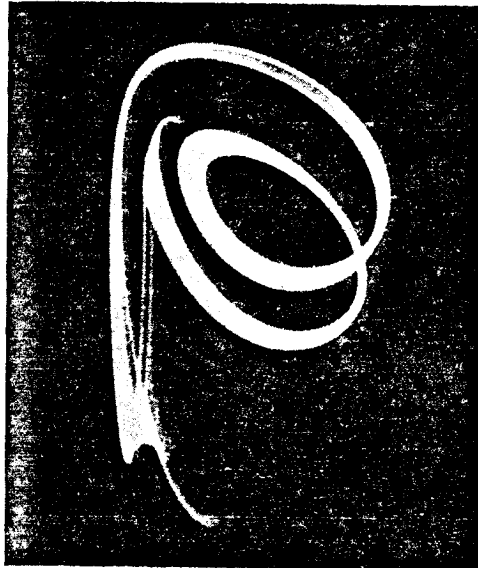
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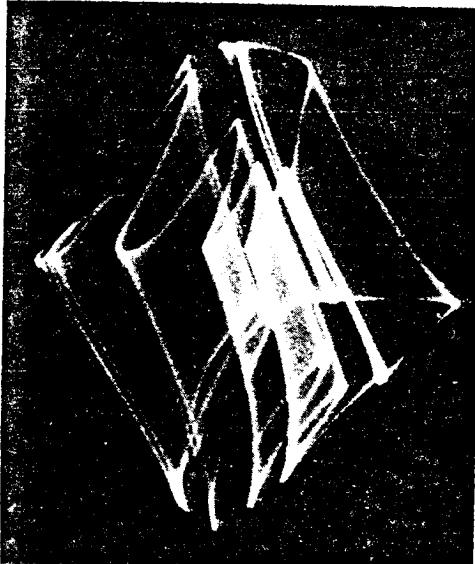
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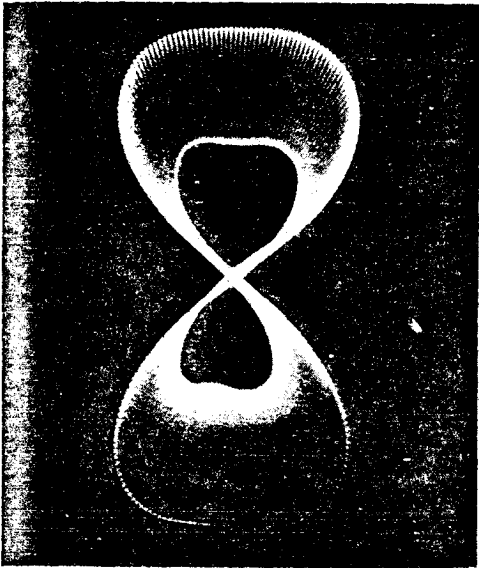
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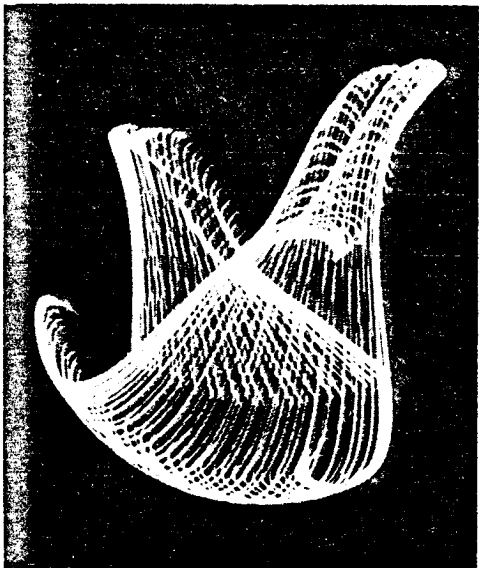
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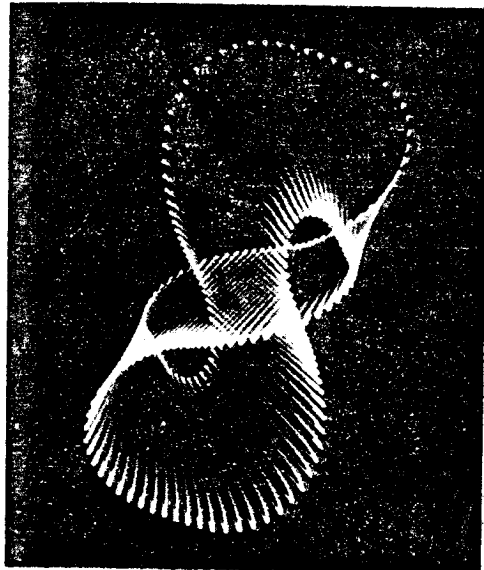
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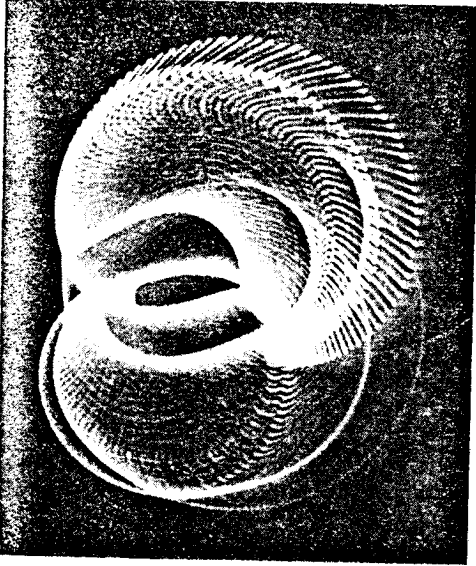


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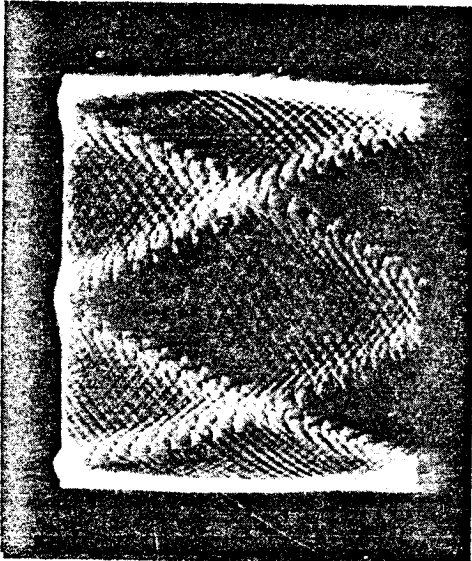
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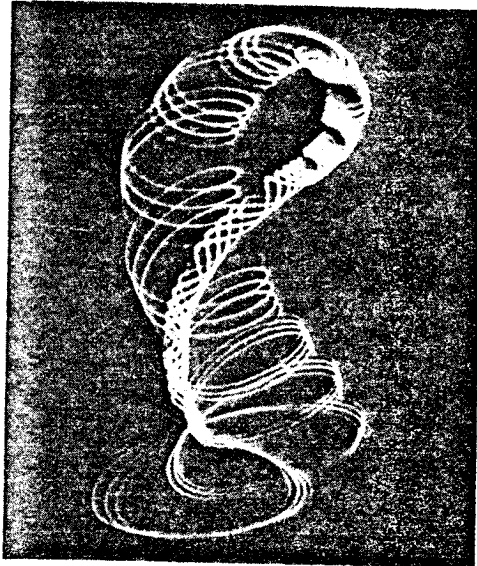
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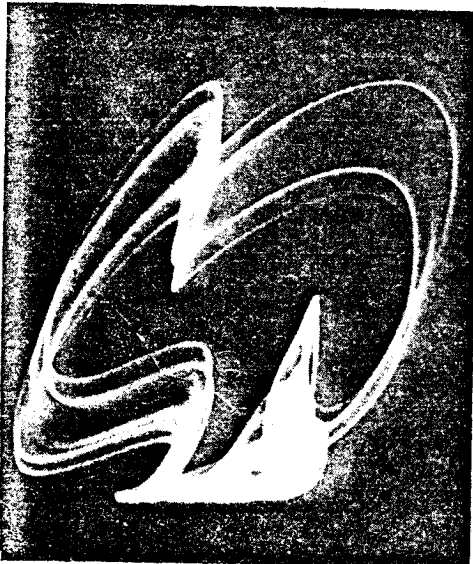
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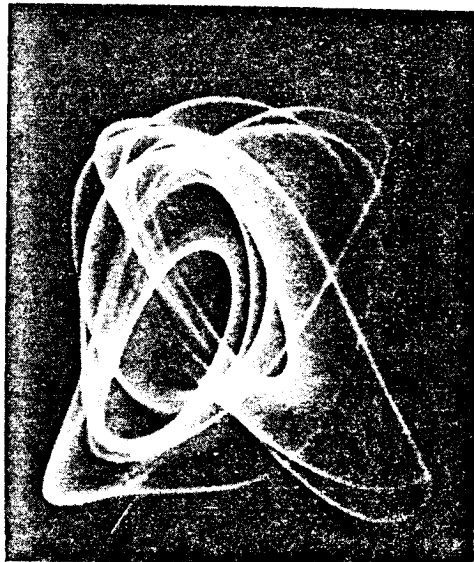
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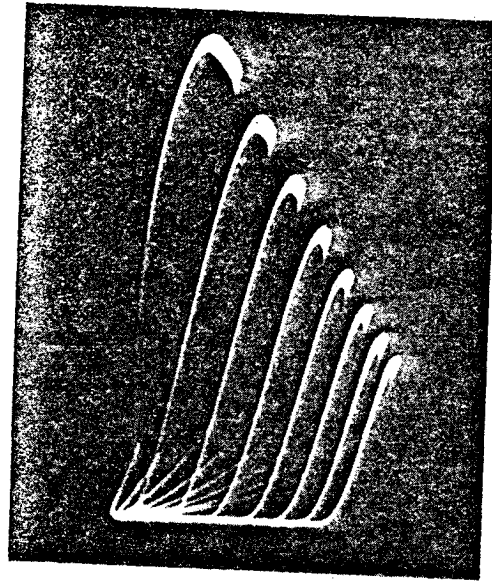


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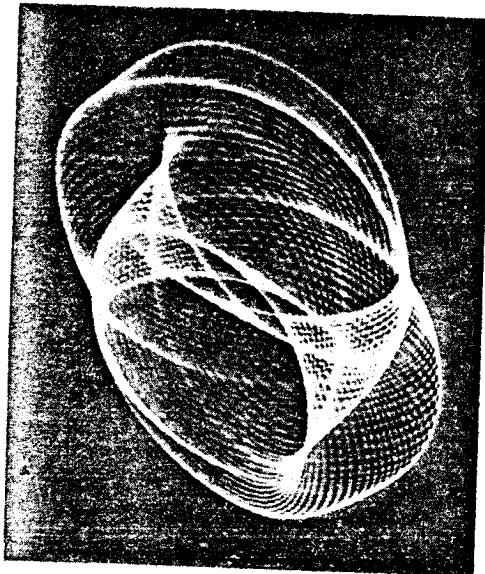




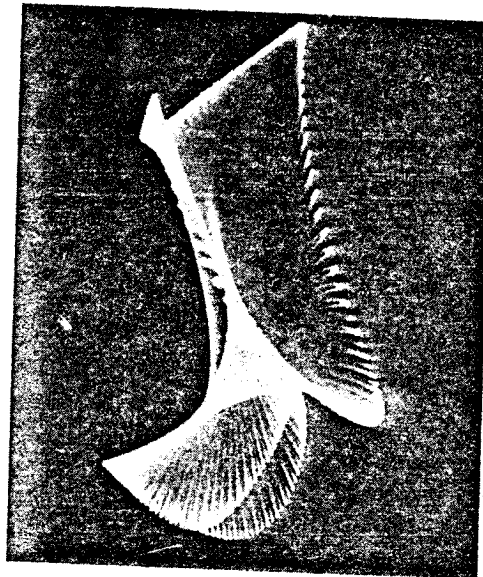
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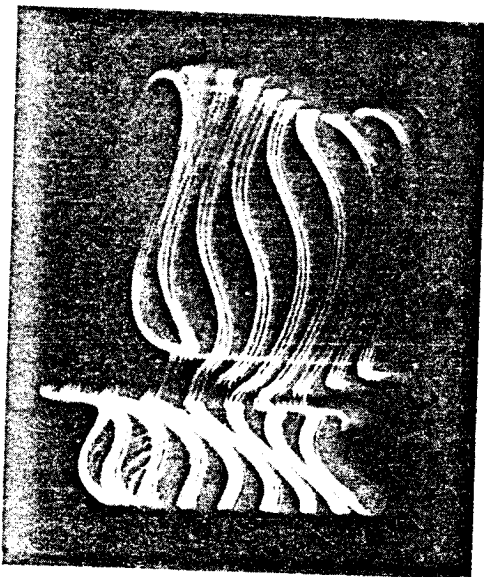
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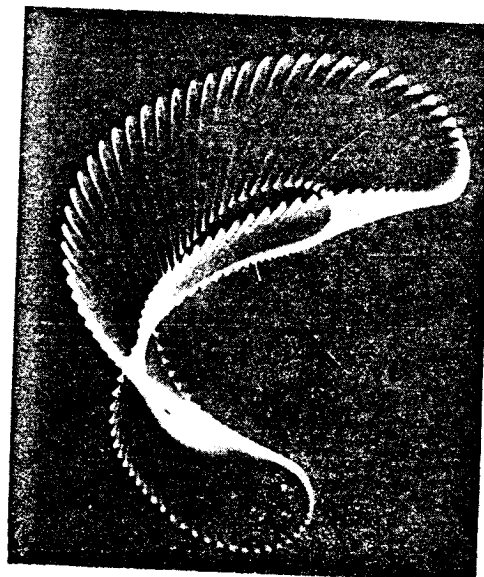
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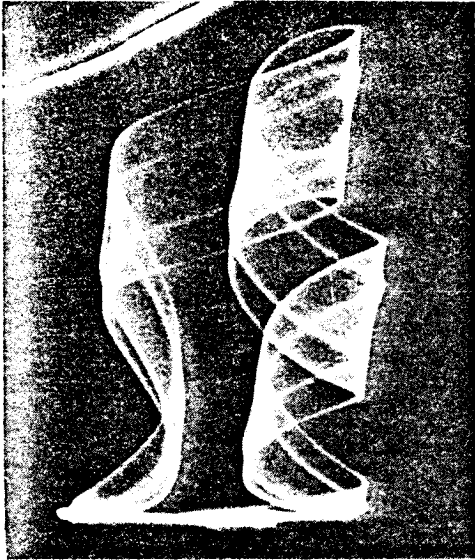
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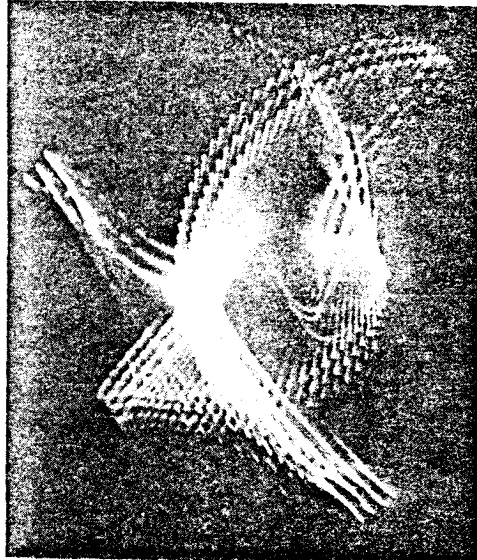
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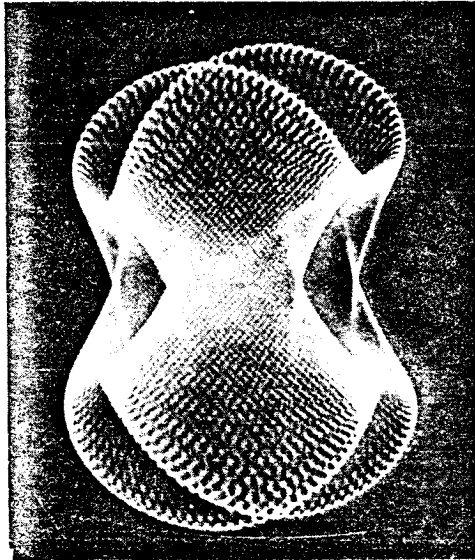
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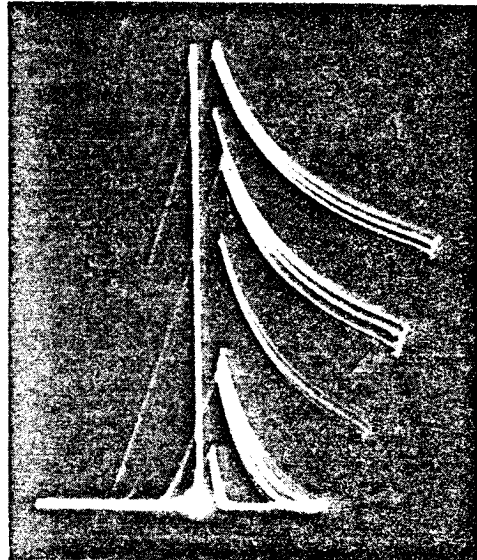
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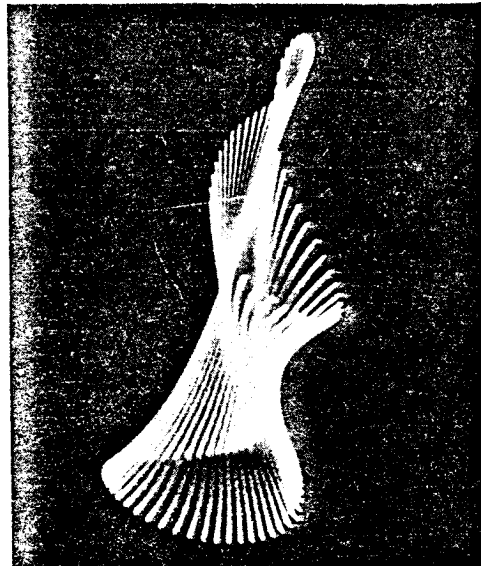
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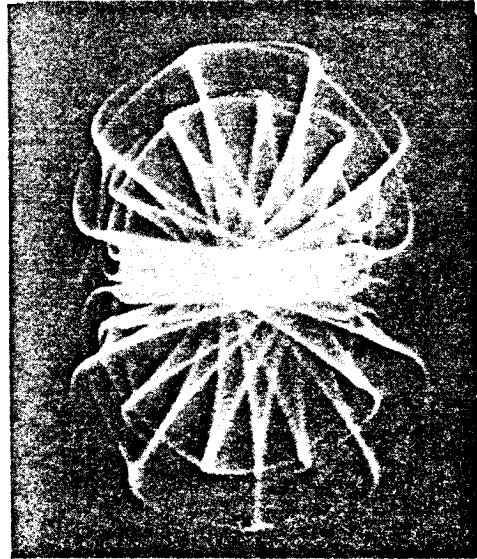
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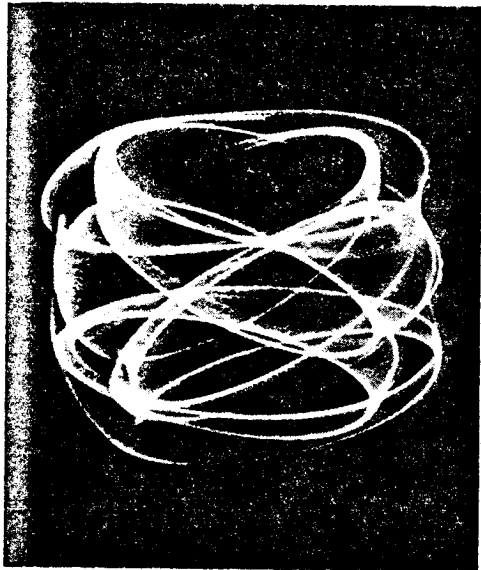
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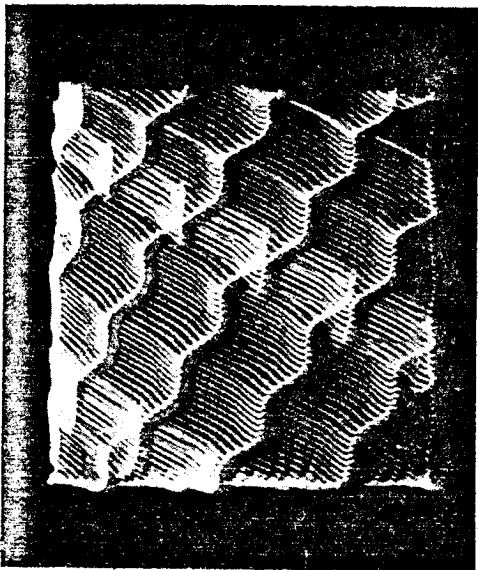
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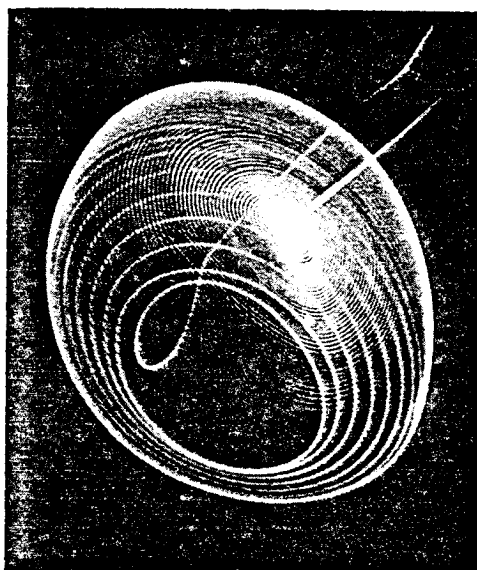
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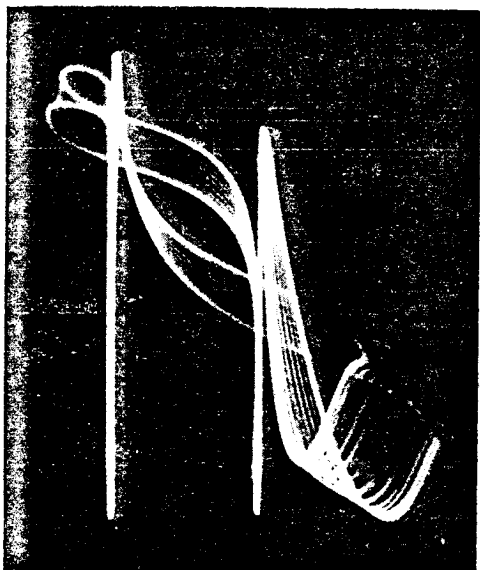
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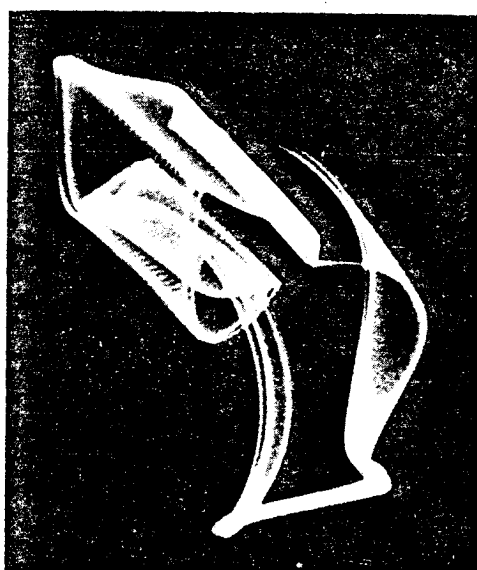
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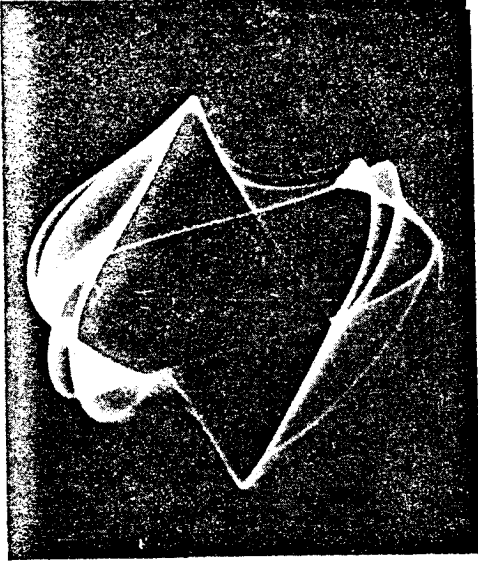


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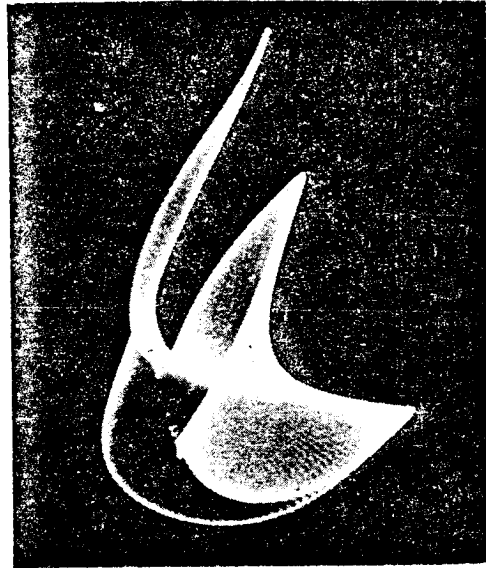


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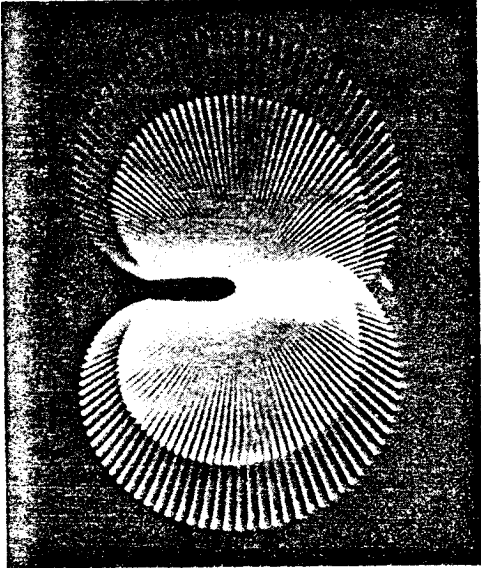
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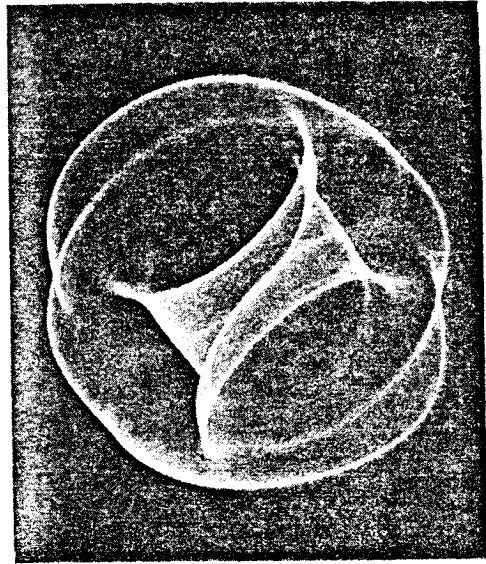
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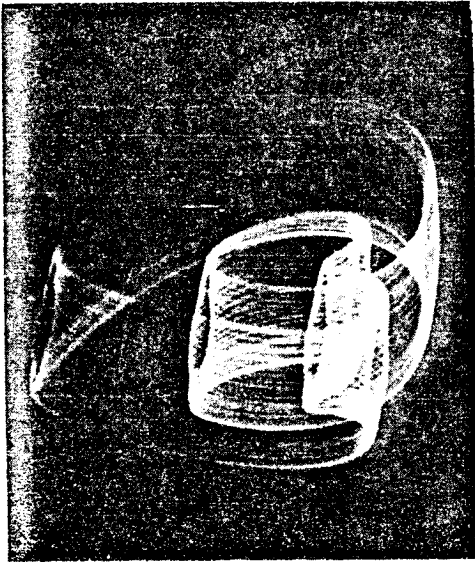
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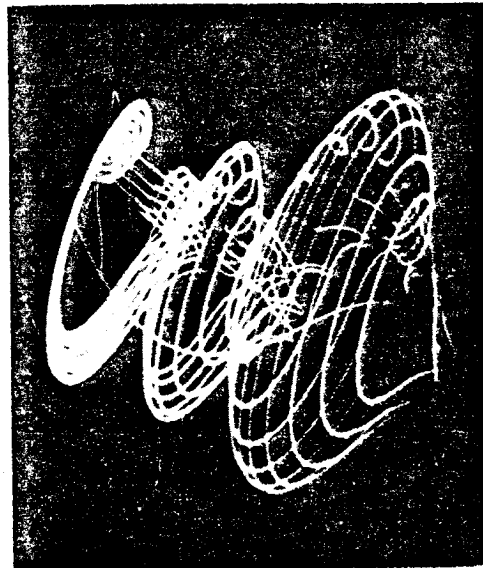
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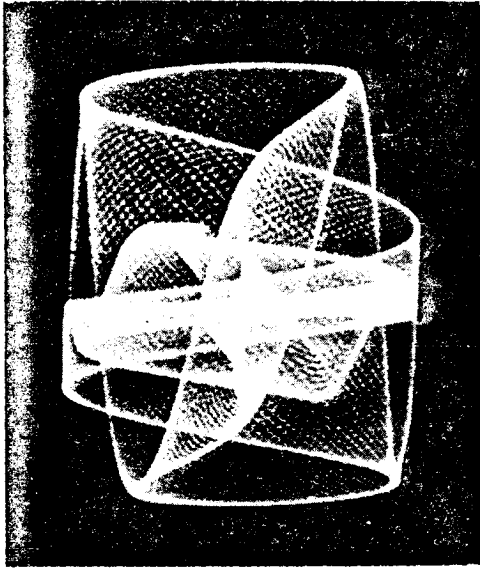


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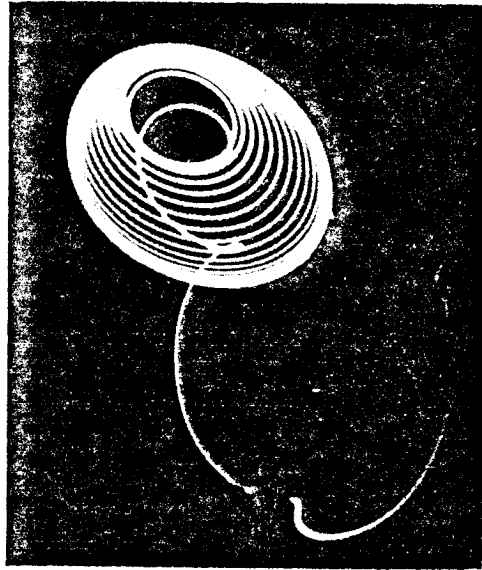


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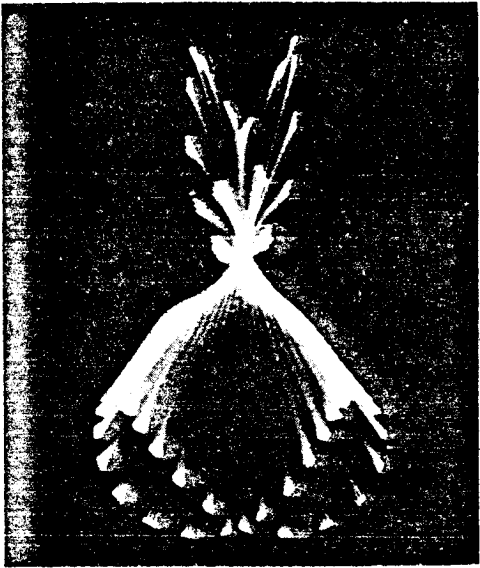




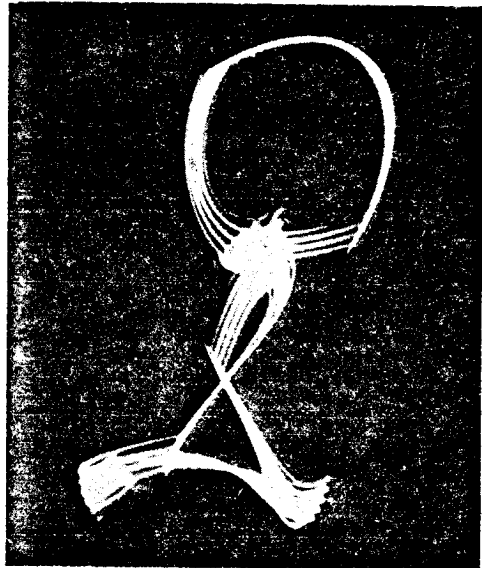
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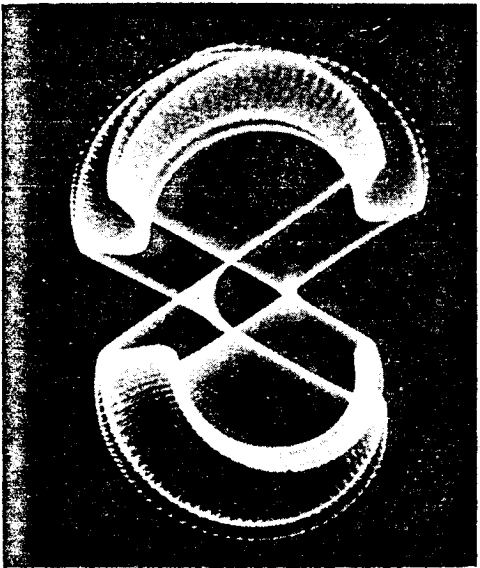
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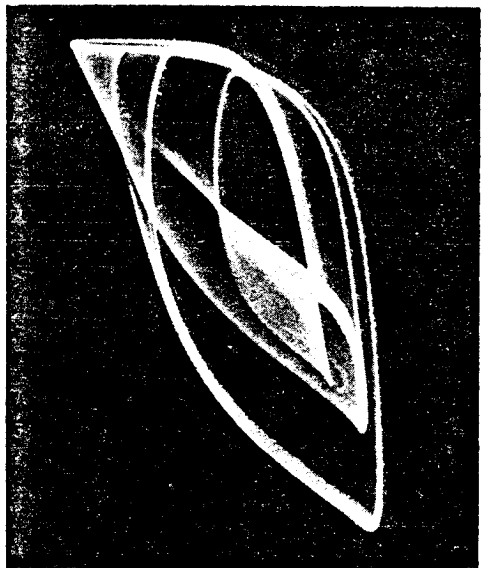
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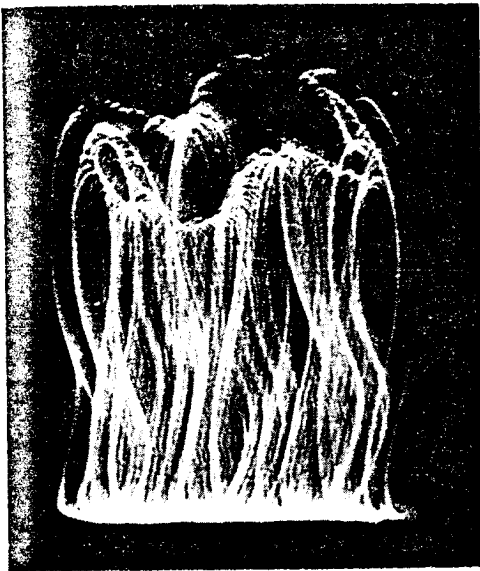


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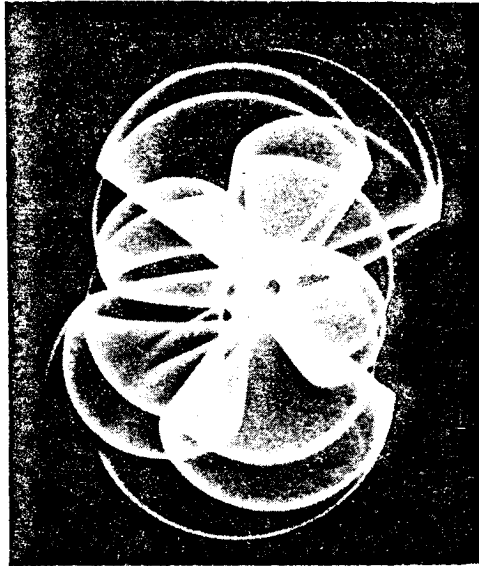


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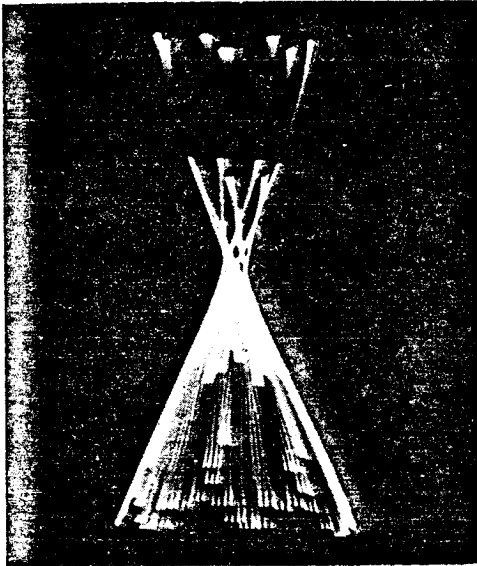
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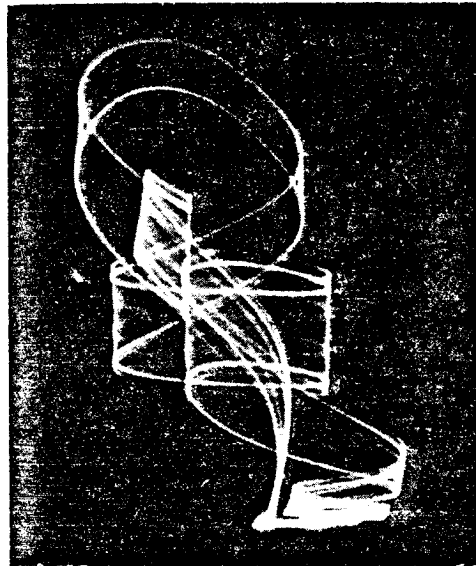
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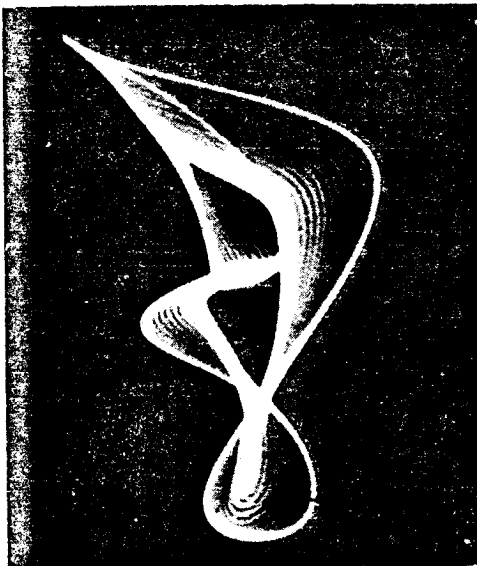
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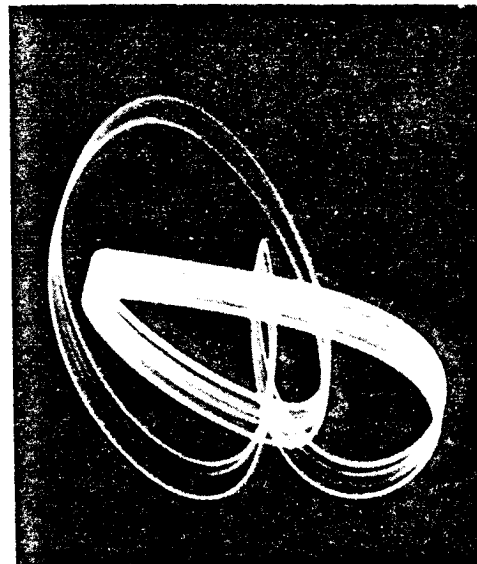
52



53



54



Among the items published about the Electronic Abstractions or the exhibit, the following are of special interest.

From *Scripta Mathematica* magazine:

Designs numbers 7, 10, 35, 38 and 50 were published as full page plates in *Scripta Mathematica*, September-December, 1952, issue pages 305, ff. A brief note on "Electronic Abstractions" appeared on page 314 describing them, and included the following: "The mathematical aspect of these electronic creations is found in the basic wave patterns which compose them."

As part of its Pictorial Mathematics series on postcards, numbers 1 and 51 were published as "Electronic Abstract Designs" by *Scripta Mathematica*. (This magazine is a quarterly journal devoted to mathematics, especially in its cultural aspects, and is published by Yeshiva University, New York. It has been featuring groups of designs based on various mathematical forms or ideas.)

From *Design Magazine*:

The photograph of the oscilloscope setup on page 2 and two oscillons were published with an article "Design by Electrons, Science Creates a Micro-World of Art, by Ben F. Laposky" in *Design*, May 1953, p. 151. Excerpts follow:

"The wild gyrations of electrical wave forms were responsible for the unusual designs reproduced below (numbers 52 and 53 on page 13). A cathode-ray oscilloscope created these strangely beautiful patterns, no two of which are likely to be exactly the same.

"The author calls his art photographs *oscillons*. They are especially composed for design or abstract values, and have been photographed with a high speed camera lens on fast film. An artist may prefer to capture their unique compositions in the form of sketches or paintings.

"The expensive electronic equipment is not within the reach of the average individual. For this reason the medium is not likely to enjoy popular adaptation, although it may one day prove a useful source of inspiration for professional designers. They will have to be something of a radio "ham," however, as the equipment requires a degree of technical knowledge. Currently an exhibition of fifty such oscillons is being planned for circulation among art museums. At this writing* the one man show can be seen at Sanford Museum in Cherokee, Iowa."

(Reprinted from *DESIGN*, 1953.)

*February, 1953

(DESIGNS 15, 18 AND 54 WERE PRINTED IN THE CHEROKEE COURIER, A NEWSPAPER, DEC. 15, 1953.)

The idea of composing abstract designs on the screen of an oscilloscope was developed as a part of a larger investigation into designs or patterns based on natural forms (as crystals, for example), curves due to physical forces (such as swinging pendulums), or curves based on various mathematical principles.

The only previous published reference (prior to 1952) found in regard to the use of an oscilloscope as a possible source of design was in a brief article in *Popular Science Monthly*, December, 1947: "Even Necktie Designers Can Use Electrons." General Electric engineers suggested the use of television test instruments, that is, oscilloscopes, to display patterns which might be useful to designers as a source of ideas for textiles, etc.

To create all the electronic abstractions in this book, 37 electronic instruments of various types especially constructed or modified for this work were connected in different combinations to the 'scope. They were then controlled so as to compose the resulting wave forms in the best ways for design. The 56 patterns included here are from nearly 6,000 composed and photographed thus far.

As observed in the exhibit explanation, there is an interesting parallel between these art forms and music. The operator of an electronic setup creating them may almost be said to play a kind of "visual music" with it, especially when the moving traces on the oscilloscope screen pulsate rhythmically or harmoniously expand and contract in a kind of crescendo and diminuendo. Since much music is not representational of any sounds in nature, and so is abstract, the analogy with these electronic designs follows in yet another way. (It is interesting to note, also, that many electric organs and other electrical musical instruments incorporate electronic oscillators, amplifiers, and other circuits which are similar to those used in this visual technique.)

In regard to the mathematical aspect of these art forms, while many of their simpler curves may be plotted or analyzed by means of the equations of algebra, trigonometry or calculus, this procedure is not used in the case of those composed purely for design. After planning on the combinations of circuits he wishes to use, the operator of the electronic instruments can by employing their controls obtain much more artistic feeling in the designs as they appear on the 'scope screen than would ever be possible by calculation alone.

(The illustrations in this book do not show in some designs the high contrast, tonal range, or all the fine details as they appear in the photographic prints in the exhibit.)

Following are the art museums showing the first series of the Electronics
Abstractions exhibit, 1953-54:

SANFORD MUSEUM, CHEROKEE, IOWA
DES MOINES ART CENTER, DES MOINES, IOWA
MASON CITY PUBLIC LIBRARY GALLERY, MASON CITY, IOWA
DRAKE UNIVERSITY ART DEPARTMENT, DES MOINES, IOWA
SIOUX CITY ART CENTER, SIOUX CITY, IOWA
BLANDEN MEMORIAL, FORT DODGE, IOWA
JOSLYN ART MUSEUM, OMAHA, NEBRASKA
HACKLEY ART GALLERY, MUSKEGON, MICHIGAN
NEVILLE PUBLIC MUSEUM, GREEN BAY, WISCONSIN
SLATER MEMORIAL MUSEUM, NORWICH, CONNECTICUT
SKIDMORE COLLEGE ART DEPARTMENT, SARATOGA SPRINGS, NEW YORK
ADDISON GALLERY OF AMERICAN ART, ANDOVER, MASSACHUSETTS
PHILBROOK ART CENTER, TULSA, OKLAHOMA
OKLAHOMA ART CENTER, OKLAHOMA CITY, OKLAHOMA

Additional places showing the Electronic Abstractions exhibits, 1954-1961:

CRANBROOK INSTITUTE OF SCIENCE, BLOOMFIELD HILLS, MICHIGAN
J. B. SPEED ART MUSEUM, LOUISVILLE, KENTUCKY
RICHMOND ART CENTER, RICHMOND, CALIFORNIA
WUSTUM MUSEUM OF FINE ARTS, RACINE, WISCONSIN
CURRIER GALLERY OF ART, MANCHESTER, NEW HAMPSHIRE
DAVENPORT PUBLIC MUSEUM, DAVENPORT, IOWA
CAYUGA MUSEUM, AUBURN, NEW YORK
OSHKOSH PUBLIC MUSEUM, OSHKOSH, WISCONSIN
BIRMINGHAM MUSEUM OF ART, BIRMINGHAM, ALABAMA
NORFOLK MUSEUM OF ART AND SCIENCE, NORFOLK, VA.
WARTBURG COLLEGE, WAVERLY, IOWA
UNIVERSITY OF VERMONT, BURLINGTON, VERMONT
COOPER UNION, MUSEUM FOR THE ARTS OF DECORATION, NEW YORK, N. Y.
ROCHESTER ART CENTER, ROCHESTER, MINNESOTA
VASSAR COLLEGE, POUGHKEEPSIE, NEW YORK
UNIVERSITY OF NORTH CAROLINA, CHAPEL HILL, N. C.
NEWARK PUBLIC LIBRARY GALLERY, NEWARK, N. J.
DALLAS MUSEUM OF FINE ARTS, DALLAS, TEXAS
GEORGE EASTMAN HOUSE OF PHOTOGRAPHY, ROCHESTER, NEW YORK
UNIVERSITY OF PITTSBURG, PITTSBURG, PENNSYLVANIA
COLORADO COLLEGE, COLORADO SPRINGS, COLORADO
UNIVERSITY OF MAINE, ORONO, MAINE
WESTERN MICHIGAN UNIVERSITY, KALAMAZOO, MICHIGAN
MINNEAPOLIS SCHOOL OF ARTS, MINNEAPOLIS, MINNESOTA
INSTITUTE OF DESIGN, ILLINOIS INSTITUTE OF TECHNOLOGY, CHICAGO, ILL.
And Others

A duplicate set of the Sanford Museum traveling exhibit was shown in France at LeMans and other places by the Cultural Relations Section of the United States Information Agency.

Smaller groups of prints from the exhibits were also shown at: Ohio Wesleyan University, Delaware, Ohio; Photographers Association of America Convention, Chicago (1955), and other places.

*EXHIBIT LIST NOT COMPLETE. PART ONLY OF OVER
210 TOTAL PLACES*

From the gallery notes on the Electronic Abstractions Exhibit circulated by Sanford Museum, Cherokee, Iowa:

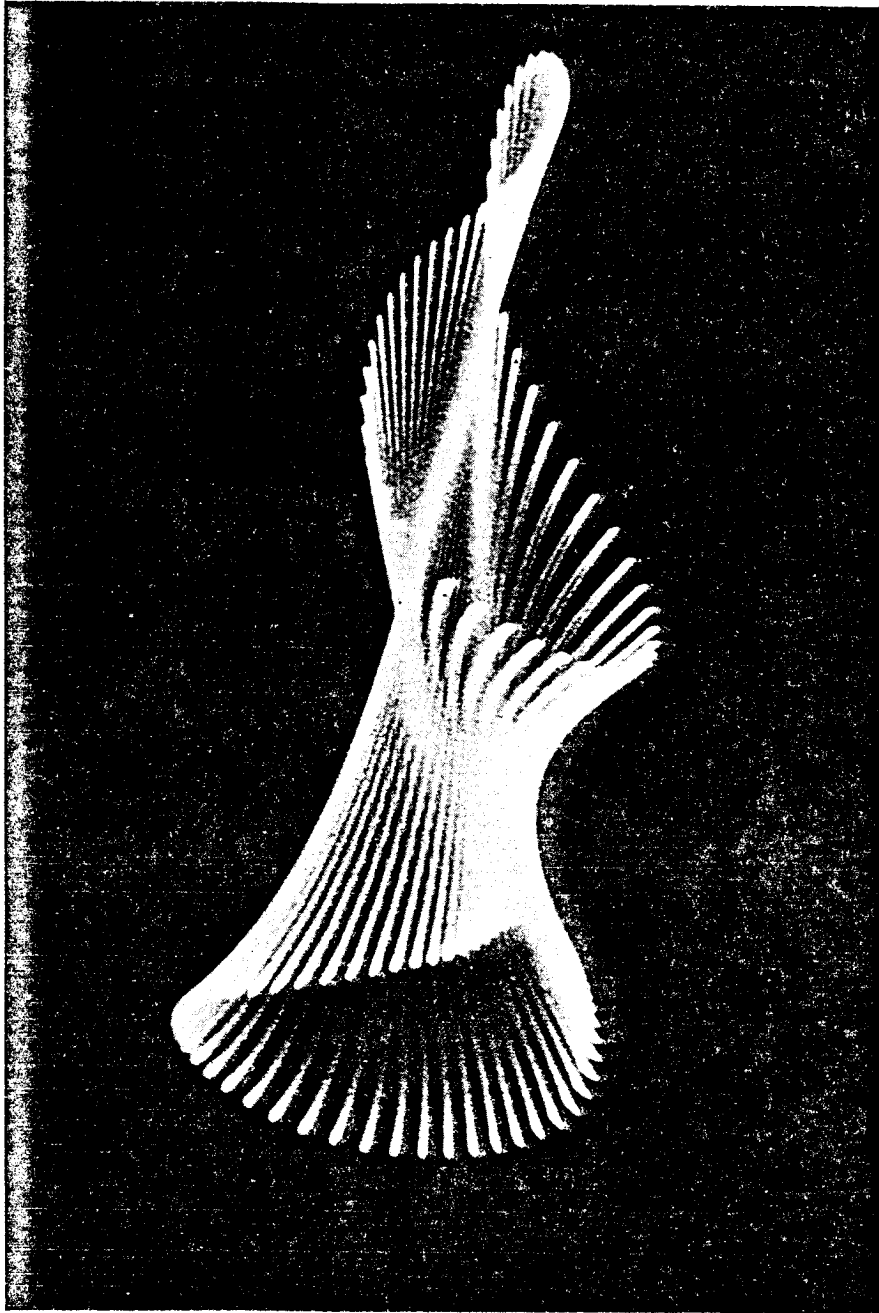
"Electronic Abstractions are a new kind of abstract art. They are beautiful design compositions formed by the combination of electrical wave forms as displayed on a cathode-ray oscilloscope. The exhibit consists of 50 photographs of these patterns. A wide variety of shapes and textures is included. The patterns all have an abstract quality, yet retain a geometrical precision. They are related to various mathematical curves, the intricate tracings of the geometric lathes and pendulum patterns, but show possibilities far beyond these sources of design.

"While not originating the idea of using the oscilloscope and electronic circuits in this way to create art forms, the artist has developed it further than any other source has yet revealed for publication or display.

"Electronic Abstractions will be of interest primarily for its new and striking approach to design forms, and is offered as an art exhibit. However, it will have appeal as a scientific display since the method of creating these patterns uses electronic instruments and principles. Because the presentation of the illustrative material is entirely photographic, it may also be considered as a salon exhibit."

ELECTRONIC ABSTRACTIONS

By Ben F. Laposky



Def't of CRT

RS 11/20/74

SCRIPTA MATHEMATICA, V. 18, 1952,

OSCILLON 35



BEN F. LAPOSKY

Oscillons: Electronic Abstractions

301 S. 6th St., Cherokee, Iowa 51012

Phone 712-225-3837

January 20, 1975

Woody Vasulka
257 Franklin Street
Buffalo, N. Y. 14202

Dear Woody:

Eric Somers recently called me and said that you were working on your Archives of Video Art. He thought you might be interested in having some of my work as a historical background to video art, as the oscillon project was a forerunner of the video-synthesizer type of art, also of some analogue computer art.

I recently purchased a copy of Stewart Kranz' book, SCIENCE & TECHNOLOGY IN THE ARTS, and saw the article on your work. I found the book quite interesting, but incomplete on the historical background of some phases, especially on oscillographic art.

I presume you saw the material I sent Bill Etra at New York University last fall. I also called him before making a trip to Colorado in October, and saw the setup at Colorado Video as he recommended (at Boulder). I can send you the same material for your files and in addition color photos, other printed material, etc. I have only a few duplicate slides at present.

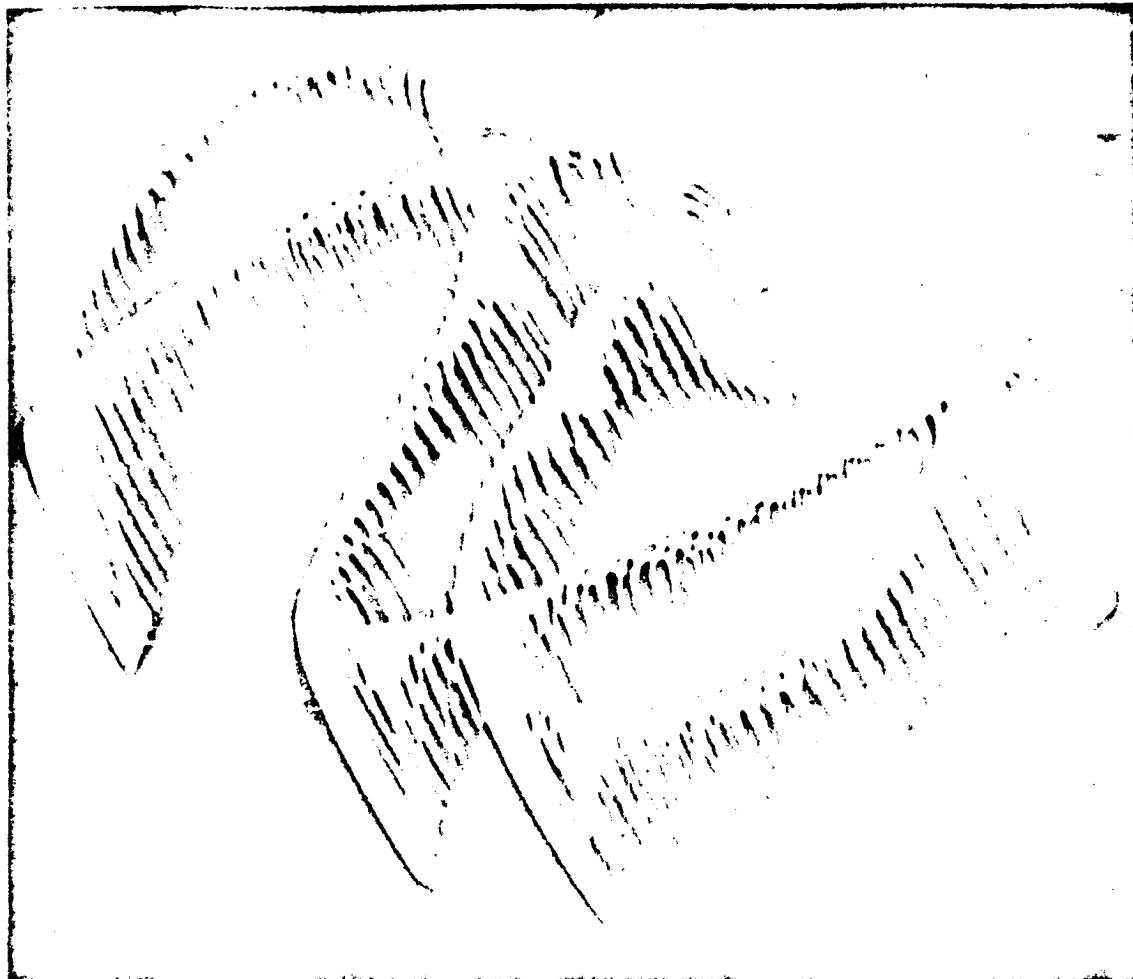
I have not done any new work with the oscilloscope for some time, but recently have been experimenting with some Lumia setups, possibly to work them into the Oscillon project.

(Incidentally, my color Oscillon exhibit was shown at the Buffalo Museum of Science in August, 1965.)

Hoping to hear from you sometime,

Sincerely,

Ben Laposky
Ben Laposky



"Oscillon 7" by Cherokee Artist Ben Laposky

Laposky Cited for Tracing History in Computer Art

By RANDI MARTIN

Ben Laposky of Cherokee has been cited as a pioneer in computer art in a book tracing the history and current state of computer art by Herbert W. Franke of Germany, recognized as a leading authority in the field.

The book, "Computer Graphics, Computer Art," was published in 1971.

Laposky first exhibited his oscillons or electronic abstractions at the Sanford Museum in 1952. It was the "first exhibit of this type of art anywhere in the world," Laposky said. While Laposky does not use computers, his work is considered part of the genre, he explained. Laposky's oscillons are created by photographing the superimposition of electrical oscillations of varying time functions which are led to the deflector plates of a cathode ray oscilloscope.

His most recent Sanford exhibition was in August and September of 1971.

The book, in a chapter devoted to the beginnings of computer graphics, states: "Ben F. Laposky provided the first major initiative, and thus the origin of graphics generated by means of elec-

tronic machines and computer installations. His work commenced in 1950 ... even today, the images generated by Laposky, which he termed oscillons or electronic abstractions, remain consummate achievements, and even with contemporary instruments, a substantial improvement is hardly conceivable. Laposky exhibited his works for the first time in the Sanford Museum in Cherokee and subsequently in more than one hundred other cities in the USA. Since 1956 Laposky has turned to what would now be termed colored analogue graphics. He adds rotating color filters before the display screen. Laposky has also done pioneering work with film."

Laposky said that he has not done a great deal of new work recently, but that a number of his prints are currently being shown as part of the international computer art show.

The computer art exhibit is a traveling show, originating in Germany. Laposky said the show has been exhibited in Germany, Norway, Belgium, Italy, Greece and England and is scheduled to be shown in Japan this year.

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Book Carries Laposky Story

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Ben Laposky, Cherokee, is the author of an article on his "Oscillons: Electronic Abstractions" appearing in a new book, "Kinetic Art: Theory and Practice."

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The 10-page article shows several illustrations of Laposky's abstract electronic art work and refers to exhibits and other publications of it, including the exhibits circulated by Sanford Museum.

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The book is edited by Frank J. Malina of France and is published by Dover publishers, New York, with other editions in Canada and England. It contains articles by 44 artists, scientists, engineers and others in the fields of kinetic art, computer and TV art, light art and related art forms from several countries. The book is described as containing the best work from the best workers in these fields. Copies of the book are in the Cherokee Public Library and the Sanford Museum library.

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Another new book, "Art and the Future" by Douglas Davis on recent developments in art including computer and television art, refers to Laposky's initial work in the fields from 1950 on. This book is published by Praeger, New York. Davis is also the art critic for Newsweek magazine.

Miami-Demarc