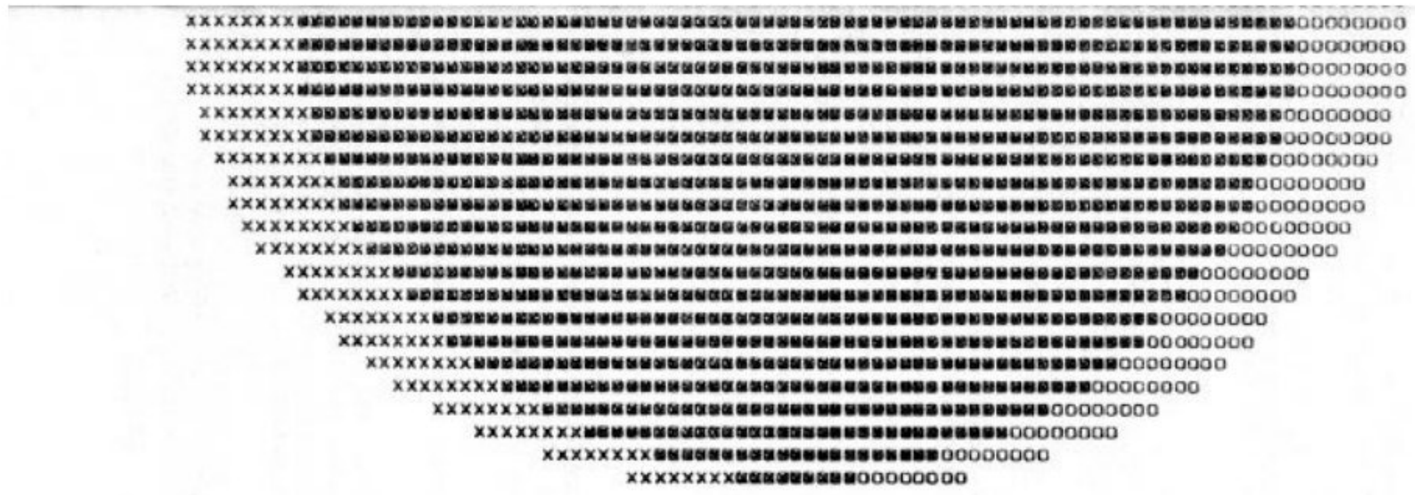
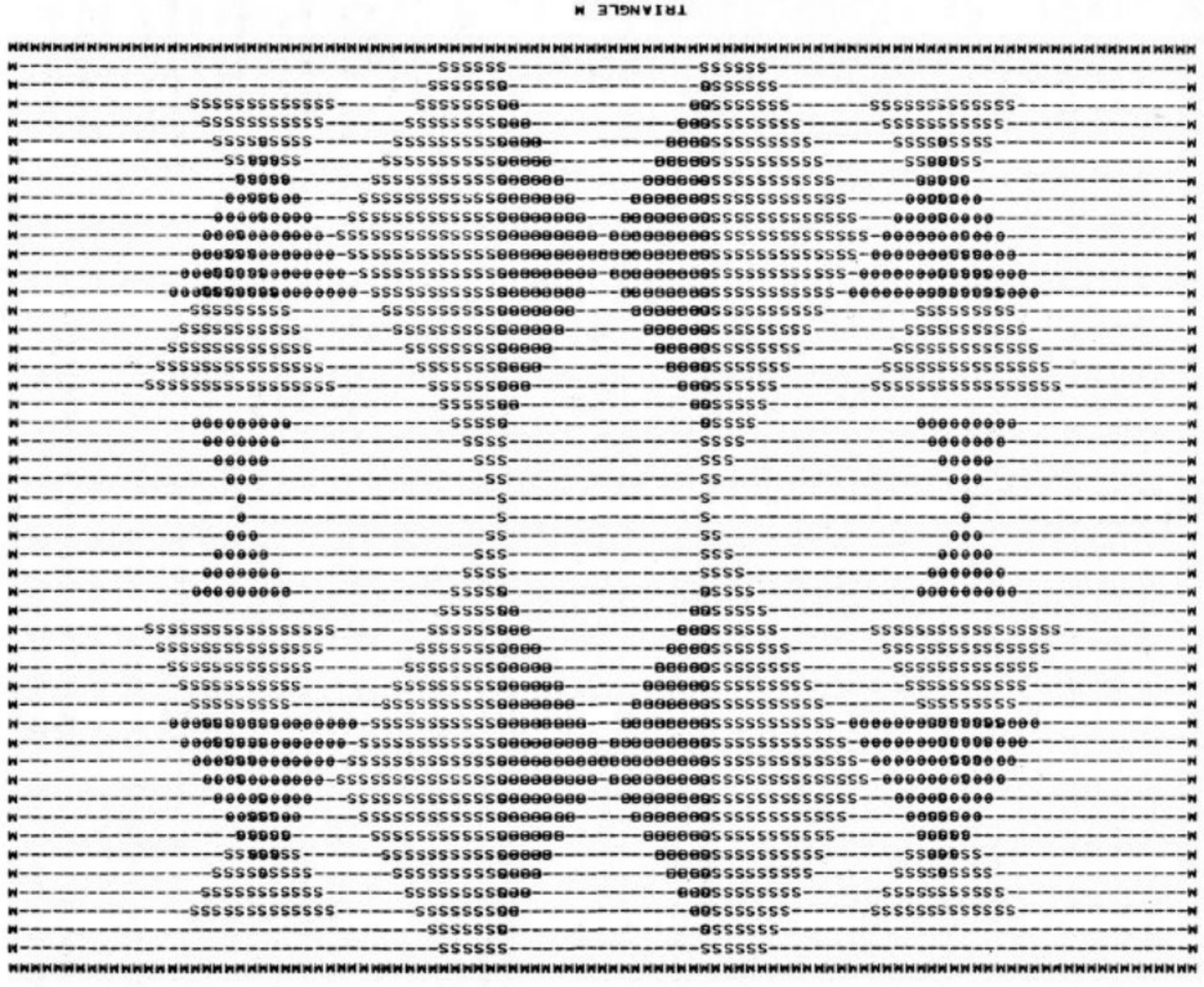
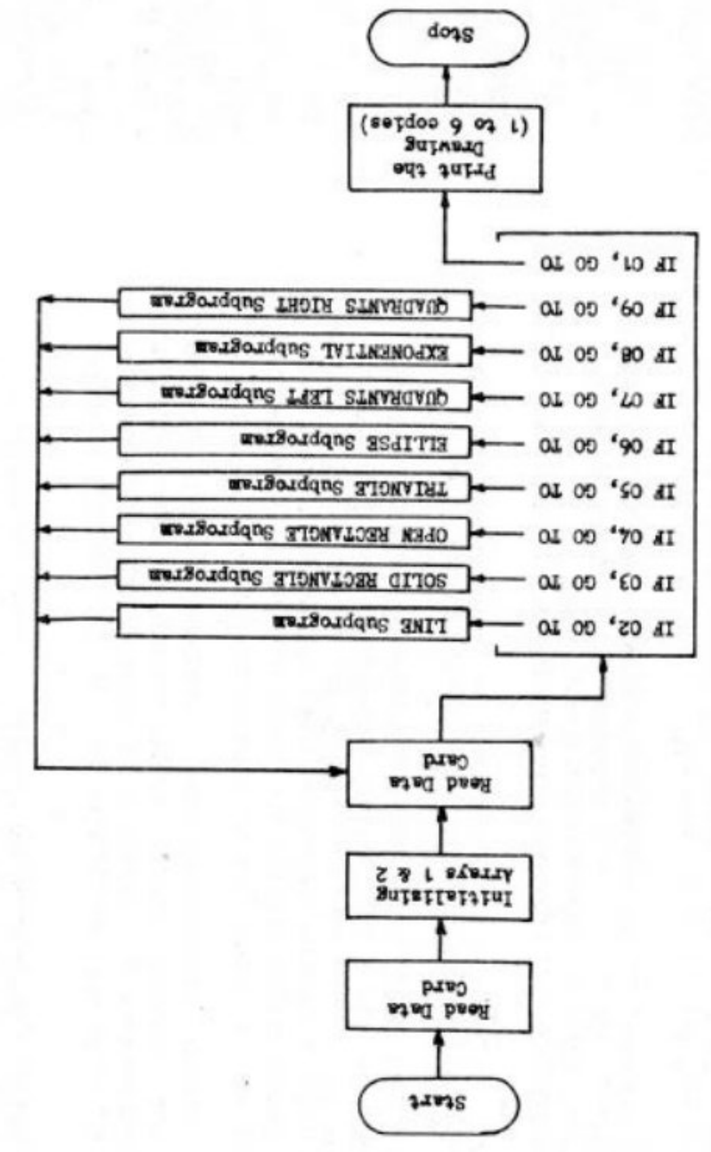


TRIANGLE M




Start
Read Data Card
Initialize Arrays 1 & 2
Read Data Card
IF 02, GO TO
IF 03, GO TO
IF 04, GO TO
IF 05, GO TO
IF 06, GO TO
IF 07, GO TO
IF 08, GO TO
IF 09, GO TO
IF 01, GO TO
LINE Subprogram
SOLID RECTANGLE Subprogram
OPEN RECTANGLE Subprogram
TRIANGLE Subprogram
ELLIPSE Subprogram
QUADRANTS LEFT Subprogram
EXPONENTIAL Subprogram
QUADRANTS RIGHT Subprogram
Print the Drawing (1 to 6 copies)
Stop

ART1 . . .

by Katherine Nash, Professor, Department of Studio Arts, University of Minnesota, Minneapolis, Minnesota, 55455, USA.

and Richard H. Williams, Associate Professor, Department of Electrical Engineering and Computer Science, University of New Mexico, Albuquerque, New Mexico, 87106, USA.

January 1970

Twenty years of a computerized society make it apparent that twenty years hence no artist can ignore the computer. He will have to adjust to it, cope with it, or use it. He cannot reject it. It will influence his creative thinking, as all aspects of society have always influenced the artist. The computer will be another tool for creativity.

There are three ways in which an artist can creatively approach a computer.
1. He can set aside a portion of his time to learn a computer language, and then write a program for the making of a work of art.
2. He can collaborate with a computer engineer in the making of a work of art.
3. He can work with a computer that already has within it's memory bank an art language upon which he can draw to make a work of art.

The average artist finds difficulty even contemplating the first. He doesn't want to take his time to be either a mathematician, or an engineer, or a scientist, and logic is not always to his liking. But if he is willing to assume the responsibility of learning a language to write a program, there is still the almost insurmountable problem at present of finding a computer that he can afford, and a situation that will accommodate him.

Some artists attempt the second solution. A creative imaginative man (the artist) attempts to verbally describe the requirements to a man of logic (the computer programmer). Too often a compromise results, and the artist in attempting to make a personal statement finds the statement no longer is personal.

The third alternative has been answered by a program called ART1. It does allow the artist to use his imagination to make a personal statement. It also permits him to gain a nodding acquaintance with the digital computer. ART1 results from the collaboration of an artist and an engineer. It is a language stored in a computer memory bank upon which an artist can draw. It is just a beginning. It does not require a computer programmer to hold the artist's hand. It is written to use the simplest and least expensive equipment. It is meant as a bridge between the artist's world and the world of technology. For the artist this language presents a beautiful introduction to the computer as well as presenting new horizons for creativity. This language makes it possible for an artist to create with a computer without a primary need of computer knowledge. The designs are rendered by a high speed printer controlled by a ditigal computer which, of course, is controlled by the artist. Examples of designs produced by this technique are shown in Figures 2 - 6.

The computer involved is an IBM 360/40*, and the printer used is an IBM 1403*, which is capable of printing at once a line of 120 characters at the rate of 1100 lines per minute.

ART1 in all its detail is somewhat involved. It contains approximately 350 separate statements written in FORTRAN IV, a programming language. An artist, however, never needs to concern himself with the programming complexities since the entire program is stored in the computer's memory bank. The program may be obtained by anyone simply by using one IBM card that has been key-punched: /INCLUDE ART1.

While some artists are indeed interested in programming details, most artists are content to understand the logical outline of ART1 as it is presented in the block diagram in Figure 1. ART1 causes the computer to reserve in its memory two arrays of storage spaces. It is these storage spaces into which the artist will put characters that the printer will ultimately print to make the design. Each array is considered to be a rectangle of 50 rows by 105 columns. Since the printer places the columns closer together than the rows, this proportion of rows to columns produces a printed field of approximately 3 by 5 proportion. See Figures 2 - 6.

The contents of the two arrays are controlled by the artist as described in the following. When the artist completes his design he signals the computer, and this causes the printer to print the contents of one array over the other. The value range available to the artist by one over-printing of any character over another is significantly greater than that produced by the characters themselves. The value range, however, is not significantly extended by additional overprinting. ART1 contains only one overprinting.

After the artist obtains the program by the /INCLUDE ART1 statement, he lists several "data cards." The first data card pertains to "initializing" the arrays in the computer's memory. Much of this initializing involves details that need not be discussed here. Suffice it to say that this data card is used to enter the design's title into the computer (see Figures 2 - 6), and to state how many copies of the design are desired (1 to 6 copies, as indicated in Figure 1).

All data cards after the initializing data card begin with 01, 02, 03, . . ., or 09. If an artist begins a data card with 02, the computer enters a LINE into one of the arrays. The proportion of the LINE and the location of the LINE in the design's field are specified to the computer by a relatively short code word (14 data card spaces) on the data card following the 02. The code word also specifies into which of the two arrays the LINE will be entered as well as which specific character is to be used. Given a starting point in the design's field, the artist can control the LINE's placement horizontally, vertically, or in any intermediate direction. One data card is required to place one LINE in one array. However, if the artist desires to repeat at a different location a LINE already specified on a data card then a labor saving feature is available. The same LINE may be repeated in a different location by stating a new starting row and column on the same data card using spaces 21 through 25. A third repeat may be specified in data card spaces 26 through 30, and so on to a 10th repeat specified in data card spaces 66 through 70. This same system of repeating a specified shape is available with other shapes in ART1 besides LINE. If the data card spaces reserved for repeating figures are left blank then no repetitions are made. Extensive use was made of the repetition technique in Figure 2, **Rain Pattern No. 3,** a design composed of LINE elements. The background of **Rain Pattern No. 3** was specified on the initializing card; only the superimposed design was made using LINE.

If the artist begins a data card with 03 or 04 the computer is instructed to generate rectangles as shown in Figure 3, **Opens and Solids;** 03 specifies SOLID RECTANGLES and 04 specifies OPEN RECTANGLES. As before, the character used to make the rectangle, as well as its location and proportions, are determined by a code word following either the 03 or 04 as the case may be. For example:

03 called SOLID RECTANGLE
0 specifies the character (symbol) to be used
2 specifies that the character is to be put into the second array
14 specifies the row of the upper left starting point
019 specifies the column of the upper left starting point
010 specifies the number of rows in the SOLID RECTANGLE
0026 specifies the number of columns in the SOLID RECTANGLE

Thus, the complete code word in this example is 0302140190100026, and it is placed in the first 16 data card spaces. This is all that was required to place the upper left SOLID RECTANGLE in **Opens and Solids**, Figure 3. One data card is required for each different rectangle in each array.

TRIANGLEs can be placed in a design by starting a data card with 05. Again, the character proportion and location of each TRIANGLE is specified by a code word which follows 05. The kind of TRIANGLE that can be generated by ART1 is limited. Typical kinds are illustrated in Figure 4, **Triangle M.** Each TRIANGLE is isosceles, and the diagonal edges are limited to slopes of one column by one row. This latter restriction is imposed in ART 1 because other slopes may present a stairstep appearance which tends to detract from the TRIANGLE's form. Other examples of TRIANGLE are in Figure 6.

ELLIPSEs may be specified to the computer by starting a data card with 06. The design in Figure 5, **Spheroids**, was made this way. In addition to specifying the printed character and the location of each ELLIPSE, the code word following 05 determines whether the vertical axis is longer, or if the horizontal axis is longer, or if the two axes are equal in which case a circle is generated. **Spheroids** shows examples of the latter two cases. Here two large ELLIPSEs are overlapped and slightly displaced one from the other. A smaller ELLIPSE, a circle of "blanks" is placed in each of the larger ELLIPSE's to make the effect of a hole. This is an example of the use of the "blank" as a character in its own right.

Data cards beginning with 07 or 09 generate what in ART1 is called QUADRANTS LEFT or QUADRANTS RIGHT. 07 takes whatever design is in the upper left quadrant of the arrays and generates a mirror image about the horizontal and vertical axes of symmetry. Figure 4 shows the effect achieved. 09 does the same thing as 07, but starts with the upper right quadrant. An artist may find that QUADRANTS LEFT would produce an effect entirely different than QUADRANTS RIGHT. The reader can visualize this by imagining the drastically different effects Figure 6 would make depending whether QUADRANTS LEFT or QUADRANTS RIGHT were to be used on it.

A different kind of shape called EXPONENTIAL is generated by a data card starting with 08. See Figure 6, **N and Z No. 1.** The reader may recognize that EXPONENTIAL is defined by the mathematical function

$$y = Ax \exp(Bx).$$

This curve has many pleasing aspects to one of the authors. EXPONENTIAL is used as an asymmetrical component that an artist may include in a design.

When the computer finally comes to a data card beginning with 01, the design assembled in the arrays is automatically printed using the high speed printer and the program is terminated.

The reader should note that ART1 is the result of an evolutionary process that extended over 18 months. It began in rather simple form when one of the authors, who is an engineer, began to work under the aegis of kinetic sculptor Charles Mattox. Many professional artists and art students influenced its development. Some results of using ART1 have been reported in the literature (1, 2). The program was given the name ART1 not only to signify that there may be an ART2, but also to symbolize that fruitful interactions of the arts and technology are legion, and there may be, some day, an ART INFINITY.

1) F. Hammersley. My First Experience with Computer Drawings. **Leonardo,** Vol 2, No. 4, October 1969.

2) J. Hill. **Leonardo**, Vol 3, No. 1, January 1970

* Located at the Computing Center of the University of New Mexico, Albuquerque, New Mexico.

COVER. Illustrations to the article ART 1, in this issue. Figure No1 is in top left corner. The sequence goes downwards.

ART1 IN ENGLAND

After receiving a copy of the ART1 program from Richard Williams, I got it running on the new 1905E at Brighton College of Technology, where I am a student. There are now three of us working on the project and we have attracted interest from several other students.

The first results produced by us have been on display at the Bradford Art Festival for the last month.

We are now considering how to extend the program. Our main question is; should we increase the range of shapes produced, or change the formats of the control cards to make them easier for the artist to use. ART2 would contain both these features, but we first require advice from experienced users as to which facilities would be of greater value to them.

We have some provisions for running the program up to and possibly after the beginning of June. If you are interested please get in contact and I will send you details.

Roger Saunders 29 Hazeldene Drive Pinner HA5 3NJ

PUBLICATIONS

'As fast as we apply computers, the world falls further apart. We are wrapped up in technical problems. We have our eyes down and pencils ready, but we are not listening for the numbers. For no particular reason we think computers may be of some use. Real Time is not a far out militant left journal. We call merely for the fast, gentle, dissolution of present structures of government, ownership, control, education, academic research, commerce, and civilian and military forces'. From an editorial in No. 3 of REAL TIME. This is now on two largish sheets, illustrated. The paper needs help with distribution, and requests contributions, comments etc. Subscription is 12/- per six issues. A good buy; from computer men – to computer men. Order from 66, Hargrave Park, London, N.19. 01-272-0093.

Herbert W. Franke, 'Computer und Visuelle Gestaltung'. elektronische datenverarbeitung, 2/70. Survey of computer art, with graphics by leading artists. The author is engaged on a book on the subject. (P5).

C.H. Waddington and R.J. Cowe, 'Computer Simulation of a Molluscan Pigmentation Pattern'. Journal of Theoretical Biology (1969) 25, 219-225. The formal characteristics of a colour pattern of complex appearance on a molluscan shell were studied by developing a computer program which produces an acceptable simulation of it.

The 1969 issue of THE STRUCTURIST is devoted to The Oblique in Art; the number is dedicated to Theo van Doesburg. The 1970 issue will be on Art and Morality: The Relevance of Art. THE STRUCTURIST, University of Saskatchewan, Saskatoon, Canada.

The IEEE Computer Group News is one of theliveliestpublications in the computer scene in content and presentation.

The forum on Social Implications invites constructive papers: suggesting practicable means for employing our technology in correcting the ills of society, reporting factually the good or bad social effects of computers, helping to correct misconceptions held by the lay public. Those outside the computer community are included in this invitation. Submit papers to H T Larson, Director of Planning, CalComp, 305 N Muller Street, Anaheim, California 92803.

The Newsletter of the Dutch Working Group for Computers and Verbal, Visual and Sonal Research (P6) has already reached its fourth number. It is a necessity for anyone seriously involved in the subject. No. 3 has the programme for the Symposium held on the 20-21 March, and a bibliography. Issue 4 lists the names of those present at the Symposium; 58 names. The first 4 issues are available for $1 from J. van der Wolk, Otterstraat, 51, Utrecht, Holland.

COMPUTERS AND ARCHITECTURE

'The Bulletin of Computer-Aided Architectural Design exists to promote an exchange of information between all those working with, researching into or interested in computer applications in architecture. Essentially, our items will cover; a) Programs-details of computer programs which are specifically concerned with architectural design. b) User experience-feed-back from architects using computers in practice, and c) Research-reports on research in progress. We shall also publish other relevant information, such as news items, book reviews and bibliographies.'

The first Bulletin appeared in October, 1969. It is an extremely useful issue. It is intended to produce this on a quarterly basis; at present copies are distributed free. Produced jointly by Design Research Laboratory, UMIST, and Architecture and Building Aids Computer Unit, Strathclyde, Scotland. The Editors are Nigel Cross (DRL) and Tom Maver (ABACUS). Re subscription, write to Tom Maver, ABACUS, School of Architecture, University of Strathclyde, Glasgow C1.

YOU ARE INVITED. . .

Third Annual ACM Computer Arts Festival in conjunction with the ACM 1970 National Convention to be held in New York, September 1-3, 1970. If you wish to submit works, you first have to obtain forms and send them off. Eventually, all works have to reach the organizers by June 15, 1970. Graphics, sculpture, film, music, etc. is eligible for entry. Reply to: Professor Monty Newborn, Dept. of Electrical Engineering and Computer Science, Columbia University, New York, N Y 10027. USA. To spur you to action, here is an extract from Professor Newborn's letter of invitation: 'With all the advantages of Fun City, the opportunity exists for a really outstanding show'. (Sic - or should it read sick? Ed.) There will be six prizes totalling about 1,000 dollars. The exhibit takes place in New York Hilton, 1-3 September, 1970.

UNLIKELY PHOTOGRAPHY

This is the provisional title of an ICA exhibition planned for the autumn of 1970. It will consist of three sections.1. Photographs of things that cannot be illustrated by any other means e.g. heat, sounds, smells and other physical sensations.2. Photographic misrepresentations, photographs which show things that don't exist or which contradict the truth. 3. Three dimensional photography.

The range of techniques topics include; microphotography, photomacrography, macrophotography, photomicrography, electron micrography, stereoscan electron micrography, X-ographs, false-colour processes, infra-red photography, ultra-violet photography, radiography, holography, ultrasonic, holography, thermography, nuclear track photography, bubble chamber photography, extreme wide-angle photography, time-lapse photography, high-speed photography, space photography, aerial photography, image enhancement techniques, underwater photography, colour schlieren photography, non-topographical photogrammetry, chrono-cyclegraphs, stroboscopic photography.

Contributions are invited from professional and amateur photographers. Further details from the organiser; Jasia Reichardt, ICA, Nash House, 12 Carlton House Terrace, London SW1. 01-930 0493

OPPORTUNITIES AT YORK, ONTARIO

York University, 10 miles north of Toronto, is new and rapidly expanding. Within it the Faculty of Fine Arts is newer still and expanding more rapidly. The emphasis is practical, with programmes in art, film, music, theatre, dance and interdisciplinary courses.

Stirling Beckwith, director of the programme in music is paying special attention to electronic music and the use of computers in composition. Cooperation is planned with Gustav Chiamaga at Toronto and Lejaren Hiller at SUNY, Buffalo.

The crucial element in all the plans is people. There is a need for technologists and practitioners, not only to set up new studio facilities, but also to bridge, by teaching and research those areas of science and art that have lived apart too long.

Stirling Beckwith, Programme in Music, York University, 4700 Keele Street, Downsview, Toronto, Canada.

AIMS AND MEMBERSHIP

The aims of the Society are to encourage the creative use of computers in the arts and allow the exchange of information in this area. Membership is open to all at £1 or $3 per year; students half price. Members receive PAGE and reduced prices for Computer Arts Society public meetings and events. The Society has the status of a specialist group of the British Computer Society, but membership of the two societies is independent. Libraries and instututions can subscribe to PAGE for £1 or $3 per year. Extra copies will be sent to the same address at half price. No other membership rights are conferred and there is no form of membership for organisations or groups. Re membership subscription, circulation and information, write to Alan Sutcliffe.

COMPUTER ARTS SOCIETY ADDRESSES

Chairman Alan Sutcliffe ICL Brandon House Bracknell Berkshire
Secretary John Lansdown 50/51 Russell Square London WC1
Editor of PAGE Gustav Metzger BM/Box 151 London WC1

PAGE. The Editor is always seeking news on all aspects of computer art. (P) followed by a number, refers the reader to a previous number of PAGE where information relevant to the topic will be found.

COMPUTER GRAPHICS FOR THE MILLIONS

From 7 April till 23 May, 1970, the first computer graphic postage stamps will be on sale in Holland. There are five compositions in a variety of colours.

MEETINGS

18 April 1970, 7.30 pm: 'Evening of Computer Art' presented by Computer Arts Society, Midland Institute, Birmingham.

20 April, 1970, 7.30 pm: 'Machines à communiquer' (Réflexions sur les mass-media). Conference de Pierre Schaeffer, Directeur du Service des Recherches de l'O.R.T.F. French Institute, Queensberry Place, London, S.W.1.

21 April, 1970: 'Computer-Aided Design of Electron Optics'. Ranmoor Hall, University of Sheffield. The Editor, Computer-Aided Design, Dorset House, Stamford Street, London, S.E.1.

20-24 April, 27 April-1 May, 1970: 'Techniques for Design Automation'. Design Automation Systems'. Engineering and Physical Sciences Extension. University Extensions. UCLA Los Angeles, California, 90024. USA.

29 April, 1970, 7.30 pm: Computer Arts Society, Music and Studio Visit. Electronic Music Studios, 49, Deodar Road, London, S.W.15. (By District Line to Putney Bridge, turn left out of station, cross river by foot way on the railway bridge. The gate of studio is at the foot of the steps leading from the bridge.)

27 May, 1970, 7.30 pm: Computer Arts Society, 'Evening of Computer Films'. Institute for Research in Art and Technology, 1, Robert Street, London, N.W.1.

8-9 July, 1970: 'Computer Pioneers who made the Past and will shape the Future'. Chairman, Richard H. Williams. Participants include J. Presper Eckert; Professor G.C. Edwards; Dr. Grace Murray Hopper; B.J.A. Hargreaves; F. Filipazzi; Professor Konrad Zuse; Bruno Le Clerc; T.R. Thompson; Edmund C. Berkeley. School Fee 100 guineas; this does not cover residence. For fuller details see page 29, Computers and Automation, February, 1970. Registration: Computer Consultants, GPO Box 8, Llandudno, Wales, Great Britain.

EXHIBITIONS

9-21 March, 1970. 'Auf dem Wege zur Computerkunst'. Works by Klaus Basset, Dr. Herbert W. Franke, Hein Gravenhorst, Gottfried Jäger, Dr. Frieder Nake, Dr. Georg Nees, Kongresshalle, Davos, Switzerland.

14-16 April, 1970. Exhibition of Computer Grapic Equipment. Also exhibition of Computer Art arranged by the Society. Brunel University, Uxbridge, Middlesex. Entrance charge 15s. Tuesday, 9.30 – 6.30. Wednesday, 9.30 – 9.00 pm. Thursday, 9.30 – 4 pm.

14-17 April, 1970. Exhibition of Computer Art within IBM Congress Exhibition. Congress Halls, Amsterdam, Holland.

22 April-19 May, 1970. Roy Ascott. Recent work. Angela Flowers Gallery, 15, Lisle Street, London, W.C.1. 01-734-0240. Roy Ascott is a pioneer in relating art and cybernetics. An illustrated article of his appears in the April number of Studio International.

23 April-23 May, 1970. 'Computer Kunst' Kunstverein e.V. 8 Munich 22. Galeriestr. 4 Germany.

CONCERTS

16 April, 1970, 8 pm: Scratch Orchestra, 'Rocks' programme devised by Diane Jackman. St. Pancras Assembly Rooms, London, N.W.1.

24 April, 1970, 7.45 pm: Scratch Orchestra, 'Roger Smalley Memorial Concert' devised by Bryn Harris. Works by La Monte Young; Roger Smalley; Scratch Music; Michael Chant; Cornelius Cardew; Bryn Harris. St. John's Smith Square, London, S.W.1.

30 April, 1970, 8 pm: Scratch Orchestra, 'Prizewinners Concert', programme devised by Howard Skempton. St. Pancras Assembly Rooms. Tickets for all these concerts 6/- available at door.

THANKS TO GRATTAN WAREHOUSES LTD

Grattan Warehouses Ltd, the Bradford mail-order firm, sponsored the recent Computer Arts Society contributions to Bradford Arts Festival: exhibition, discussion and performances. We thank them.

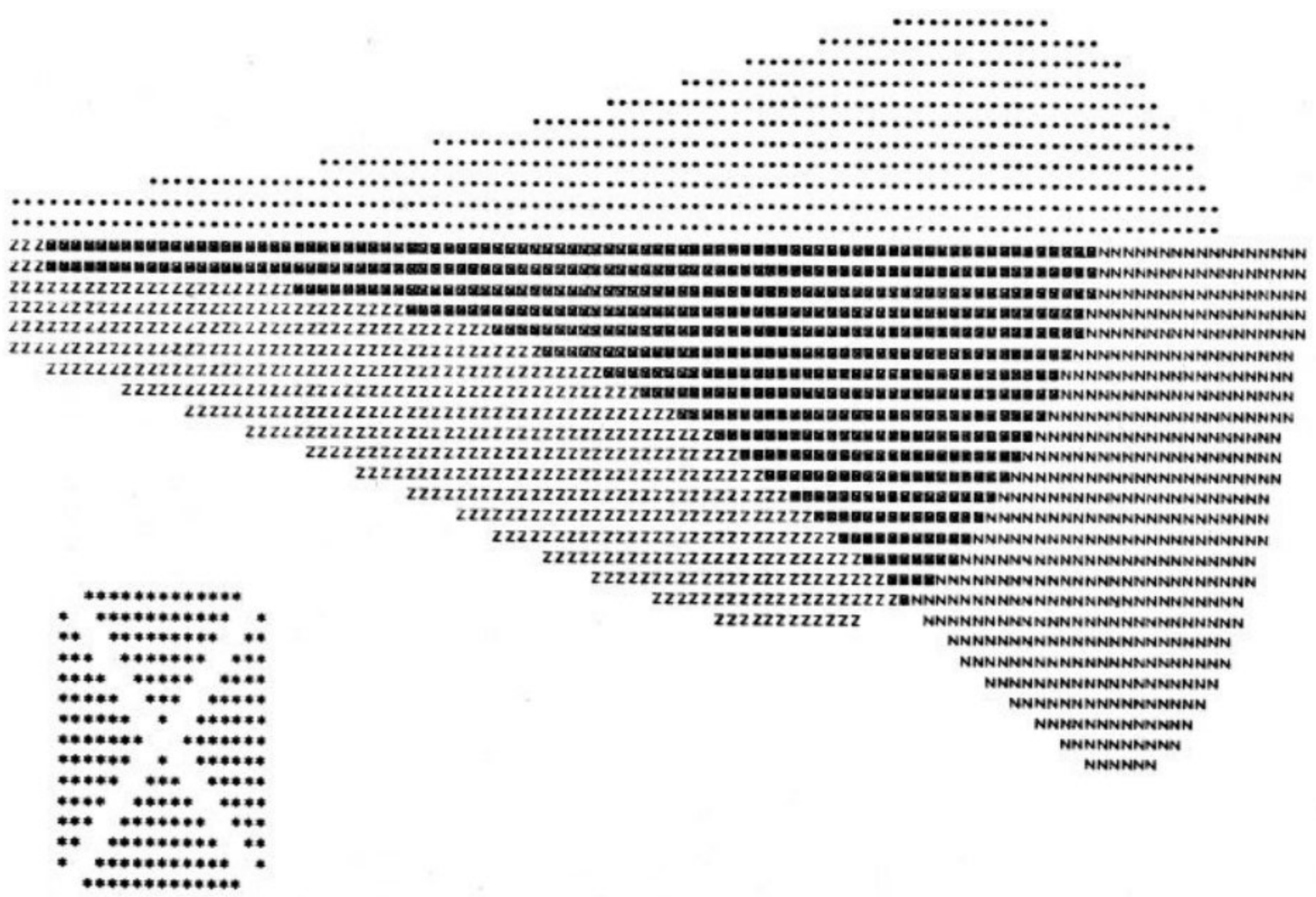
HOW'S YER GRAMMER GRAMMAR

Work is proceeding at the Mathematisch Centrum in Amsterdam on the generation of grammatically correct English sentences. Output on 19 March 1970 ran from

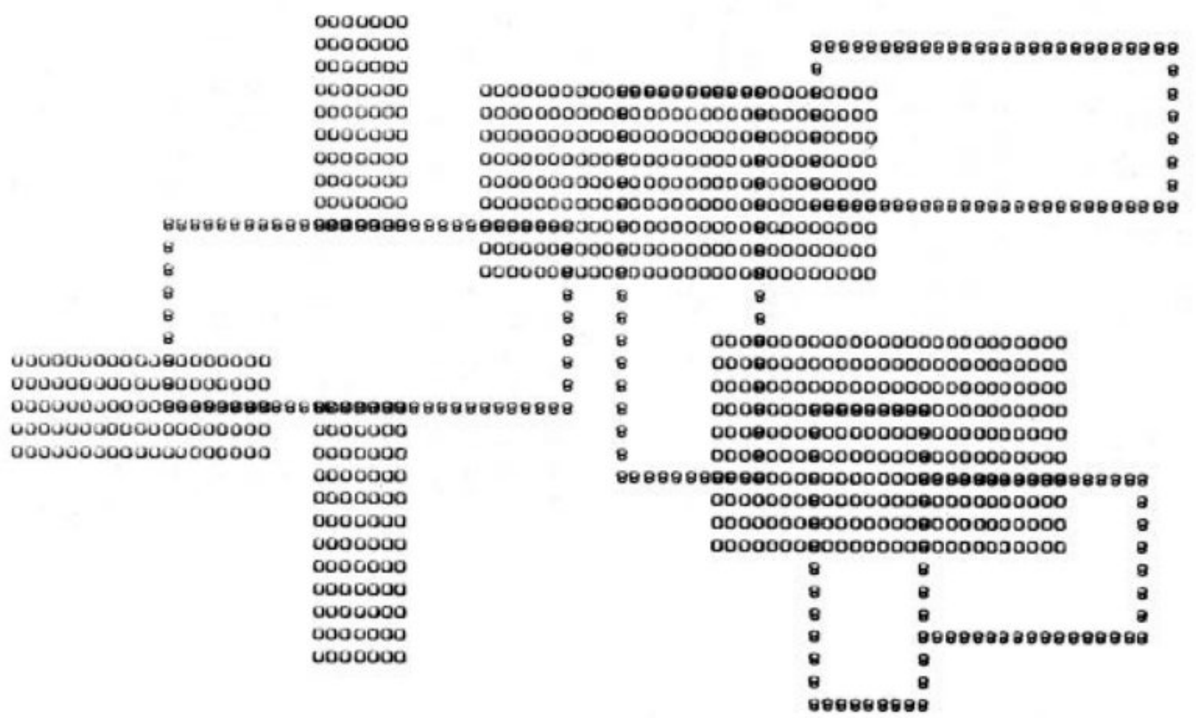
HE HAS HER
and
THE WORLD FAMOUS X-8 COMPUTER LIKES MARY
to
A LAMB FROM CLEVELAND (OHIO) IS THAT HUNTER BECAUSE THE TREE, THAT DAVID LIVINGSTONE DREAMS ABOUT ALWAYS EATS THE RATHER BAD TREE, THAT MARY EATS BECAUSE A NICE BOY, THAT THE TREE DREAMS ABOUT OFTEN SMELLED THIS RATHER NICE LAMB, THAT WAS NICE.

Printed by F.S. Moore Ltd., 33-34 Chancery Lane, London, W.C.2.

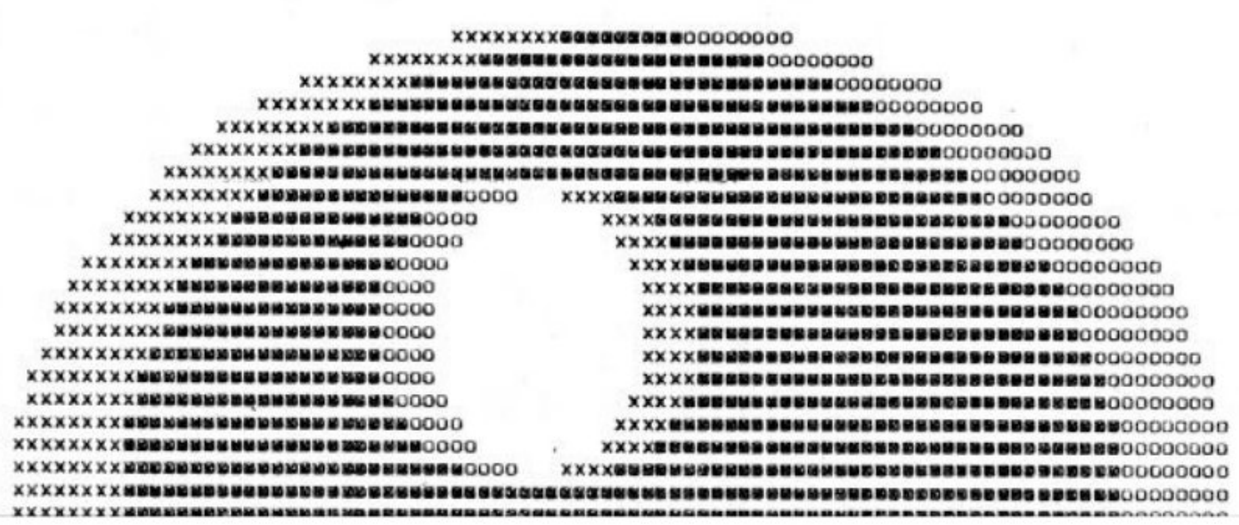
N AND Z NO. 1



OPENS AND SOLIDS



SPHEROIDS



RAIN PATTERN NO3