

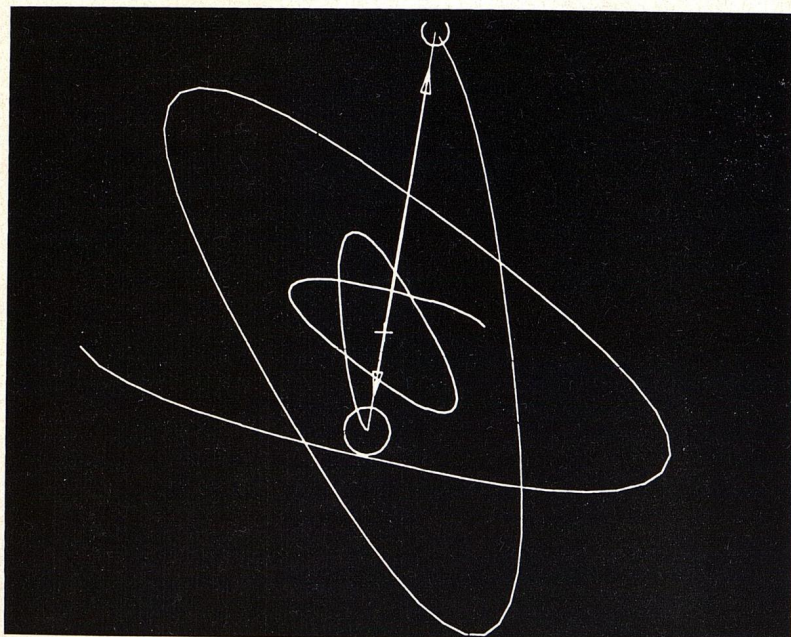
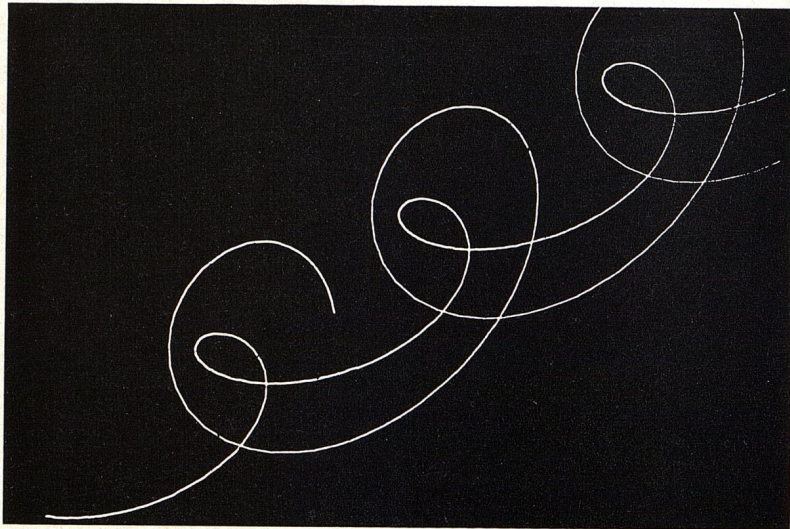
## VARIETIES OF COMPUTER GRAPHICS

*As this sampling demonstrates, computer-generated pictures range from exercises in pure design to simulations of environments*

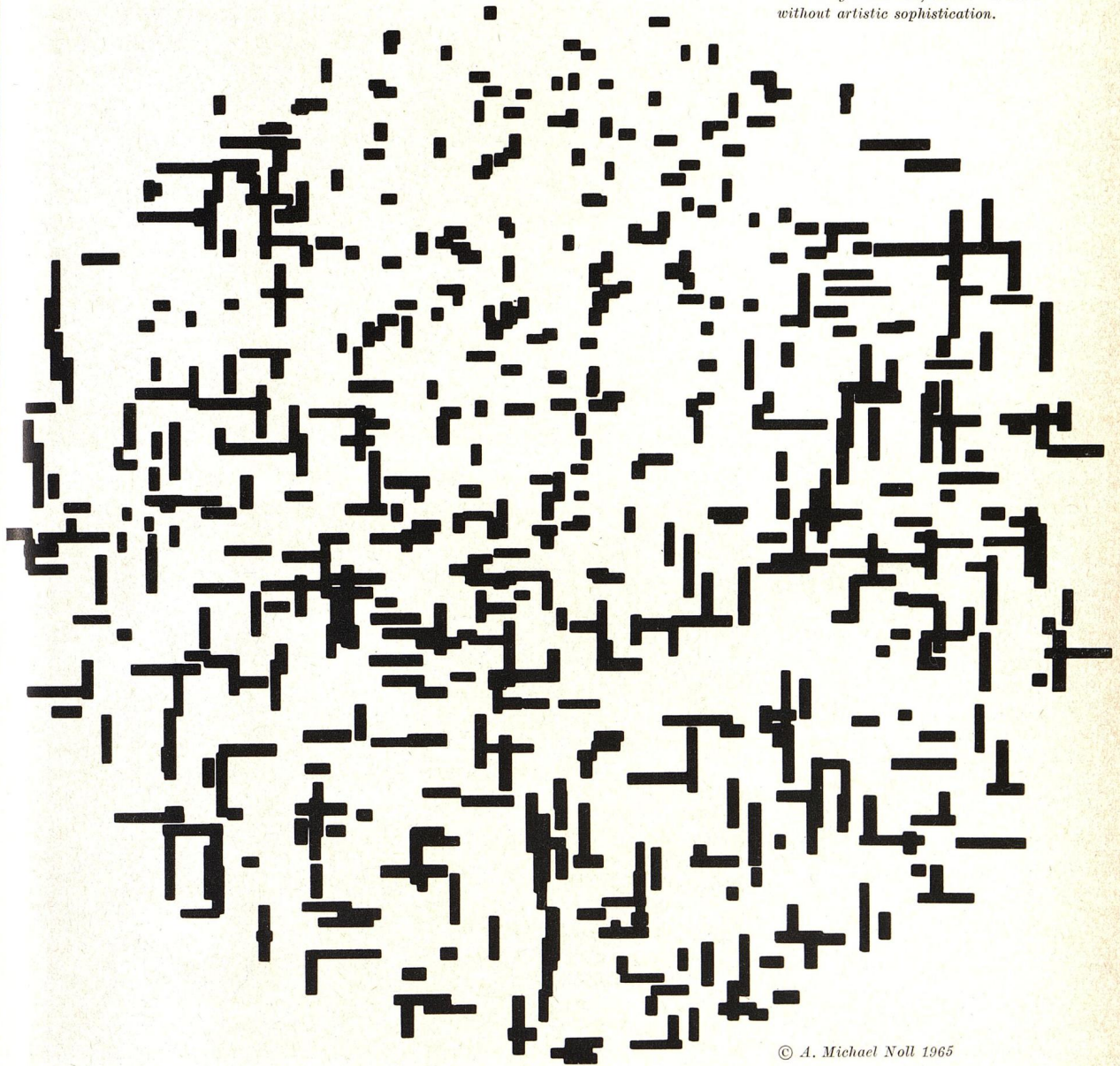
Shown here and on the following six pages are exciting examples of Computer Graphics, ranging from static compositions to frames of motion pictures. Although these pictures have in common the fact that they are not more than about three years old, they were generated by different types of equipment and different programming techniques. Moreover, the function of the pictures varies. Some of them may be said to approximate pure design or art, in that the visual result of the programming effort was an end in itself. In others, the pictures served to visualize complex physical phenomena—while still others were composed with the idea of setting the stage for the simulation of architectural and other environments. Finally, there are examples for the instructional use of computer-generated movies.

Whether microfilm photographs from the cathode ray tube (which has the capability of connecting by lines a set of points that are numerically labelled within a coordinate system) or ink drawings of a computer-driven plotter, the pictures all have an obvious visual fascination. Viewing them, one can't help but wonder whether this new medium will be accessible to designers in the not-too-distant future. —M.K.

*Two frames from the 10-minute computer-generated black-and-white sound film, "Force, Mass and Motion," by F. W. Sinden (Bell Telephone Laboratories, Murray Hill, N. J.). The film demonstrates with mathematical exactness the interaction of physical variables in producing the movement of bodies in space. The degree of exactness reached by the computer in a relatively short time could not be matched by a human animator.*

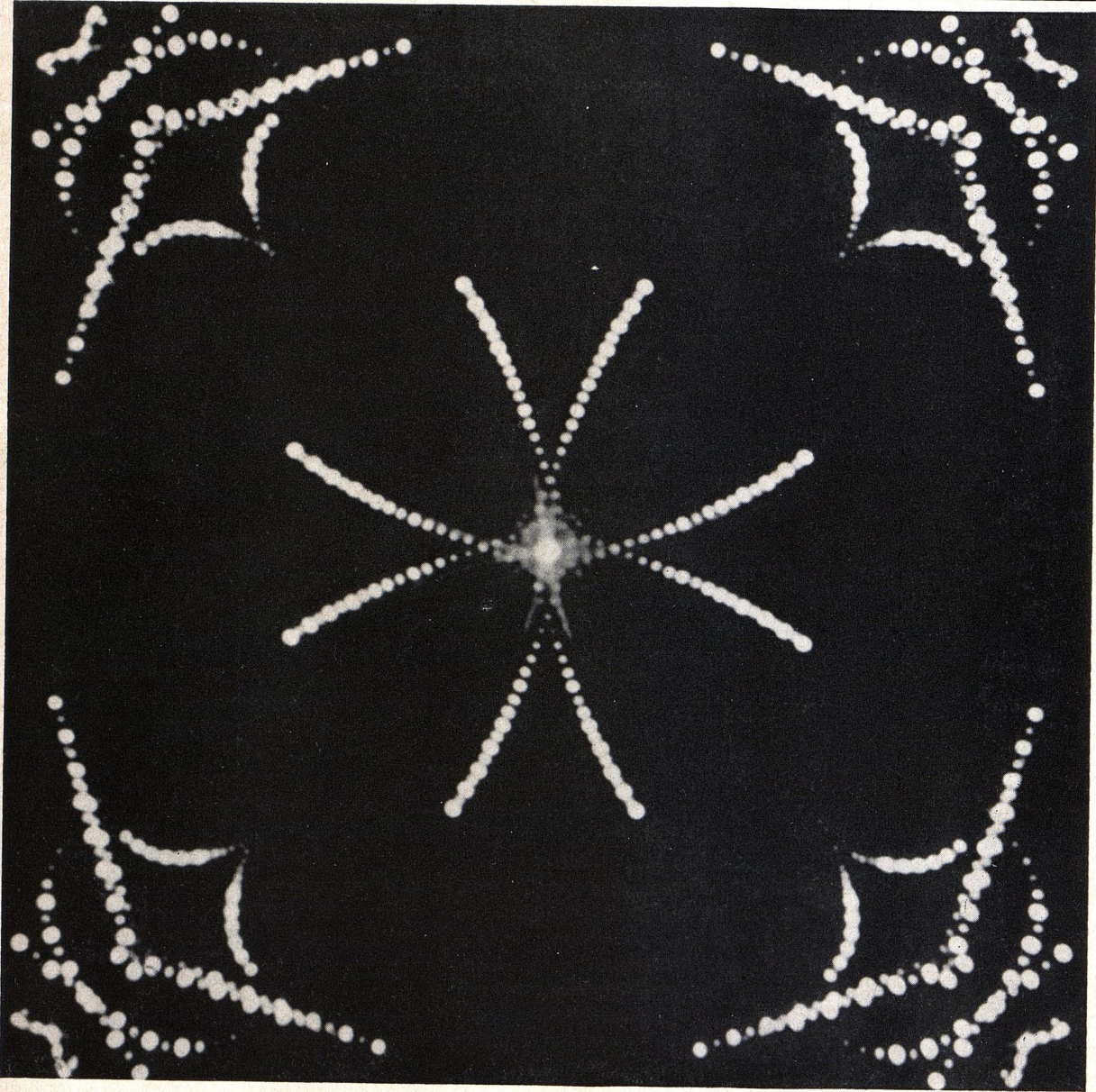
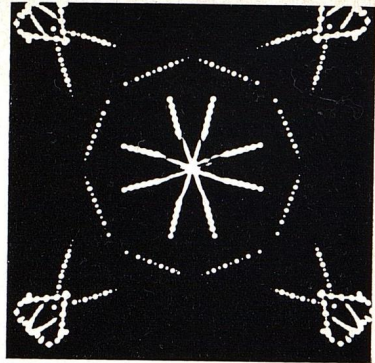


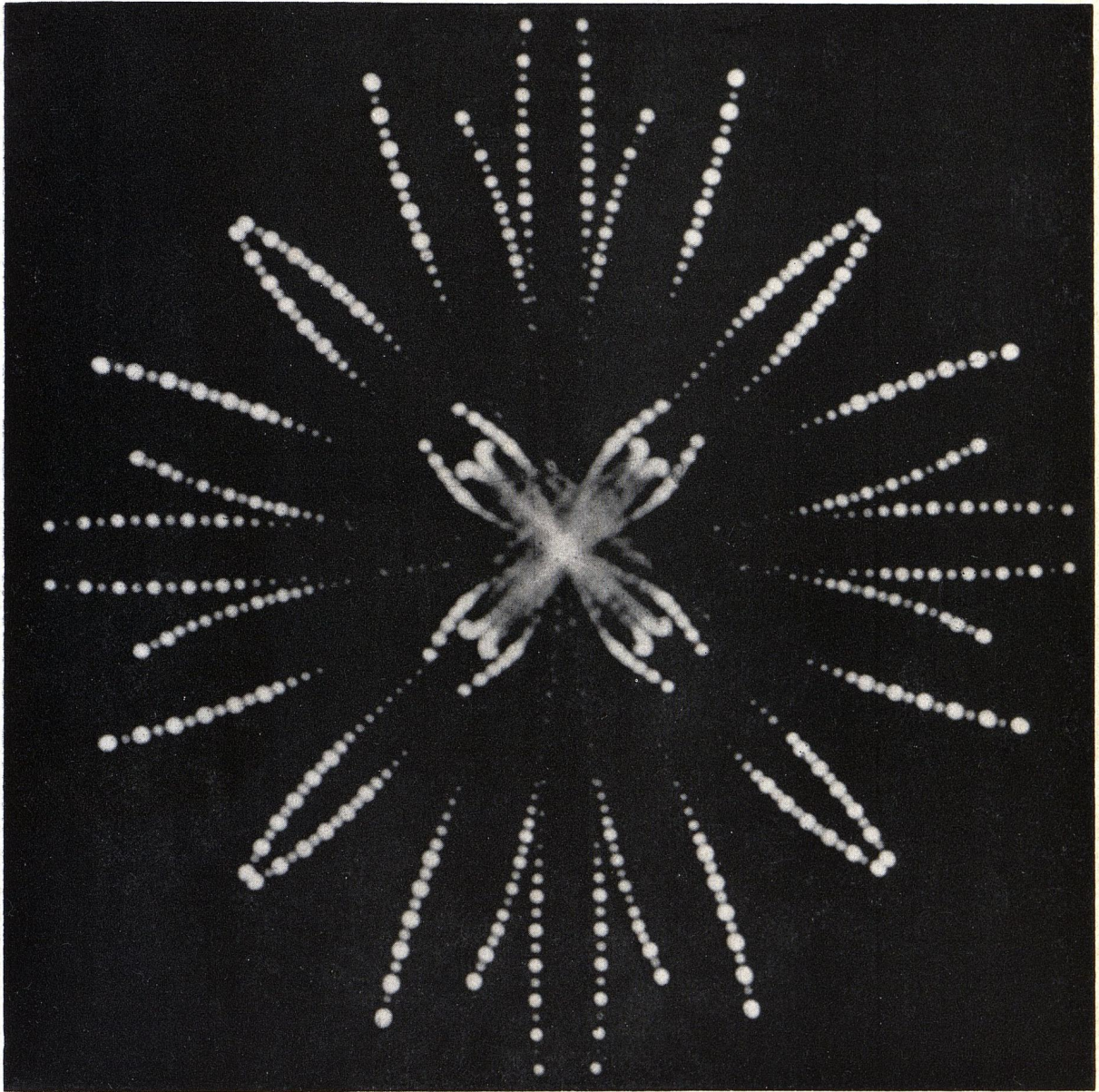
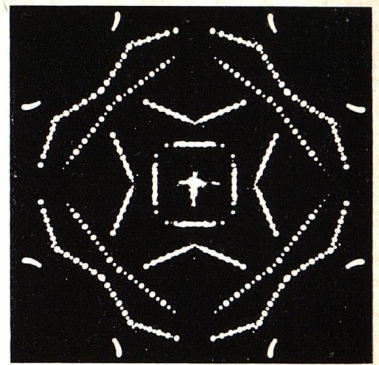
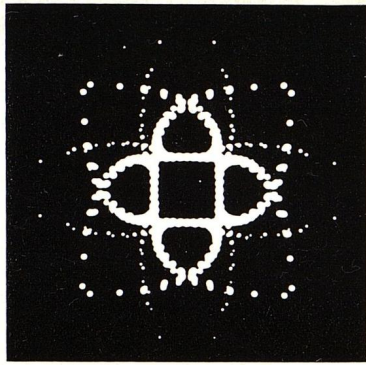
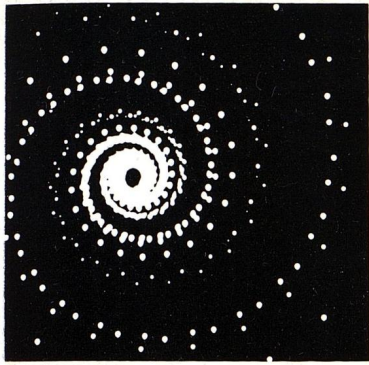
*Computer composition with lines (1964)  
by A. Michael Noll (Bell Telephone  
Laboratories, Murray Hill, N. J.). This  
computer-generated pattern was inspired by  
Piet Mondrian's "Composition with Lines,"  
1917 (Rijkmuseum Kröller-Müller, Otterlo,  
the Netherlands). In a psychological  
experiment, a sampling of 100 persons was  
given the Mondrian and the computer picture  
with instructions to identify the computer  
picture and to indicate which picture they  
preferred. Only 28 per cent of this group  
were able to identify correctly, and 59  
per cent preferred the computer-generated  
picture! The subjects were mostly technical  
and clerical personnel with high school or  
university education, but in the main  
without artistic sophistication.*



© A. Michael Noll 1965

Frames from a computer-generated film by George A. Michael and Robert Cralle (Lawrence Radiation Laboratories, Livermore, Calif.). These pictures are both the result of programming mathematical formulae and using the "controls" (i.e., facilities of the computer backed up by programs). In any case, the visual result is meant to be a fireworks of visual excitement. The film is presented in laboratory processed color.

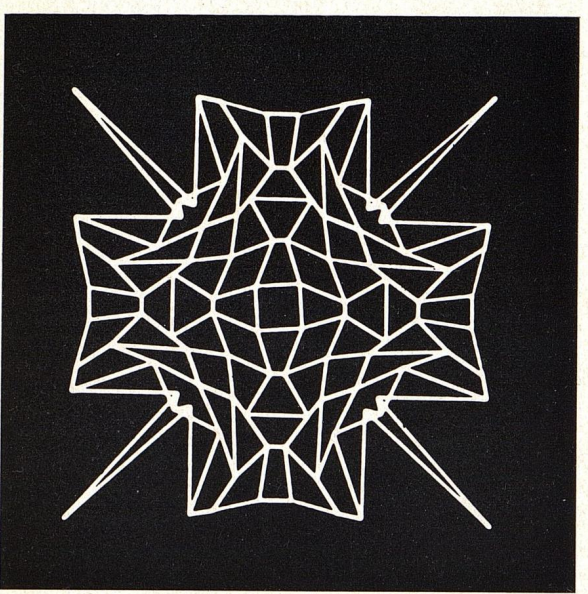
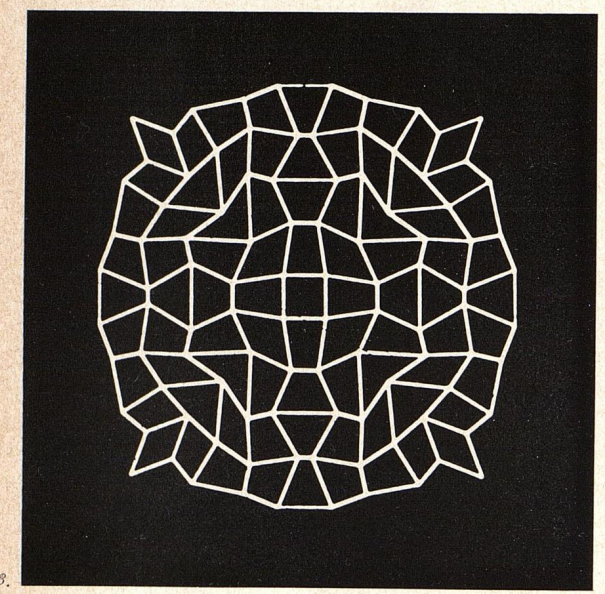
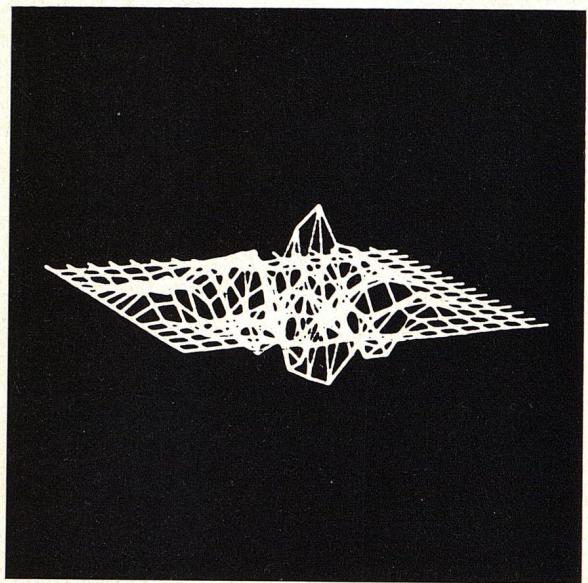
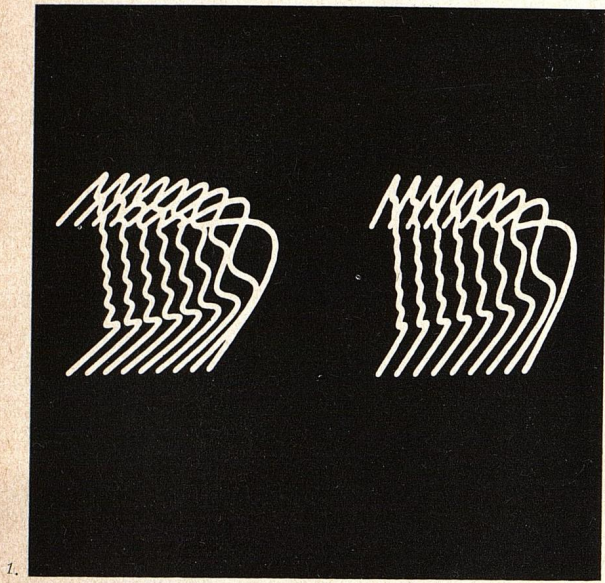




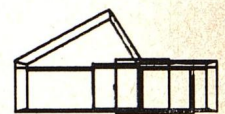
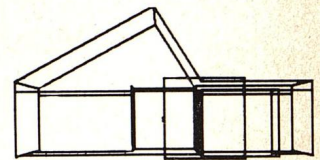
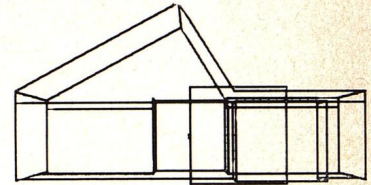
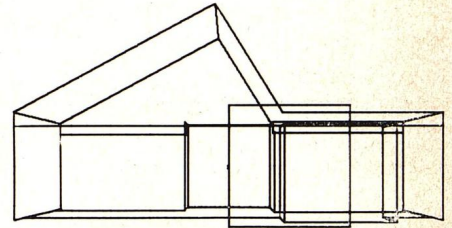
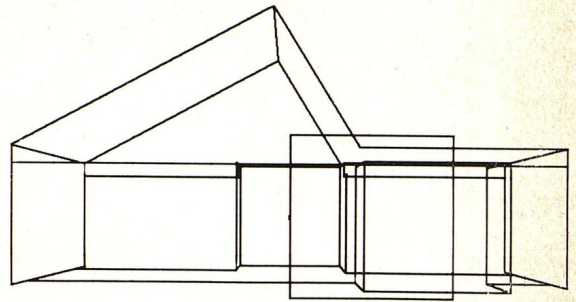
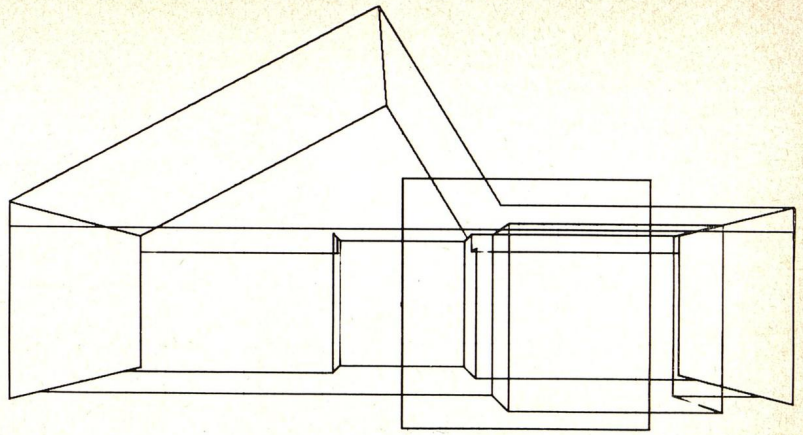
Frames from computer-generated films by George A. Michael and Robert Cralle (Lawrence Radiation Laboratories, Livermore, Calif.). Though the films are presented in color, it should be noted that the color, at the time the pictures were taken, was not computer-generated, but was the result of laboratory processing.

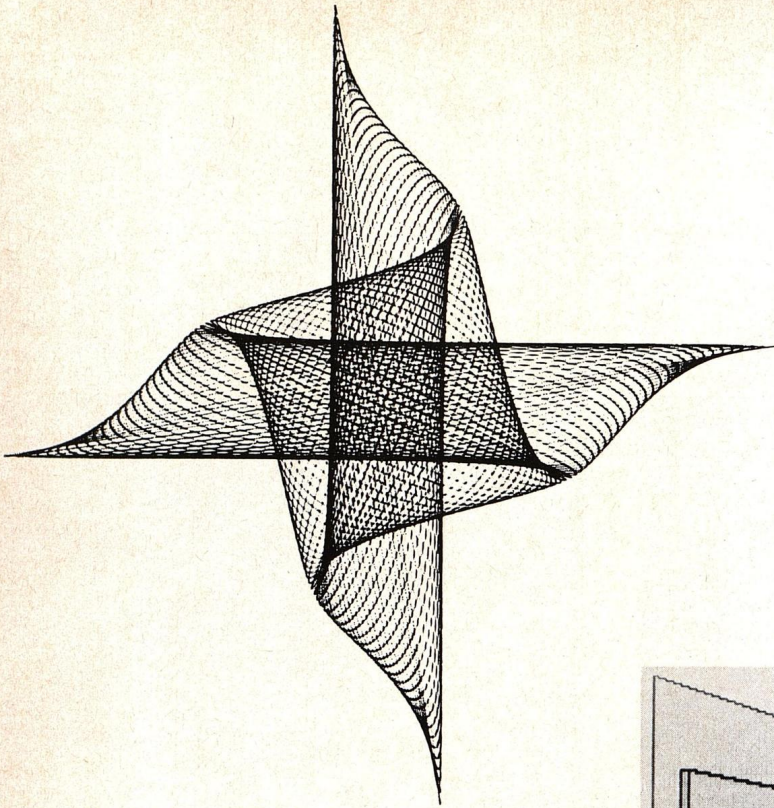
Fig. 1 is a frame from a stereo movie, presenting the left eye and right eye version of a complex rotating figure.

Figs. 2-4 represent stages in the deformation of mathematically defined grids or surfaces, which may in turn be models of physical processes in real time or slow-motion.



*In this series of pictures, drafted one by one on a Calcomp plotter, Toronto-born architect Allen Bernholtz (Harvard University) takes the viewer on a walk toward a house about to be constructed. Perspective programs driving the plotter allow the environmental designer to view a design before its realization from all points of view and all distances. You can walk toward a house, around it and enter it by the back door before it is even built. Pre-testing environmental designs visually is perhaps one of the most intriguing possibilities for the designer in the near future.*





*Above: A graphic form displaying the output of a mathematical formula. This form was generated on a Model 3500 electro-mechanical data plotter (EAI). Courtesy of Dr. Mack Rowe, chief, Economic Graphics Section, Division of Data Processing, Board of Governors of the Federal Reserve System. Right: Kenneth C. Knowlton (Bell Telephone Laboratories, Murray Hill, N. J.) has developed a motion picture language for computers based on a mosaic grid. An introduction to this language is presented in "A Computer Technique for the Production of Animated Movies," a 17-minute, silent black-and-white film. The two frames shown here demonstrate the capability of the language to generate animated sequences and film captions (lettering) containing several shades of gray.*

