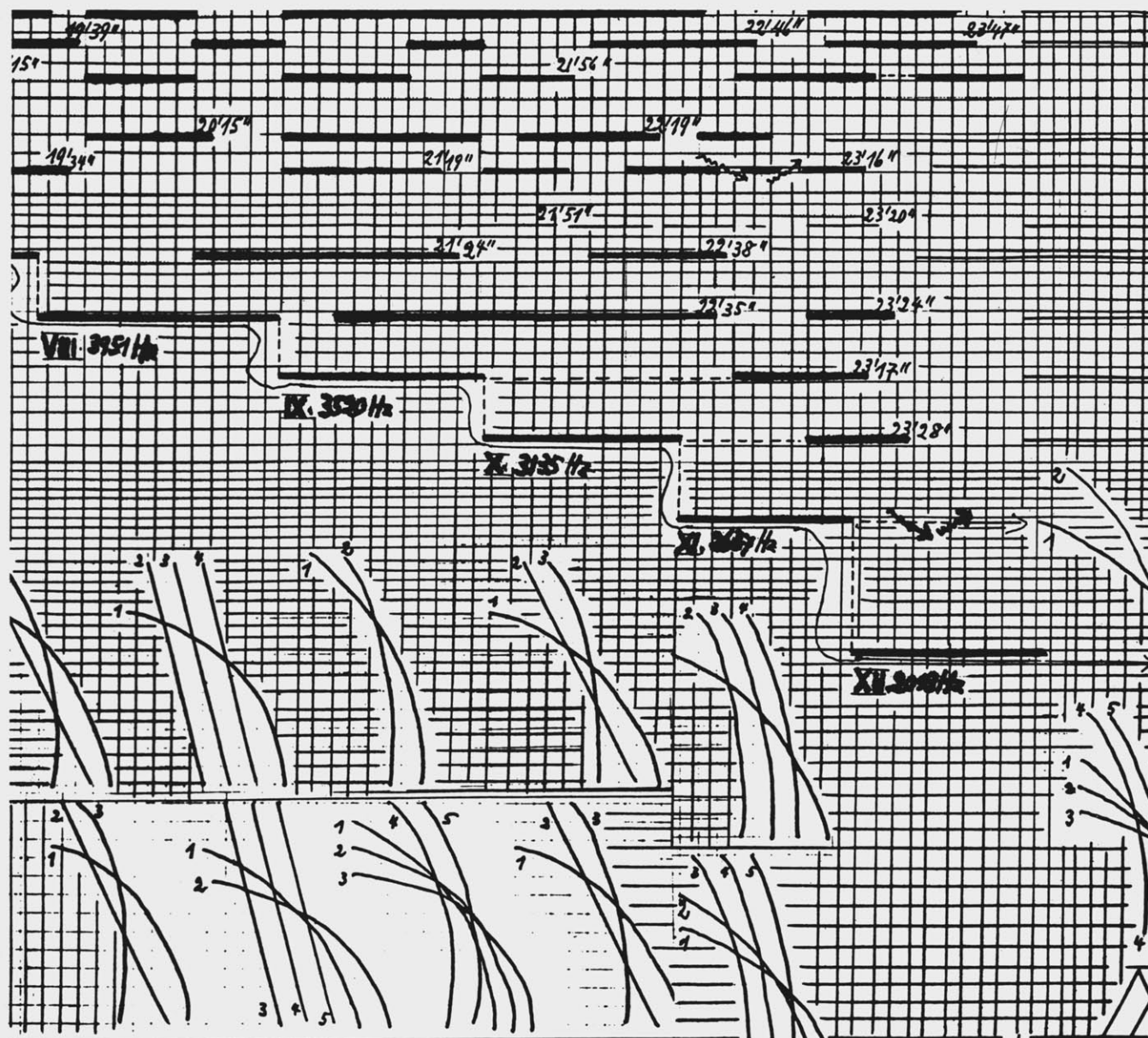


PAGE 45

COMPUTER ARTS SOCIETY QUARTERLY

JULY 1980



BENNO AMMANN: SPLENDEURS NOCTURNES

PAGE

Number 45 July 1980 Editor: Dominic Boreham

COMPUTER ARTS SOCIETY QUARTERLY

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EDITORIAL

PAGE is beginning to gather momentum again, and I am getting a little feed-back from contributors and readers. We still have some difficulties; both financial and in terms of the number of man-hours needed to prepare an edition, get it to press, and then mailed. At present all of this work is done voluntarily, and I would like to thank Sharon Nightingale for all the time she has given, or more precisely, is giving, particularly in mailing PAGE out to subscribers and re-organizing our membership records. In addition, we have John Lansdown to thank for his unfailing and continued support in keeping PAGE afloat.

I hope that you, as a subscriber, will bear with us if you are finding that PAGE arrives rather late. One of my aims is to provide comprehensive coverage of current and forthcoming activities, so that PAGE provides, amongst other things, a really useful information service. It is, therefore, disheartening if such information is sent out too late to be of any use. This is one of the reasons why I am currently attempting to secure further sponsorship for PAGE that will enable us to produce the journal in a more professional way. I hope that 1981 will see us with an efficient publishing system, but I must add that if PAGE is to be really worthwhile, these efforts must be matched by a greater sense of involvement from members. So get writing!
D.B.

Cover: Detail of a page from Benno Ammann's Score for "Splendeurs Nocturnes"

MUSIC

B e n n o A m m a n n : "Splendeurs nocturnes"

Langgehaltene hohe Töne, mit Sprachsignalen Amplituden- und Frequenz-demoduliert, setzen sukzessiv in logarithmisch-proportionaler Zeitfolge ein, und verdichten sich zu einem komplexen Klang von atonalen Akkorden, aus denen, in Gruppen aufgeteilt, durch Computer (DIGITAL PDP 15) gesteuerte Staircases und Glissandi abgeleitet werden, und insgesamt in tiefere Klangbereiche absteigen.

Studio Utrecht 1976

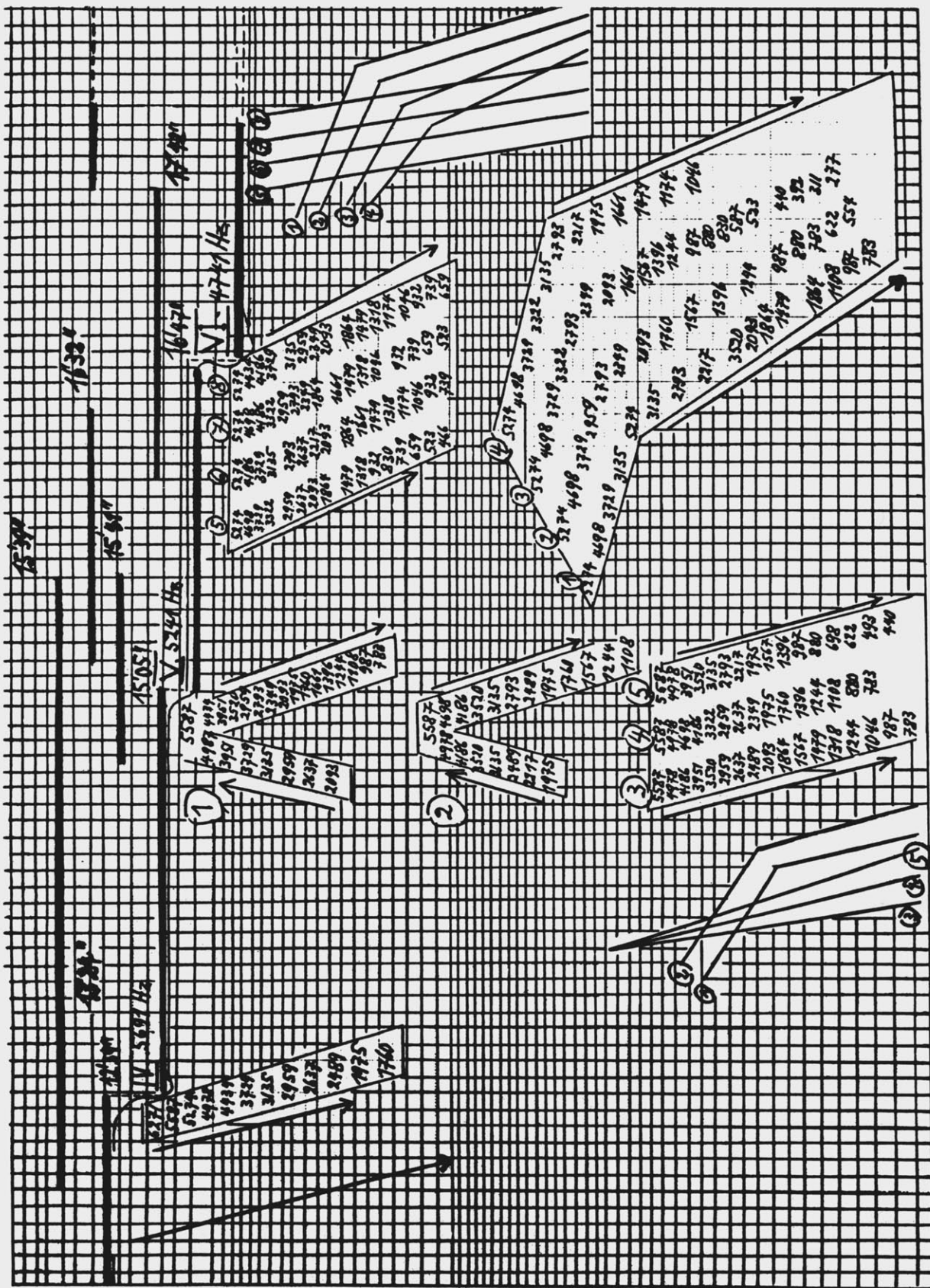
Hauptanliegen bei der Komposition dieses Werkes waren: Erforschung des Klangspektrums zwischen 2000 Hz und 8 000 Hz und dessen Reaktion auf bestimmte elektronische Vorgänge, Gestaltung einer neuen Form nach logarithmischer Proportion.

BENNO AMMANN, the Swiss conductor and composer, was born in 1904 in Gersau. He studied music in the Conservatory of Leipzig, majoring in composition and direction before working in Paris (1934) with Arthur Honegger, Albert Roussel and Darius Milhaud. His youthful spirit has always ensured his involvement in musical innovations and after the war he worked with Pierre Boulez, Olivier Messiaen and Karlheinz Stockhausen at Darmstadt (since 1952). He has appeared as a conductor with a number of leading European orchestras, and has written a great many chamber and choral works, cantatas, ("Flight from the Depth") and ballets, ("The Two Visits", "Waterplants"). In his sixties, still active and keen to learn, he turned to electronic music. He has collaborated with the R7 Studio in Rome (1969-1972), the I.P.E.M. Studio at Gent University, the Institut voor Sonologie at the University of Utrecht (1973-1976), and the Electronic Music Center at Columbia Princeton University of New York (1977-1978).

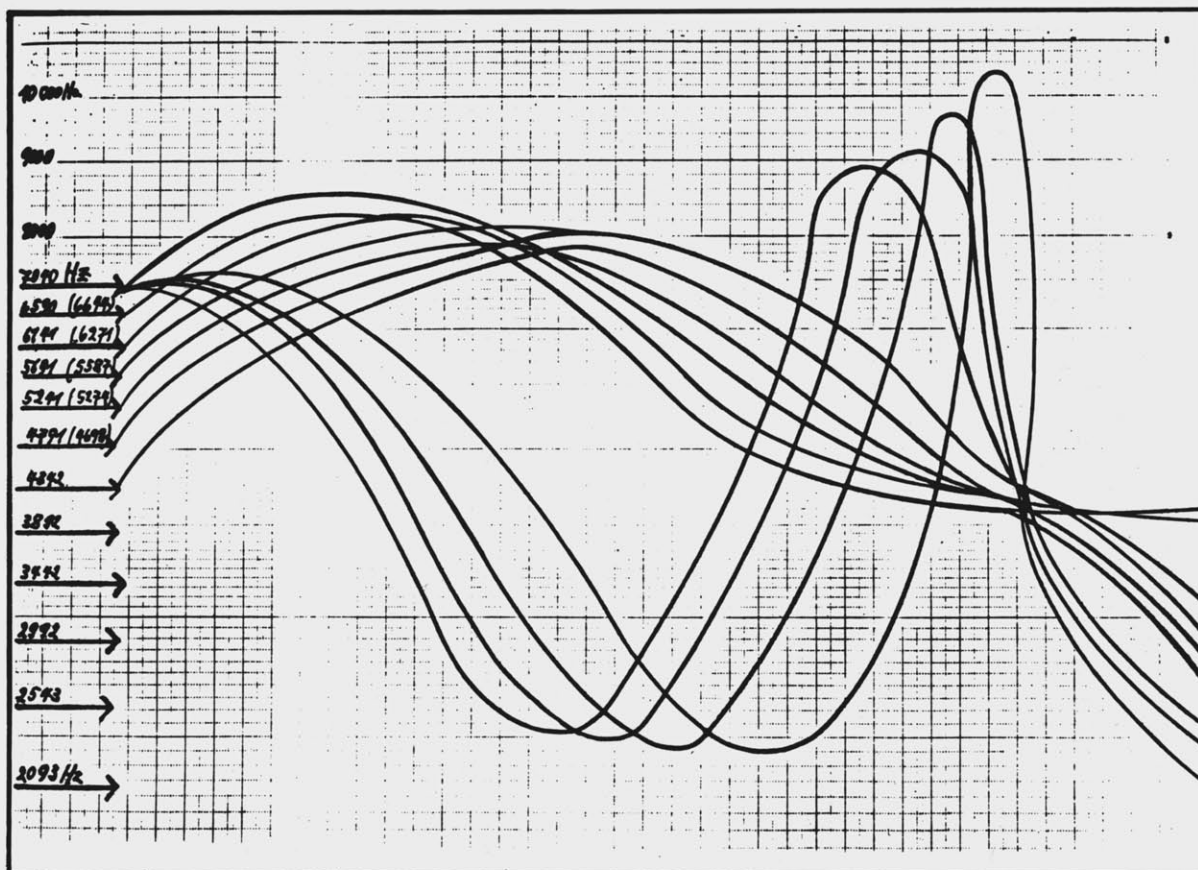
Thus the composer-conductor left behind the Leipzig tradition which he had studied, and progressed through his activities at the Basle Theatre and the Opera in Rome, unearthing works by Boieldieu, Méhul and Grétry, which he subsequently directed. Benno Ammann's career displays a lengthy and impressive evolution by which he came to his electronic works of the past decade; works that often contrast or blend the human voice or an instrument with electronically synthesized sound.

Of particular interest in this instance is "Splendeurs Nocturnes", an electronic score produced with the aid of a PDP 15 computer in 1975-1976 at the Utrecht Studio, (mentor: Werner Kaegi, professor at the Instituut voor Sonologie). The first part (about 12 minutes) was conceived for 4 track tape and orchestra. Considered here in detail is the second part, 14 minutes long, styled as a slow and progressive descent from the highest pitches of the sound scale.

The composer chose a row of high frequency tones, between 2000 and 7040 Hz, with a double series from between 7500 and 15000 Hz, for which the sequence of twelve phases is based on a logarithmic law, and which appear at mathematically proportioned intervals, combining later to form complex atonal chords. These twelve phases constitute twelve steps of the 'Principle Curve' (the base structure depending on twelve values determined by Jacobi's



page 3
 6000 Hz
 5000 Hz
 4000 Hz
 2000 Hz
 1000 Hz



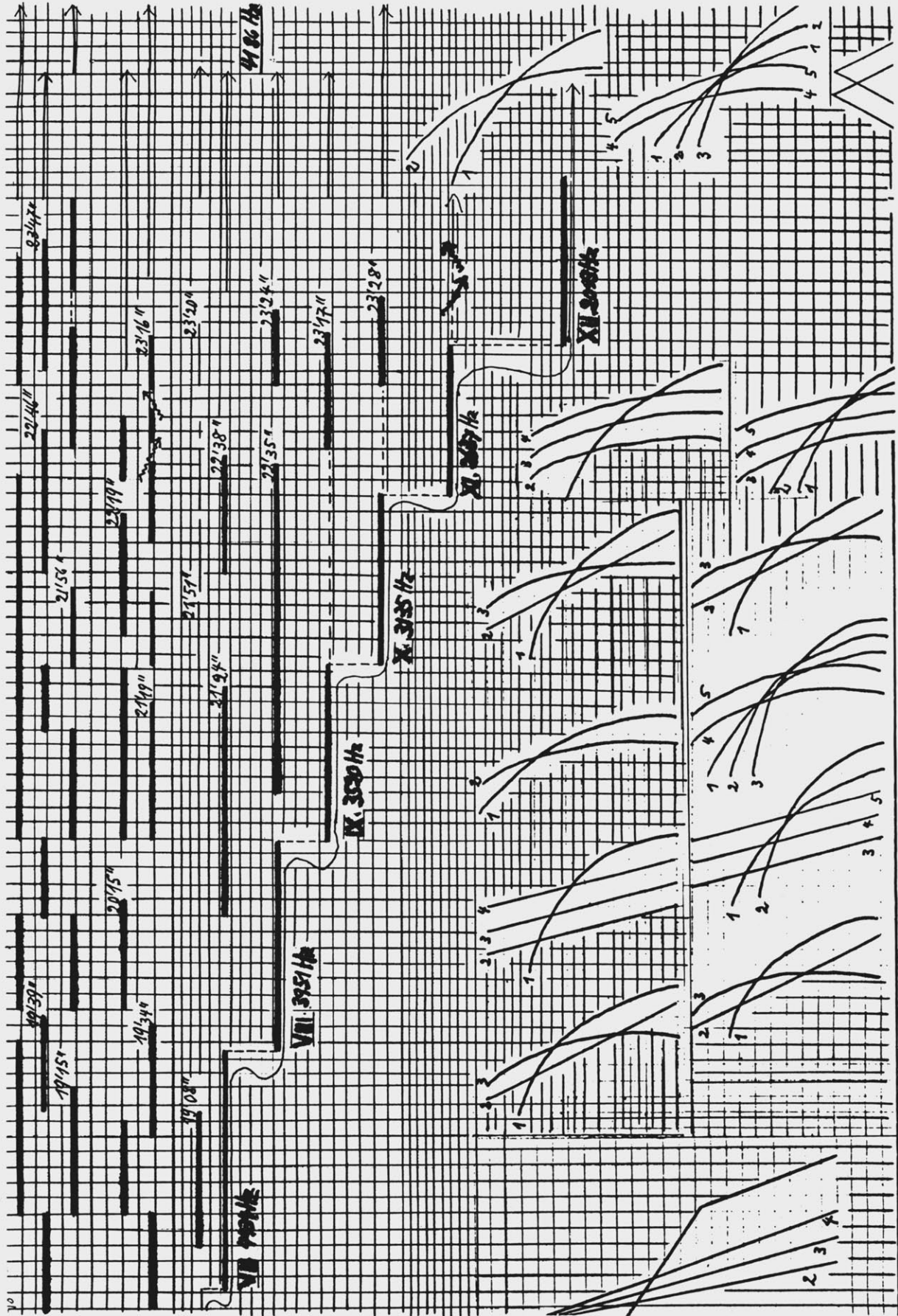
law of elliptical function). Each phase is linked to the next by a glissando and a 'staircase curve'; these curves are divided into groups, regular or not, according to their pitch and the duration of the time-intervals. The duration of the curves is calculated as a function of the logarithmic increase of their speed of execution. At first the steps of the staircase change rapidly, but gradually slow down throughout the piece. Early on the staircase curves are simple — descending only; in the last three phases however, each staircase is composed of simultaneously ascending and descending forms.

The frequencies of the staircase tones are noted in a separate file, and catalogued with a special nomenclature, using the Ollivetti print-out from the PDP 15 which made the production of these staircases possible. The long-sustained tones of the principle curve are modulated in both amplitude and frequency with demodulated speech-signals from six different languages. The tones of the staircase curves are derived from the principle frequencies of the twelve phases by a modal function. The earlier phases required greater and more intensive variations than later ones.

In the course of the work 3, and later 5, sound layers are distinguishable: on the one hand, the high-pitched continuous tones resulting from the principle curve, and on the other hand, the staircase curves and the lower sounds in the CODA. The latter chords consisting of staircases and glissandi, generated and controlled by the PDP 15 computer, are juxtaposed, and slowly evolve towards the lower end of the sound scale.

Leaving aside technical description, "the birth of light amid the shadows of the Universe...", is the composer's description of his work. This is validated by listening to the piece: the high-pitched extreme suspends the listener in infinite space, in the eternal glow of the night. High-pitched vibrations remind him of the myriad twitches of insects, the wings of cicadas; then he seems to hear the far-off croaking of frogs. He follows the gleaming trails left by falling stars on the sparkling backdrop of the celestial vault. Then, after an almost unbearable wait, the last crescendo, and finally the descent to the lower tones generates a powerful effect of amplification, landing, and calm.

Notes by the composer and Pierre Michot, translated and compiled by Juliet de Mowbray



ELECTRONIC MUSIC BY BENNO AMMANN

- "Points de depart" for tape and bass clarinet (1969) Rome
- "12 Fases" for tape and guitar (1970)
- "Sumerian Song" for soprano and tape (1971) Utrecht
- "Breath of the desert" for tape (1974) Utrecht
- "Waterplants" for tape (1974/5) Utrecht
- "Splendeurs nocturnes" for tape and orchestra (1976) Utrecht
- "Mouvements" for tape and harp (1976) Gent
- "ESVEHA" for tape and violin (1976) Gent
- "Voices within the wind" for Chorus and tape (1977) Columbia Princeton
- "Poemetto" (little poem) for tape
- "Mutations" for tape

ARS ELECTRONICA

18 — 23 September 1979 im Rahmen des Internationalen Brucknerfestes '79 Linz

The prelude to Ars Electronica was tremendous; a hundred thousand people listened to a Bruckner Symphony coming from four stations situated around the Danube Park of the City of Linz. Ars Electronica, a three day symposium dedicated to electronic art, gave evening performances which were very popular, and demonstrated to a small but interested audience the possibilities of new form that electronics can offer.

The symposium included computer-music, scheduled graphic arts, cybernetic aesthetics, and audio-visual electronics. The director and moderator of the symposium, Herbert W. Franke, had called together international experts from several countries of Europe leading in this field. As he emphasized in his opening speech, the event heralded a new beginning in many ways. Contrary to performances of a similar kind, Ars Electronica was not concerned with things past, finished or relegated to history, but with new concepts still in the process of development. Thus the whole performance had an experimental character — and certainly not everything worked out as might have been wished.

Presentations by world-organizations were juxtaposed with the results of personal activities. It was evident that in the case of music, electronics and especially computers have long been the object of research amongst the universities. It was equally obvious that in the visual sphere, the use of electronic media in the Plastic Arts had hardly attracted the attention of promoters and sponsors.

The first day was dedicated to theory in a series of lectures given in the Bruckner-Hall. Prof. Dr. Rul Gunzenhäuser talked about "The Computer — from the Instrument of Arithmetic to the creative partner of man?"; Prof. Dr. Robert Jungk, "Aesthetic guide-lines for technique", appealed for a philanthropic technique, not aimed at capacity and profit, and which would allow for and include serendipity as a conceptual factor. Prof. Dr. Vladimir Bonačić, Zagreb, talked about the "Dematerialization of Art", and so initiated the actual theme implicit in the demonstrations and experiments of the next two days.

The scene of this happening was the ORF-Studio of Upper Austria, an utopian stage for the advance of future art. At the front of the auditorium batteries of switch-systems, loudspeakers, projection equipment and so on were installed. A real-time transformation-system transformed both the spoken word and music into cascades of light.

As Ars Electronica took place within the International Bruckner Festival, music opened the programme, with three specialists in computer-generated music explaining their researches by means of Bruckner motifs. Prof. Dr. Werner Kaegi, Utrecht, Prof. Pietro Grossi, Pisa, and the composer Pierre Barbaud demonstrated sound-effects which depended more or less distinctly on the stylistic characteristics of Bruckner. But what many listeners thought only to be new effects, had serious applications in musical theory. The registering of the laws of order applicable to music was dealt with, although this was not expressed precisely enough perhaps, owing to difficulties of language.

The next speaker, Manfred P. Kage, presented his new invention, the Audioskop, an electronic-optical system that transforms music into coloured wave-structures. In comparison to the well-known light effects of discothechs, this showed a remarkable step towards the realization of an old idea — the transformation of music into light and colour. A similar transformation was presented by Alexander Vitkine, Paris, who showed his Sonoskop.

In the afternoon programme the "Astropoeticon" presented by Walter Haupt was a highlight. This is an epoch-making development for artistic expression in many ways. The basis was a series of sixteen poems by Herbert Franke, accompanying a sequence of pictures by the painter Andreas Nottebohm. The lyrics were transformed by Walter Haupt by means of a Vocoder and other similar systems, into an acoustic work for which a name does not yet exist — a language strange within the tradition of artistic expression. Under the direction of Manfred Kage a video-tape was produced, where the pictures of Nottebohm were transformed in both form and colour. The video-system "Videosizer", developed by Ludwig Rehberg, was presented by the inventor.

The next day was dedicated to graphic methods. A team consisting of an artist, Klaus Basset, and a technician, Willi Plöchl, had collaborated on a graphic program. With a high-speed printer they presented a variety of cubic structures in perspective. More attractive to a general audience were the presentations of Christian Cavadia, who brought part of his equipment from the Centre Georges Pompidou, Paris. His programs were so prepared that every visitor without previous experience could get graphic results according to his own taste. Next came Dr. Helmut von Falser, Munich/Freising, who presented a World-Premier. On a home-computer he showed graphics programs where three alternatives were possible: real-time composition of single pictures, graphic improvisation with moving picture sequences, and automatic casually controlled sequencing.

In the afternoon Oskar Beckman spoke as the representative of the Vienna group Ars Intermedia, and showed a fascinating film about fantastic architecture. Dr. Paul Jenewein, Paris/Vienna, proved with some artistic examples of video-tapes and computer-films that it is already possible to create very impressive works in these media. The final presentation was given by Walter Giers, Schwäbisch-Gmünd, with his "Concert Machine". This is a switch-system which composes in real-time, and includes infra- and ultrasonic effects.

The performances took place with free admission, so it was not so much an occasion for discussion among experts, but rather an opportunity to disseminate information to the public. This was the reason that theoretical arguments were left in the background; demonstration had absolute priority, and indeed, what had been offered here within two days had never been seen anywhere in the world before. The basis of this conception was that the public has been confronted until now always with finished inventions that preclude any possibility of interaction. In the field of art, at a moment where electronic media can for the first time be used as a construction-aid, the public to which this development is addressed should not be excluded.

As was expected, there were a great number of different reactions from the public and the press. Especially it was evident that one approaches musical developments well informed, but that a comparable conceptual framework does not exist in the domain of design and the visual arts. But it was here that the most interesting innovations were to be found; while instrumental music has taken millenia to develop to its present position, instrumental visual art is still in its infancy. It is, however, possible that in the visual arts a comparable development will be accomplished, and at a rather greater speed.

It is easy to provide a music festival full of stars and critical lectures for the expert. An event like Ars Electronica, however, deliberately courts criticism and accepts the risk of misunderstanding. Without doubt, not all the demonstrations achieved the desired aim, but the character of the performance must be approved — it is not often that the public is confronted with such a multitude of unusual and new things. In 1980 there will be another Ars Electronica symposium and it will be very welcome.



NOTES ON "TOWARDS A THEATRE OF SOUND 1980" BARRY ANDERSON

A brief report on the two days of public rehearsals, lectures, demonstrations and discussions on the Preparation and Performance of Electro-Acoustic Music, with a concert on the final evening of a programme of music for tape and live electronics.

in St. John's Smith Square, London, Friday and Saturday, 25/26 April, 1980.

A step towards a national performance centre? That was certainly one of the main ideas behind the discussions a year ago which led ultimately to this first major collaboration

between the SPNM (Society for the Promotion of New Music) and EMAS. They led to a partnership whereby the SPNM provided funds and assistance in promoting the event, with EMAS contributing equipment and technical resources. Responsibility for the choice of programme was shared.

The chosen formula of rehearsals, demonstrations and lectures built around the works in the concert programme, designed to show the production mechanisms of EA music performance, proved highly successful. Lively discussions developed, with interest quite excited at times, both during formal sessions and afterwards.

It was indeed encouraging to see so many people there — between 100 — 150 at each of the preparatory sessions and 350 — 400 in the audience for the Saturday evening concert.

And it was the public which came, not just the professionals. That was the point: this was intended as a deliberate public relations exercise for electro-acoustic music, to meet a real need to explain, clarify and dispel the mystification surrounding our work.

The BBC not only came but took an active interest in the whole event. Though an original intention to record the whole proceedings had to be modified, plans for preparing two programmes from material recorded during the event, and some to be recorded in BBC studios, are going ahead.

Attendance may have been helped by the BBC having broadcast a short interview the Sunday before and Time Out's substantial and enthusiastic preview the day before must surely have aroused some curiosity.

This was the first time the EMAS Equipment Pool (albeit in still interim stage of growth) was all in use on one occasion. From it and from two of the London studios, West Square and City University a formidable battery of apparatus had been assembled: a 14 speaker system, comprising Altec 1215 bass and HF units, Bose 802 and Tannoy 15" HPD with additional HF tweeters suspended high in the auditorium — Soundcraftsmen MA5002 and Quad 405 amps — Chilton QM2 16/8 mixer and West Square's 12 channel tape delay system (for SOLO in this instance) with its ancillary sub-mixing and modulating facilities. DBX noise reduction was used for 4-channel tape replay. The technical scheduling was complex, switching between very specific requirements: the Chowning and Wishart utilising well defined 4-channel projection, Harrison a strong well-balanced front projection, and for Stockhausen, LH-RH 'wall' projection free of acoustic 'holes'.

As a venue for EA music St. John's cannot be described as ideal — its extremely long reverberation time and pockets of local resonance make definition of detail and general control of acoustics difficult. Nevertheless it is an attractive place to work in, it must be said, with a cooperative and unfussy administration.

Are there in fact other suitable places in London for the performance of EA music? We shall need to keep searching, keep pressing for one to be set up whatever the immediate prospects are for achieving a fully-fledged National Centre.

Of the public interest generated by the event itself there can be no doubt. During rehearsal sessions a constant flow of encouraging reports emanated from Box Office that people were coming downstairs from the auditorium to ring friends to tell them to come along.

The unquestionable success of this venture has made new friends for EMAS — converting some from the ranks of the sceptical and mistrustful. It has awakened talk of an annual event on similar lines. Such enthusiasm is exciting. But, while this particular recipe for involving an audience in the whole follow-through process of EA music-making may be expected to succeed again, we must beware of any promotional formula which smacks of routine. Towards a Theatre of Sound demonstrated clearly enough that audiences can be found for EA music; the challenge remains, however, one of sustaining what is still a relatively superficial curiosity in the medium and of transforming this into a more permanent understanding and appreciation.

EMAS COMPUTER MUSIC CONFERENCE: COMPUTER MUSIC IN BRITAIN

8 — 11 April 1980

SIMON EMMERSON REPORTS *

The first EMAS Computer Music Conference, directed by Steven Holtzman, was hosted by the Department of Computer Science, University of Edinburgh.

At the opening session four short reports and papers were presented. Tim Souster described plans for the establishment of the latest MUSIC V (Fortran version, IRCAM) at Keele University. Peter Manning described plans at Durham University to establish Barry Vercoe's MUSIC II (still problematic) and also to instal a Plessey Micro I (PDP 11) to control the main studio, possibly with signal processing facilities at a later date. Eric Graebner described Southampton University's predicament running MUSIC IVBF — but without adequate conversion facilities which were by post from London. Marcus West described his hybrid

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control program developed on a PDP 8 controlling a Synthi 100, used largely for 'melodic' controls at the Cardiff studio.

The first full day combined theory and practice. Four papers were read. Mike Greenhough, director of the Cardiff studio, described a program he had developed, related in philosophy to Marcus West's, which could be set to follow certain statistical controls of 'melodic content'. Kevin Jones (City) has specialised in stochastic control and generative programs. He played examples from electronic (digital) and instrumental compositions which used these methods. Steven Holtzman (Edinburgh) introduced his concept of grammer and his program GDDL with reference to an analysis of a movement of the Schoenberg Suite Op.25 and the generative rules one could deduce from it. He then looked at more complex grammars and used examples from his own 'After Artaud' (realised at the Institute of Sonology in Utrecht). The final paper, from Lawrence Casserley (RCM London) dealt with his development of a micro-processor based system for performance and composition control.

The concert that evening was not confined to British works but covered a whole range of philosophies and approaches. A new work by Marcus West created on the hybrid system at Cardiff opened the programme. Kevin Jones' **Macricisum** was created using MUSIC 10 at IRCAM and investigates stochastic structures relating to different parameters in each of its five movements. Steven Holtzman's **After Artaud** structured standard and non-standard synthetic sounds in a grammatical sequence based on a poem of that author. Paul Berg's **Locks and Dams** for trombone (Kevin Anderson) and tape used extremely 'non-standard' noise sounds. Jean-Claude Risset's **Songes** is a classic work using a version of MUSIC V which allows for the transmutation of concrete sounds within the computer. Tim Souster's **Driftwood Cortège** was created while on the Stanford University Summer course in 1978, and Stanley Haynes' **Prisms** for piano (George Nicholson) and tape, used Risset's catalogue of instrumental sounds to imitate, then move away from, 'real' piano sounds. A computer-generated work, **Uebung fuer Klavier** by Gotfried Michael Koenig was also heard. The audience size was extremely gratifying at 80 or over (i.e. double Conference numbers) due perhaps to Radio Forth publicity that morning.

Practical sessions continued the second full day. Edinburgh provided the languages and systems available on their PDP 11, the grammer GDDL and the synthesis system (for voice). MUSIC IVBF was also demonstrated. In addition, City made available two micro-processor systems, a Nascom Z80 controlling a VCS3 synthesizer (Don Finlay) as well as providing an 8-overtone fourier synthesizer (extendable), and an ITT 2020 (Apple) machine with VDU used to demonstrate stochastic and other structuring programs devised by Kevin Jones.

Two final papers dealt with more general aspects of computer music programming. Richard Attree (City) spoke on 'Heuristic Approaches to Computer Composition' — the idea that a program must have a flexible number of possibilities which the user can influence. Stanley Haynes (IRCAM) dwelt on 'The Musician : Machine Interface' in relation to new programs, and gave a useful insight into comparing the same process with different programs.

A final discussion session covered short items by participants. Eric Graebner and Ho Wai On played and described their own compositions, Stephen Montague introduced and played extracts from speech-synthesized and processed works by Charles Dodge. Tim Souster introduced part of a work by Mike MacNab from California.

A concluding general discussion advocated establishing a national pressure group to promote computer music, and recommended that the Conference be made an annual event.

* Reprinted from EMAS Newsletter April/May 1980, by kind permission of the author.

MUSIC ANNOUNCEMENTS

CALL FOR COMPUTER COMPOSITIONS

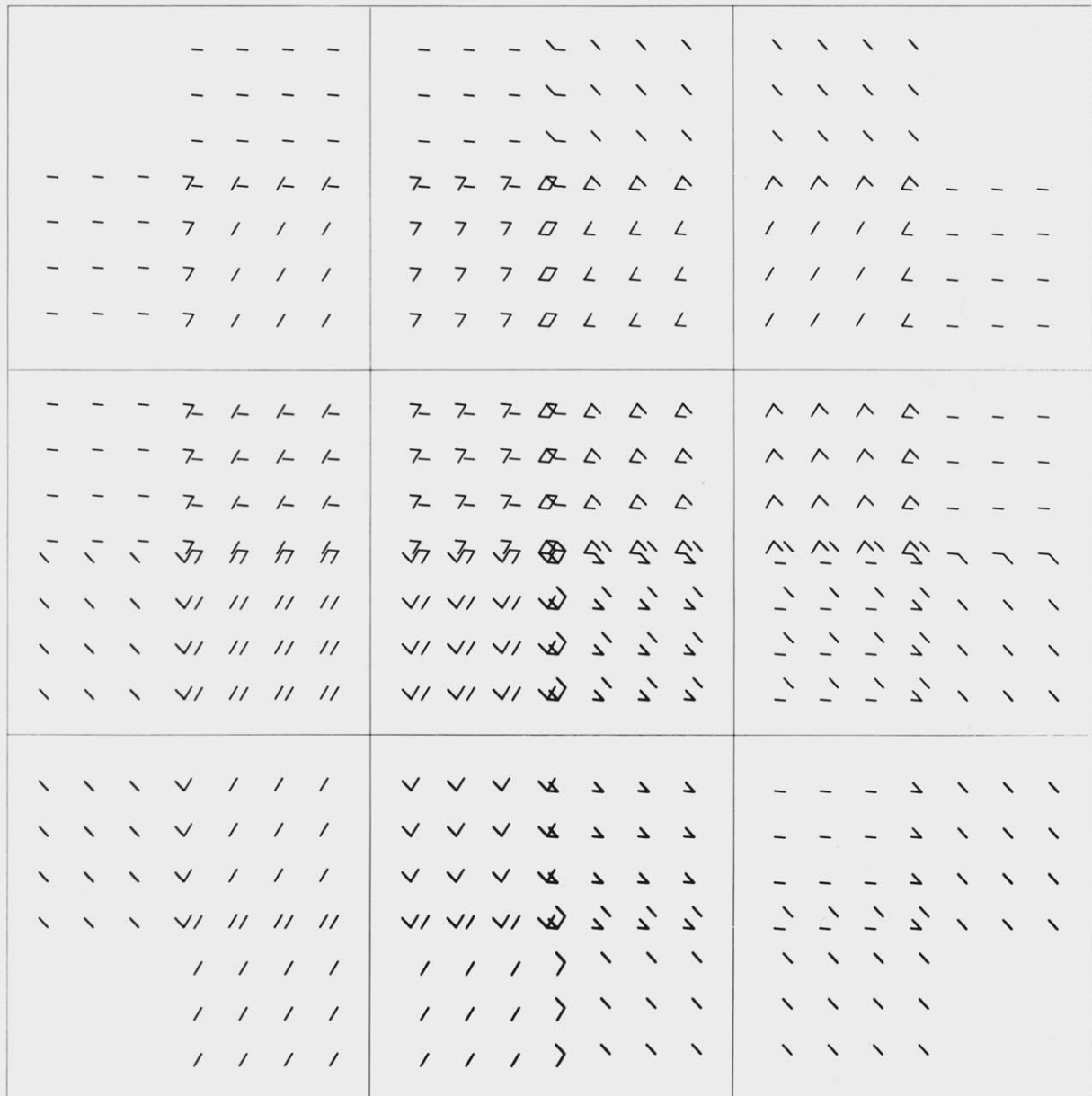
IRCAM, Paris, is sponsoring a week of seminars and concerts under the title of "The Composer and the Computer", from 17— 21 February 1981. The programme will include discussions about various compositional issues, two sets of concerts, and a documented presentation of tape works representing an over-view of computer music.

For this event, IRCAM is currently collecting tapes of works created with the use of computers. Only works for tape solo are acceptable for the February presentation, but IRCAM is interested in receiving pieces for tape and live instruments for performance in future events. Tape submissions for consideration should be sent as soon as possible, together with information about the composer and notes about the work, to:

Tod Machover, IRCAM, 31 rue Saint Merri, Paris 75004, France.

1980 Summer School of Music, Dartington Hall. Dir. of Music: Peter Maxwell Davies.
 ELECTRONICS CLASS Directed by IVAN and SERGE TCHEREPNIN, July 26 — August 9.
 "Creative Electronic Music in Secondary Education", workshop Directed by PETER WEST,
 August 9 — 23. Prospectus from: S.S.o.M., 48 Ridgway, London SW19 4QP Tel: 947 2244

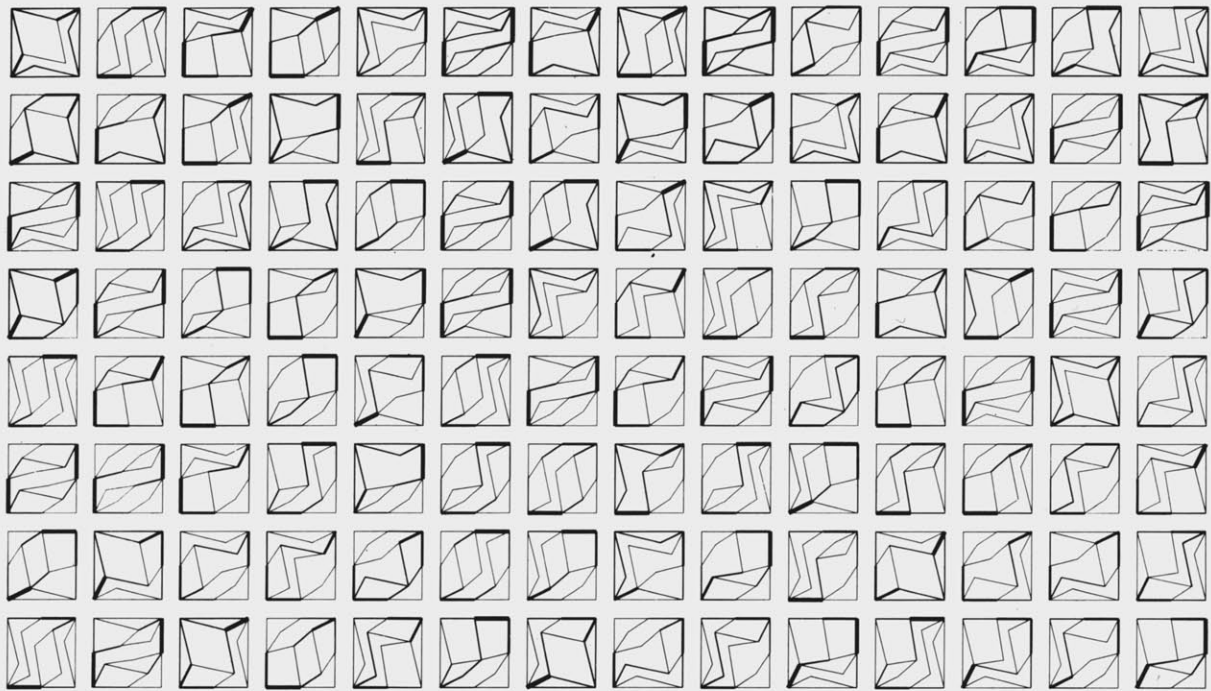
GRAPHICS



MANFRED MOHR

P-190/B Drawing 1975 600mm x 600mm

The 12 lines of a cube are repeatedly added together, eventually forming the complete cube in the centre.

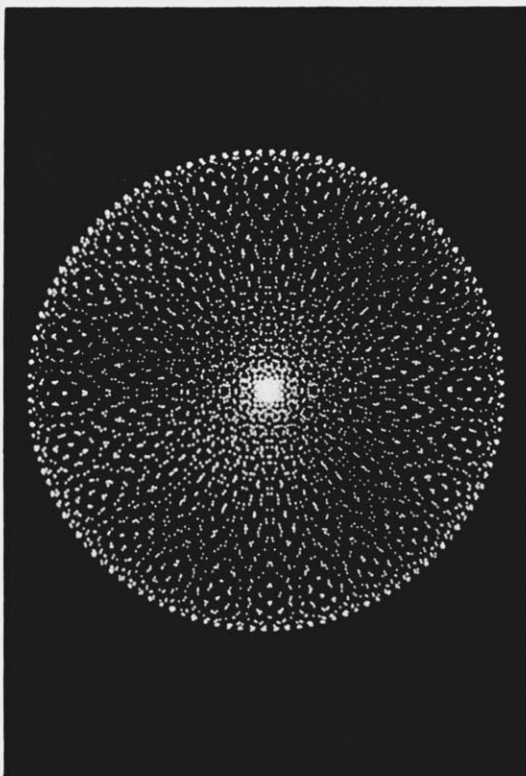


MANFRED MOHR

P-231/A Drawing 1978

All the 112 possible 'maximal plane graphs' (maximal number of non-crossing lines) from the graph of a 4D hypercube.

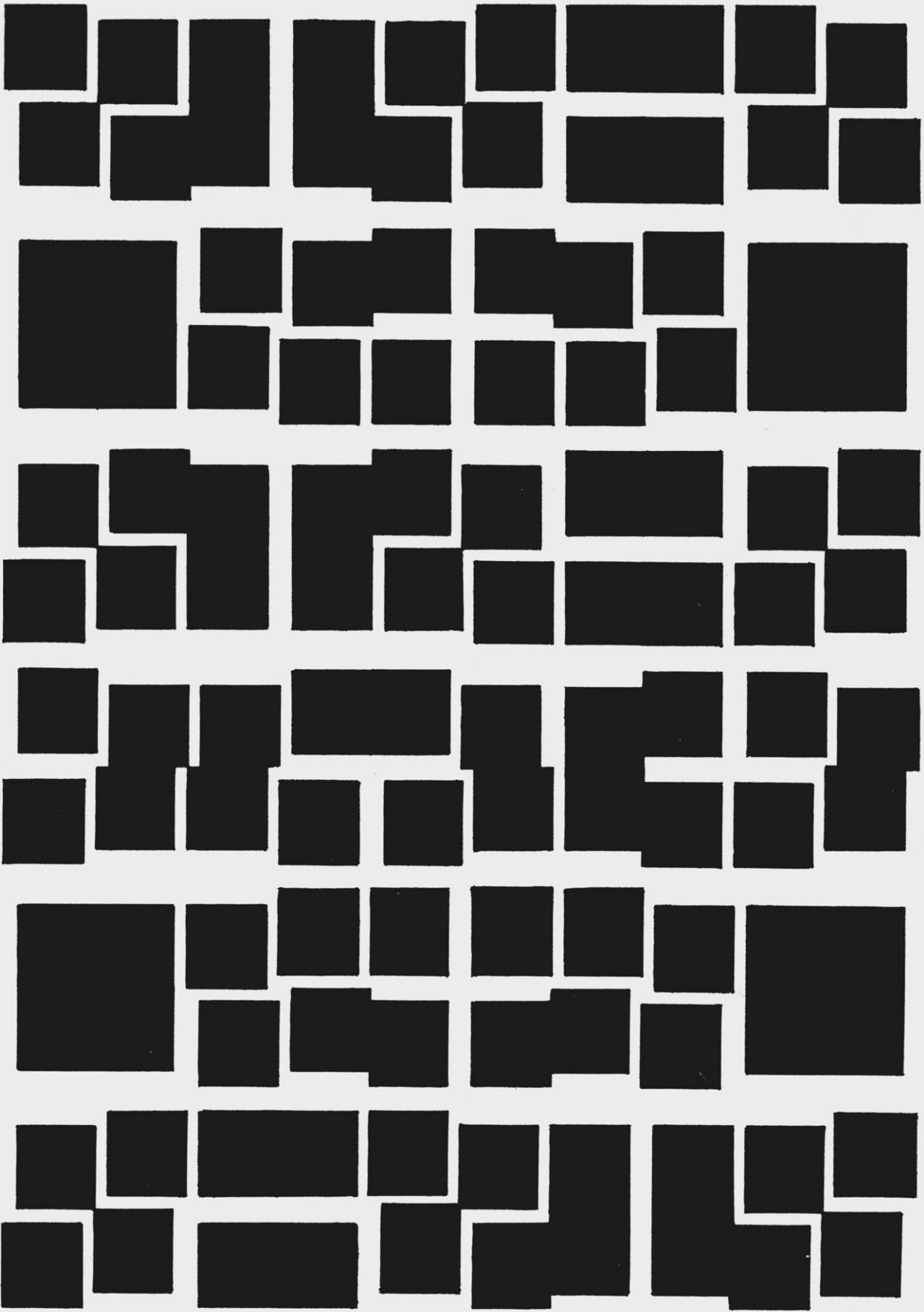
The width of a line is equal to the number of possible ways to pass through this line on its 'maximal plane graph' along diagonal paths from 0000 to 1111.



SOZO HASHIMOTO

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LP - 1 - 57

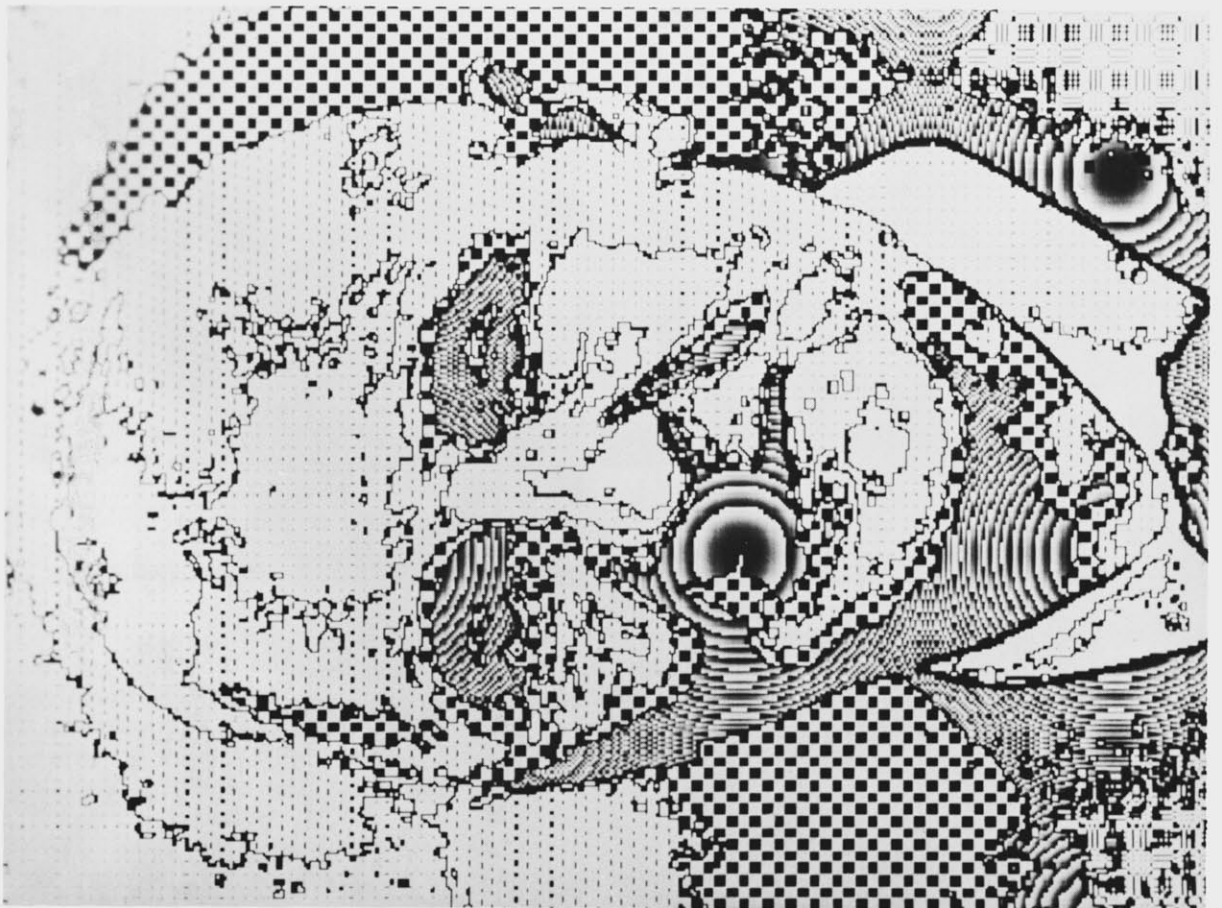
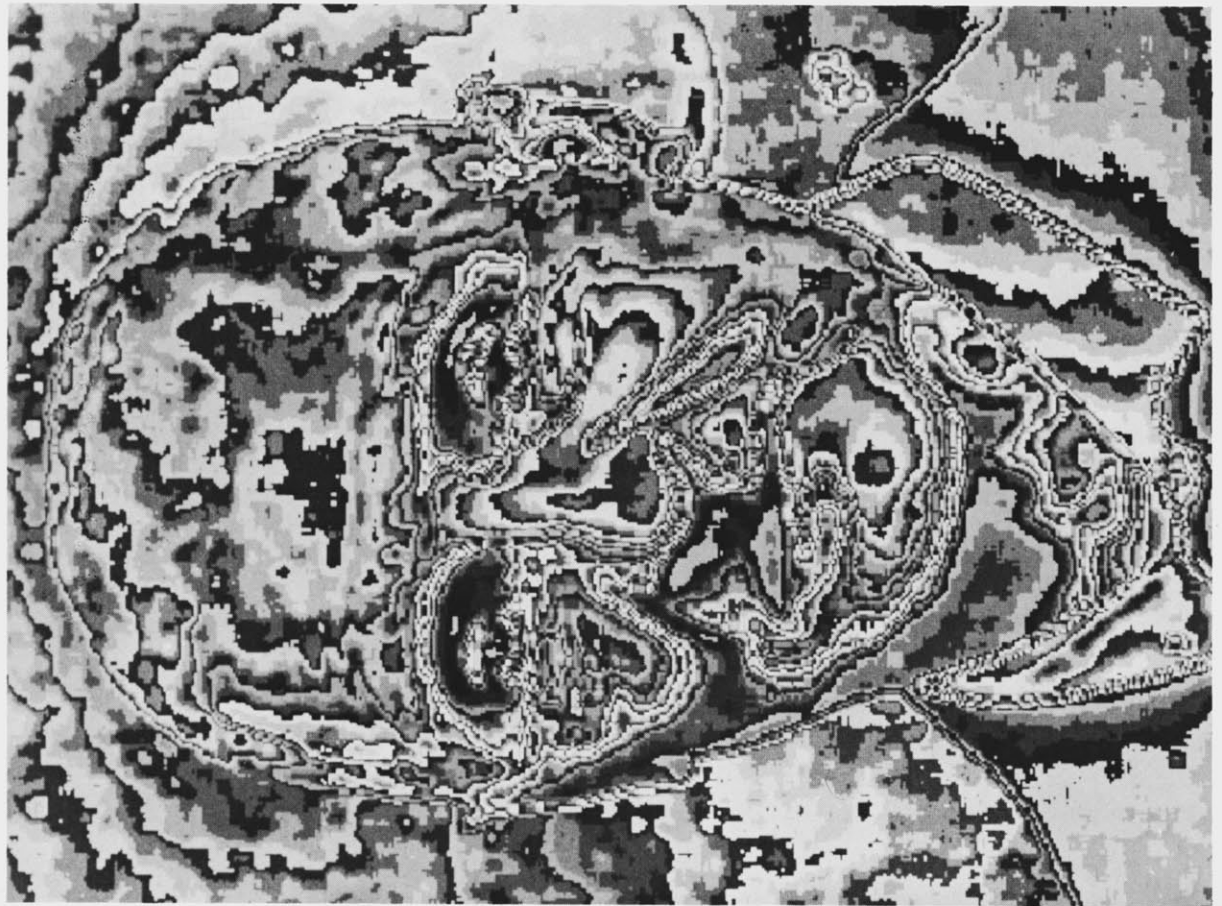


TAMSIN GILES Blaksqr. 1 1980.



HERBERT FRANKE

3 Transformations on the theme of Anton Bruckner

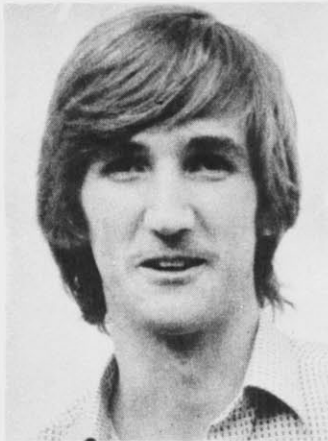


COMPUTER ART COMPETITION MUNICH 1979

MÜNCHEN. Der von der Gesellschaft für Computergrafik und Computerkunst e.V. (GCC) erstmals veranstaltete Wettbewerb für Computergrafik traf auf überraschend große Resonanz. Mehr als 150 Einsendungen aus ganz Europa gingen ein. Die Computerfirma NCR in Augsburg stiftete Preise im Werte von insgesamt 10 000 Mark.

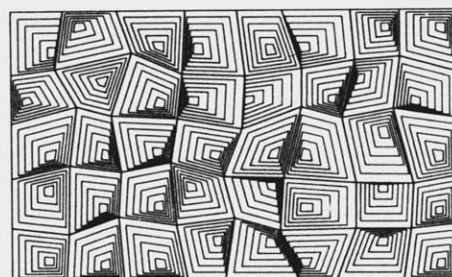
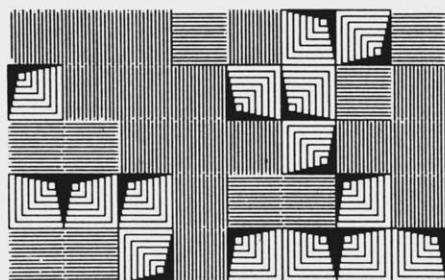
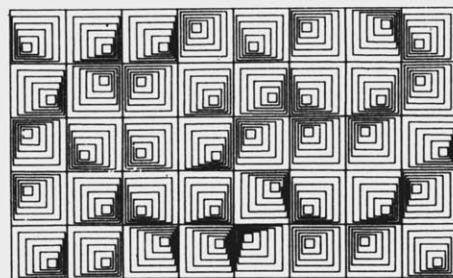
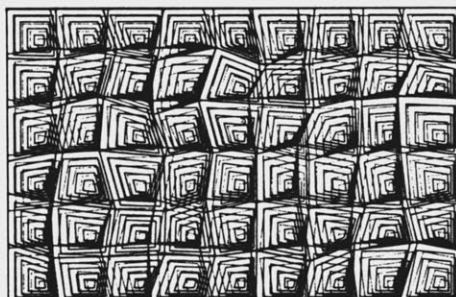
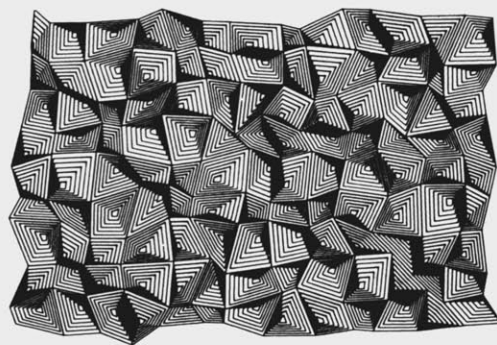
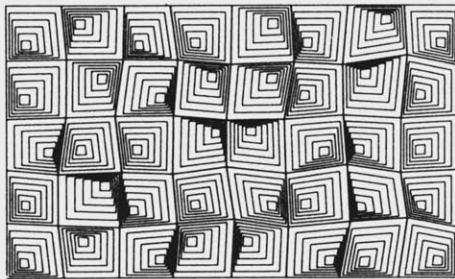
Die Jury unter Vorsitz von Dr. H. W. Franke hat ihr Urteil getroffen und die Werke folgender Künstler prämiert:

1. Preis, 4000 DM: Hans Korneder, München — Motiv: "Serie 6—Zentren";
2. Preis, 2000 DM: Vera Molnar, Paris — Motiv: "Schriftzeichen";
3. Preis, 1000 DM: Axel Miessner, Gräfelfing — Motiv: "Der Münchner".



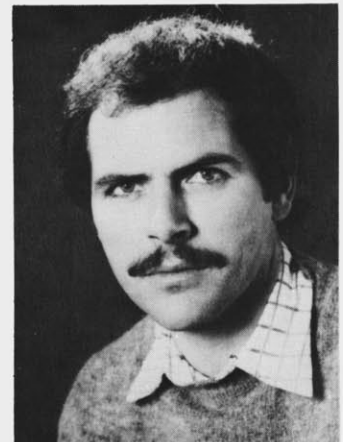
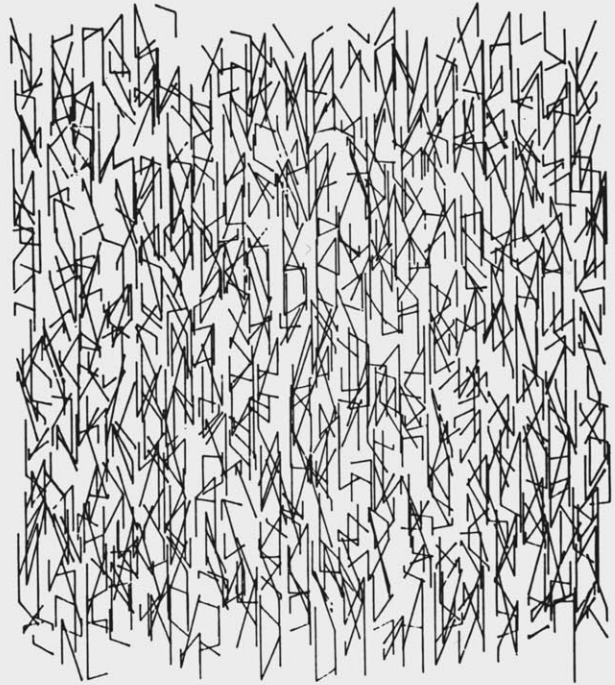
Weitere Geldpreise gingen an:
Hermann Bense, Coesfeld; Robert Stoiber, Neubiberg;
Reimer Harnisch, Furtwangen; Herbert Brün, Illinois
U.S.A.; Arno Groth, Kiel; Karin Hohner, Lochham und
Marita Schulik, Essen.

1st Prize:
Hans Korneder
Serie 6-Zentren





2nd Prize:
Vera Molnar
Schriftzeichen



3rd Prize
Axel Miessner
Der Münchner

INTERACTING WITH VIDEO IMAGES

ERNEST EDMONDS & STEPHEN SCRIVENER

The purpose of this note is to report on certain technical and conceptual developments in interactive computer graphics that we believe have significant implications for artists working in this area. We briefly describe the current state of the work and its future direction, using as an example the generation of an image which has in itself no serious value whatever. We intend thereby to clarify the description of procedural concepts, without confusing the presentation with specific artistic or aesthetic considerations.

The reduction in hardware costs in computing in recent years has meant that the generation of raster, or video, images has become increasingly economic. As in a raster image it is possible to use grey scale, colour and solid areas rather than just lines, its appeal is obvious.

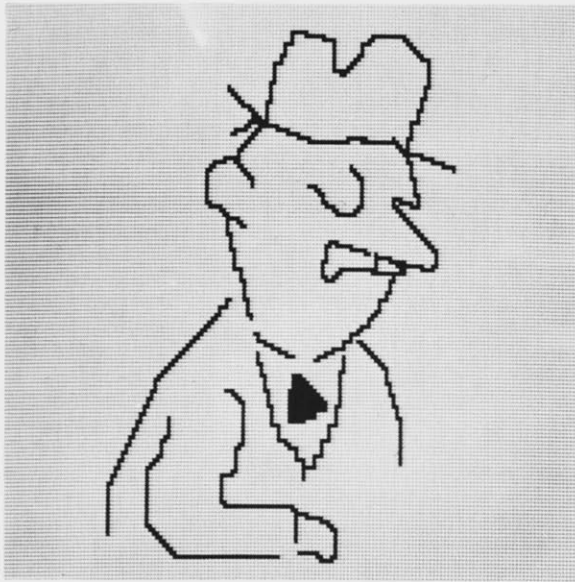


Figure 1



Figure 2



Figure 3



Figure 4

However, even if we restrict the image to only two tone values (in our case, black and white), as in the traditional computer graphics displays, raster graphics allows us to employ a quite new concept of computer image generation and manipulation. This arises because the image is not specified as a list of vectors but as a matrix of points, or pixels, each with a specified colour value (which may be restricted to, for example, black or white). It is possible, as in the Leicester Polytechnic system, to store this matrix of values in a specially designed memory device which contains one bit for each pixel and from which the image is refreshed at normal video rates. The computer can write to this memory, in order to generate an image, and read from it in order to inspect one. The computer thus has available to it what is in effect a representation of the image that maps directly onto the image. It can then 'look at' the image on the screen. In contrast one can see that a list of vectors, specified by the co-ordinates of their end points, is a highly abstract representation of the image as seen on the screen. In a vector system the computer user is forced to communicate with the computer in terms of this highly abstract model of the image. As users of computer graphics systems will know, it is common to work at an even more abstract level than this, employing such descriptive units as SQUARE, represented perhaps by the co-ordinates of the centre point, the orientation and the length of the sides. Whilst these abstractions are useful, they are also extremely restricting. Communicating with the computer about the image must be done in terms of them, so that, for example, reference to half of one of the sides of SQUARE is almost impossible. Our concern is

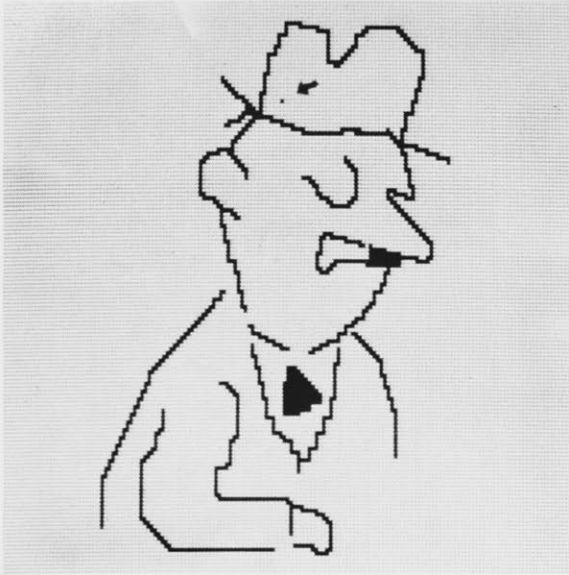


Figure 5

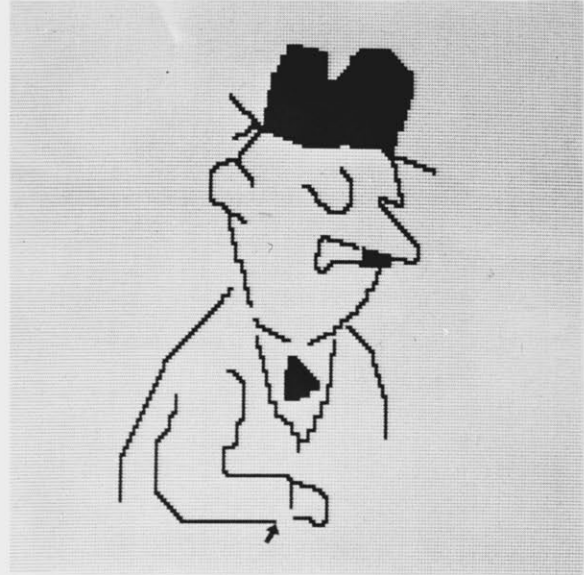


Figure 6

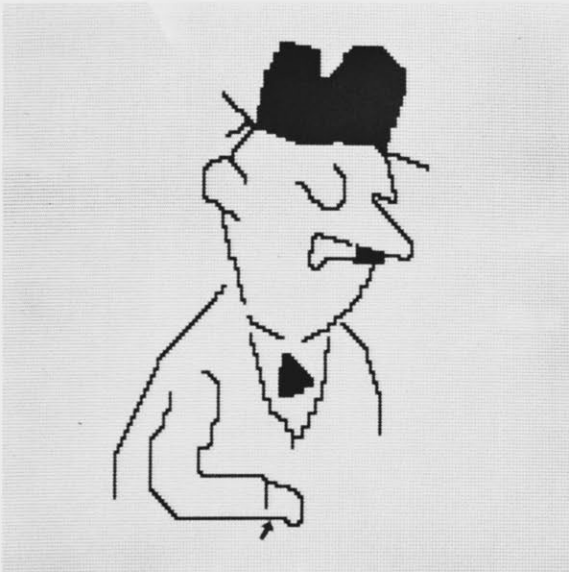


Figure 7

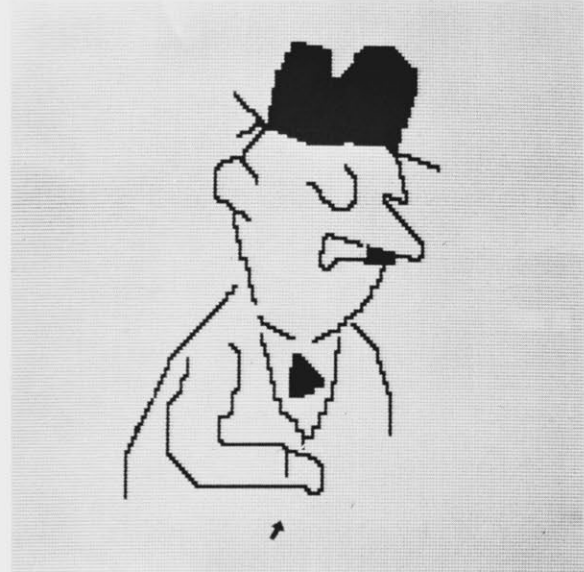


Figure 8

to take advantage of the raster representation of the image, pixel by pixel, so as to allow the user to handle the image directly when the available abstraction is not convenient. In effect the human and the computer are then looking at the same image, so that that image can itself be the central concern of both. In a vector system the image can only be thought of as visual representation of an abstract structure and the user interested in the image itself must manipulate the structure so that its representation corresponds to the required image.

The illustrations show examples of simple manipulations of a raster image that is unstructured (i.e., the only representation of the image available to the computer, in this case, was the current matrix of pixel colour values). We started with the image shown in fig.1. Figs. 2—4 show how a cursor was introduced, moved into an enclosed region and that region then filled in. When the command to FILL is given the computer has no information about the region in question. At that time it inspects the image and determines which pixels are to be changed in colour value. In figs. 5,6 the hat is filled in, in the same way. In fig.6 the cursor has been moved onto the lower line of the arm. It is thus pointing to a black region just as it was pointing to a white one in fig. 5. As the FILL operation identifies a region it is possible to regenerate it in a new position. Fig. 7 shows the result of using the cursor position to indicate the intended location of the rest of the arm, filling in the upper arm with white and regenerating it at that location. This is then a MOVE operation. As the whole arm is now connected we can move it in a single operation, yielding fig. 8. By performing a MOVE and then

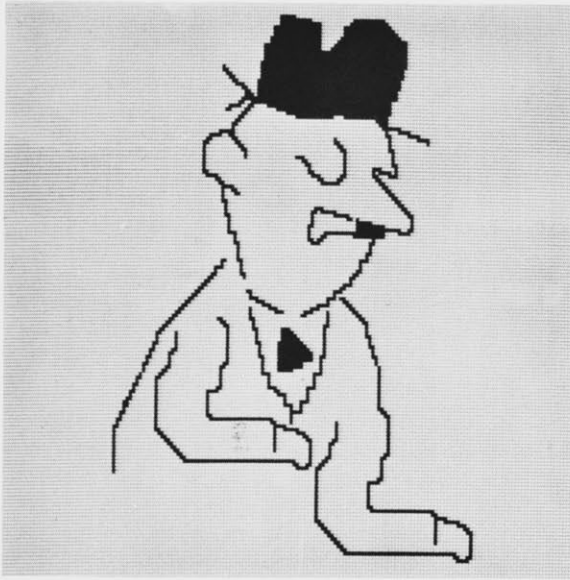


Figure 9

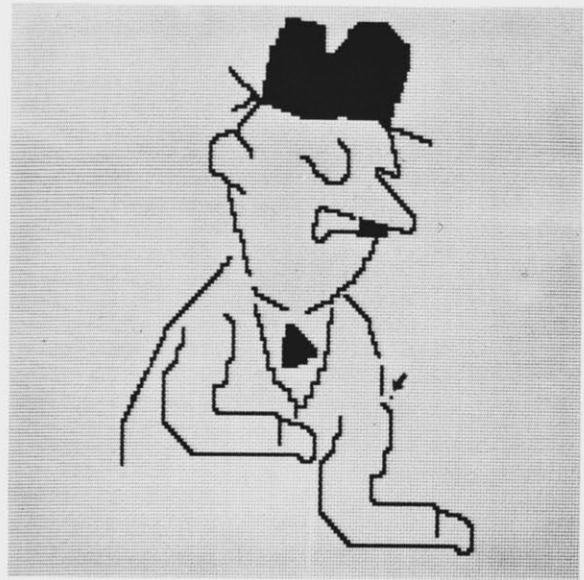


Figure 10

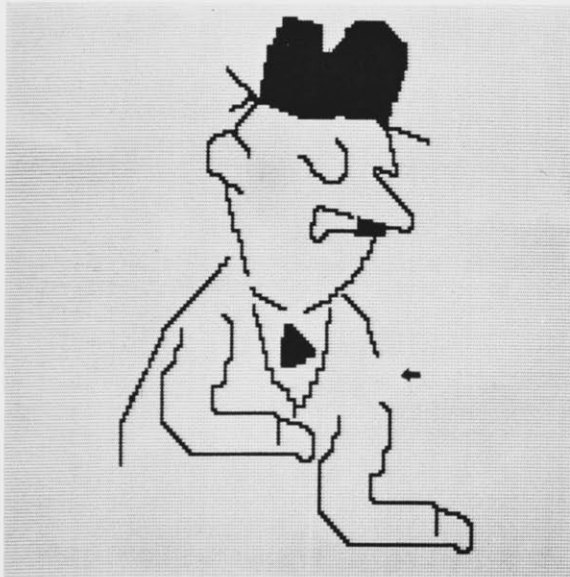


Figure 11

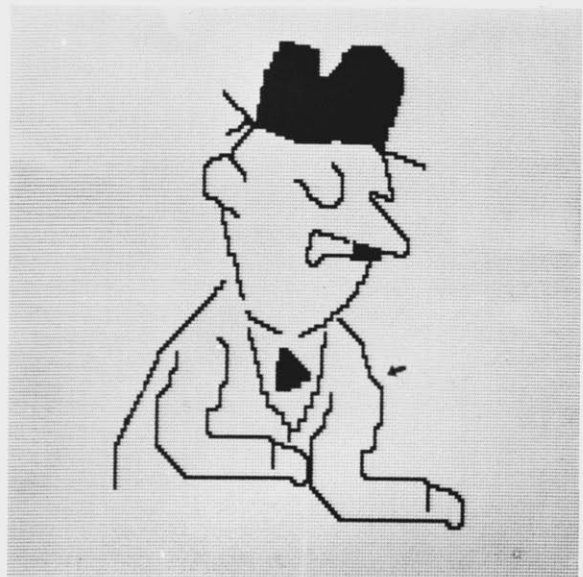


Figure 12

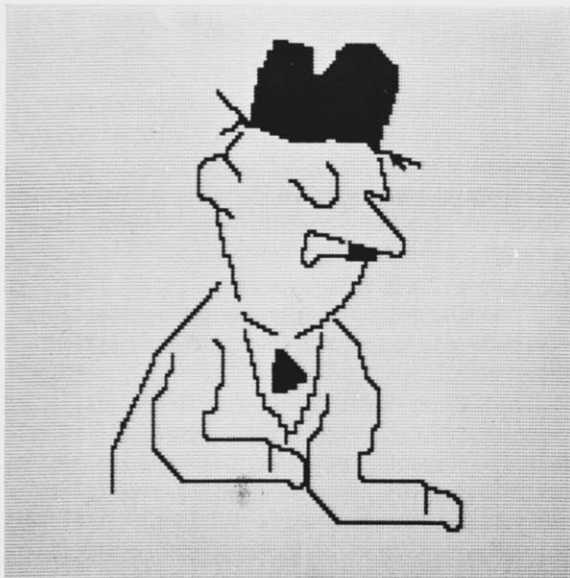


Figure 13

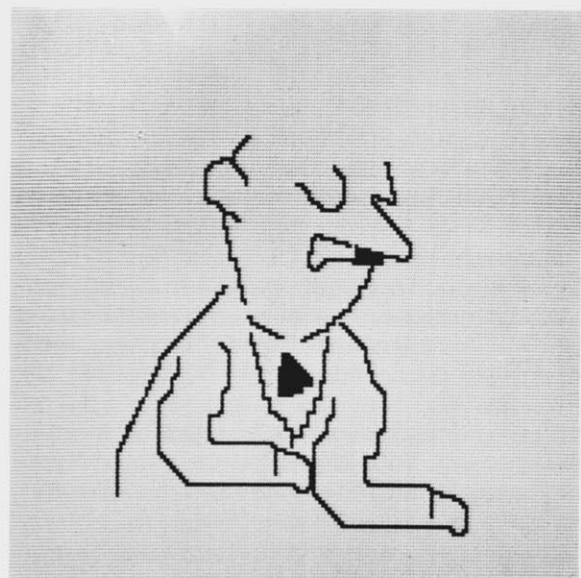


Figure 14

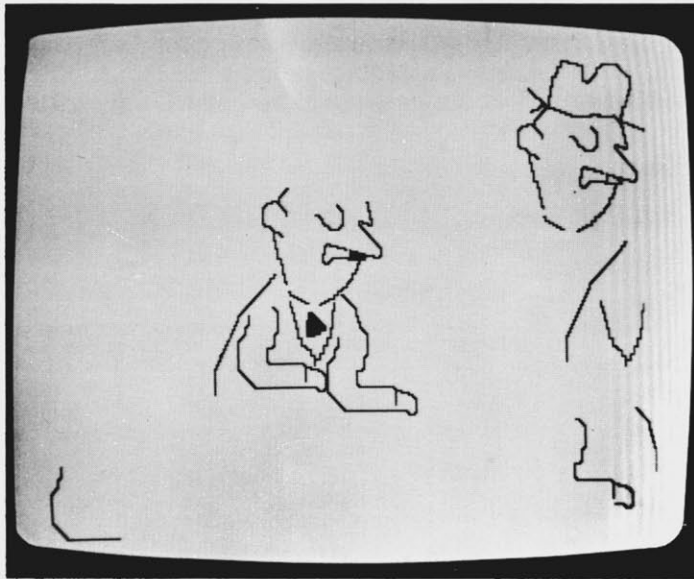


Figure 15



Figure 16

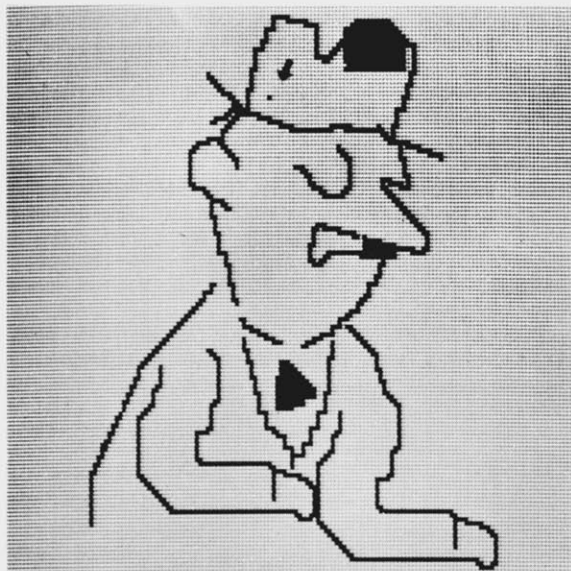


Figure 17

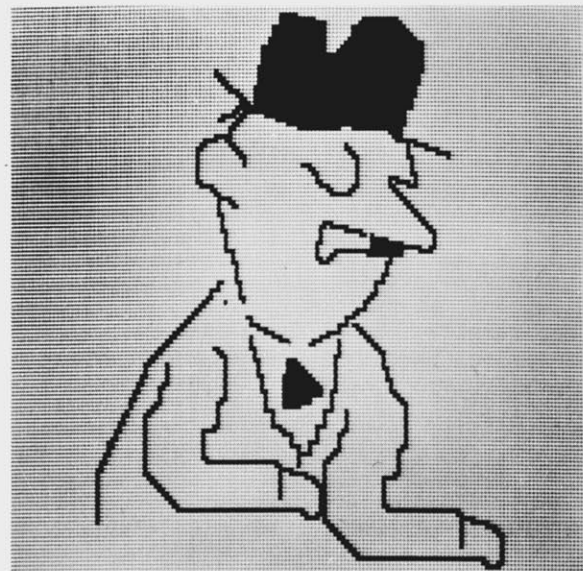


Figure 18

regenerating the region in its original position we have a COPY operation, as in fig. 9. By changing two individual pixels to white we can isolate part of a line (fig. 10) and fill it in with white, or ERASE it (fig. 11) and then move the remaining arm up to a new position (fig. 12). In figs. 13, 14 we remove the hat as before. All of the information about the hat is now lost. In producing these illustrations, however, we kept copies of the various components of the original image round the edge of the screen, as shown in fig. 15. We thus used the image itself to store visual data in. We could then regenerate the hat by performing a COPY (fig. 16). By issuing a FILL with the cursor in the position shown in fig. 16 and then stopping the program almost instantly we obtained the image shown in fig. 17, where part of the hat has been filled in. The stopping of the program merely stopped the operations on the image. The image itself, stored in its special memory, remained. We could thus re-initialise the program, place the cursor in the unfilled part of the hat and fill that in (figs. 17, 18). It is important to note that at each step in the above sequence the computer was extracting the relevant information from the image and was not relying on some previously defined component.

Our current work, as well as moving to grey scale and colour, is looking at more complex aspects of the problem of equating the computer's perception of the image with the human's. We are thus concerned with such issues as figure/ground relationships. Our major goal is to provide ways in which users could communicate with the computer about video images in terms that correspond to human perception of the image. The implications of this for artists are perhaps obvious, but we would like to mention one particular possibility. Starting with any

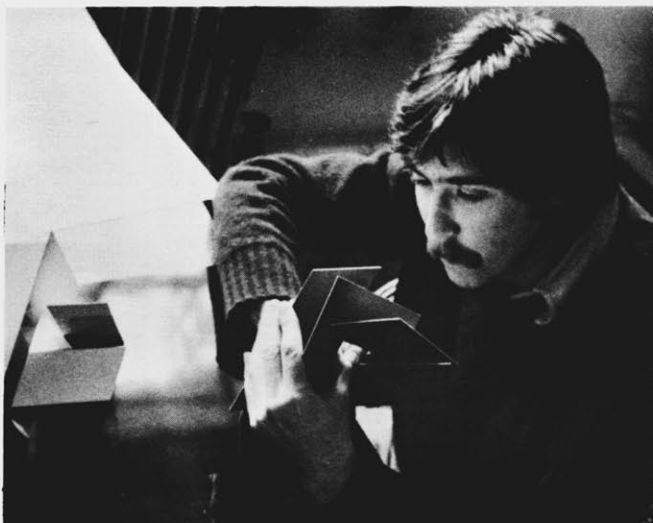
image, which could have been 'drawn' or taken from a TV camera, for example, it becomes possible to write procedures that operate on it, producing new images that selectively take into account features of the original image. In the case of TV camera input, the source would be a digitised picture of 'the world', so the procedures could be seen to be generating images from 'the world'.

The work is supported by the Science Research Council.

The School of Mathematics, Computing and Statistics,
Leicester Polytechnic,
P.O. Box 143 Leicester.

NEWS

photo: Anthea Sieveking



TONY LONGSON

The celebrations of America's Bicentenary have included awards for artists, writers and musicians to visit the United States for up to a year. In this fifth and final year of awards one Fellowship has been given to Tony Longson, an artist who since 1973 has used computers as a part of his work.

Longson makes three-dimensional constructions which he describes as "drawings in space". Marks are densely printed on to layers of clear perspex, and make up geometries which form and re-form as we, the viewer move around the object.

While the concerns that his work displays, those of geometry and of visual space recognition, have changed little, the constructions have become far more detailed since he has used computers to organise ideas. Despite this, the image retains its simplicity, devoid of figurative content. Longson argues that when we recognise something we tend to stop looking at it, and he is keen that these constructions will sustain our attention. Certainly they do reveal different visual relationships with time.

"Some aspects of the work are a surprise to me, and this is an inevitable part of creativity; the reason why artists make things for themselves rather than having them made by other people, though these occurrences are within the context of an idea, and not out of control. My drawings give a first impression of dis-order, and this too is intentional as beneath them lie different kinds of organization such as symmetry, perspective, tone-gradient, and geometry, which combine to make sense gradually."

Longson takes up his Fellowship in September and will be based in Pasadena, California, associated with the Jet Propulsion Laboratory.

"Pictures of planets have always held a fascination for me, not just for their unusual content, but for the quality of their presentation. Computers at JPL fabricate the image from signals sent back from space vehicles, and like my recent drawings, the image is made up of a large array of small units called pixels. The characteristics of each pixel, for example its colour or tone in relation to its neighbours can be determined by program. One picture that caught my attention is of a boulder strewn surface on Mars. The image is composed of small but distinct blocks of grey tone, and as the rocks get smaller with distance, they become the same size as,

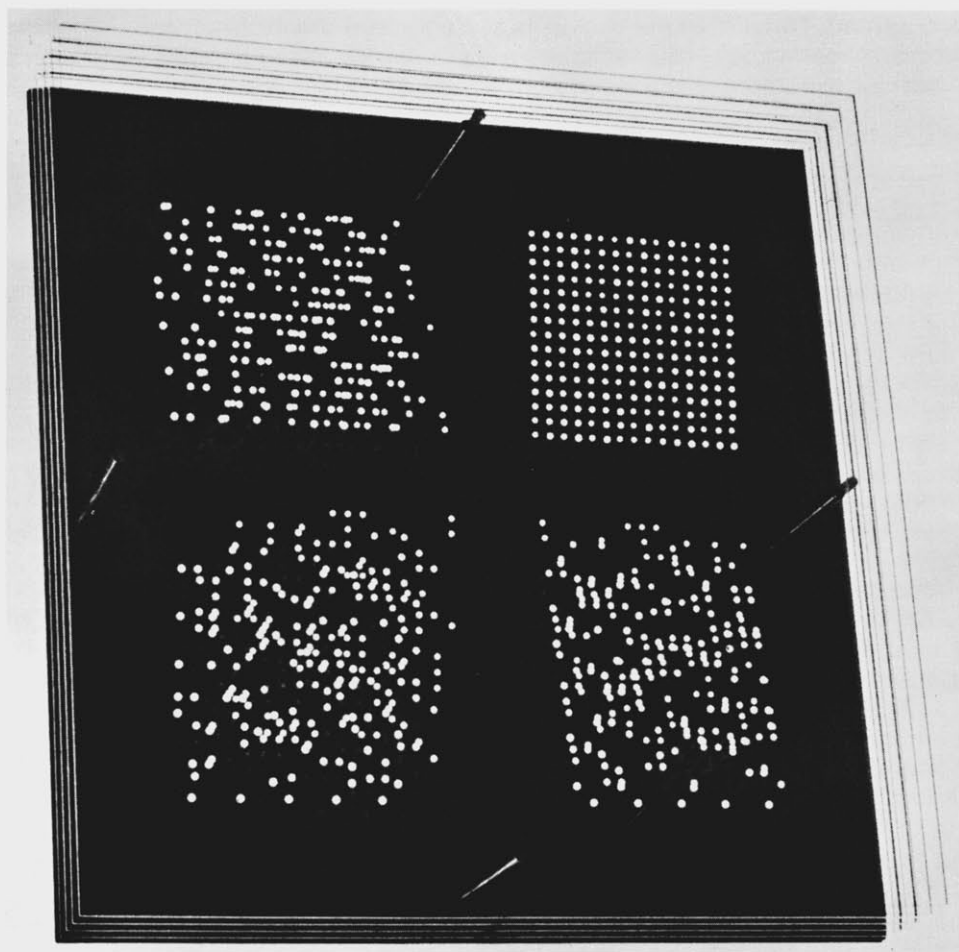
and indistinguishable from the blocks of tone that depict them. So a large part of the image looks like an arbitrary arrangement of tones on the paper, and it is only by seeing it in its context that it takes on substance and meaning as a landscape. Whilst many art forms have ended up with such a fragmentation of an image, few artists have tried to construct an image from tiny elements. Seurat is an exception to this, and I am sure that he would have delighted in current techniques."

S.W.1980

- 1948 Born in Stockport
- 1967 — 71 Studied at Reading University
- 1971 — 72 Worked in Holland on a Royal Netherlands Government Scholarship
- 1973 Started to use computers to organize visual ideas
- 1974 — 77 Research using computer facilities at Hatfield Polytechnic, funded by the Arts Council
- 1976 — 79 Studio visitor at Reading University and the Slade School of Fine Art Experimental Dept.
- 1980 — 81 Bicentennial Arts Fellowship, U.S.A.

SELECTED EXHIBITIONS

- 1976 Space; Abbot Hall Gallery, Kendal
- 1977 Visual Objectives. Playhouse Gallery, Harlow
- 1978 Constructive Rationale; Polytechnic of Central London
The Constructive Context; Arts Council touring exhibition
- 1979 Artist: Computer; Westlake Gallery, White Plains, New York, U.S.A.
TELIC Constructionist Exhibition; Kansas City, U.S.A.
- 1980 Non Standard Constructions, (Pope, Law, Longson) MOMA, Oxford, and Gardener Centre for the Arts



TONY LONGSON: QUARTER 7 1976. Milled Perspex. 60 x 60 x10 cms.

DOMINIC BOREHAM is taking up the post of Research Assistant in Computer Graphics, in the School of Mathematics, Computing and Statistics, Leicester Polytechnic.

Dominic, who was educated at Cambridge and Wimbledon Schools of Art and the Slade School of Fine Art, University College London, has for the past year been engaged in full-time Ph.D. research in the Department of Design Research, Royal College of Art. He intends to continue his doctoral research programme at the Royal College on a part-time basis.

His work as both artist and composer has been constructed around a conceptual framework which could most aptly be described as trans-disciplinary in nature. (With the painter, Richard Bright, he founded the group TRANS in 1979.) His concerns with epistemology and perceptual psychology in particular, should find further applications in the Leicester research project, where he will be helping to develop an inter-active graphics system which allows manipulation of the image in human terms of perceived structure. (See the report by Dr.E.Edmonds and S.Scrivener in this issue.)

Dominic starts work at Leicester Polytechnic on 28 July 1980. He will continue as Editor of PAGE, which will henceforth be prepared and printed in Leicester. Members are reminded that all future communications should be sent to his new address listed on the back page.

J. de M.

FUTURE PAGE PART 2 of the SURVEY

Part 2 of the "International Survey of Computer-assisted Art" will not appear in the January 1981 edition, as was tentatively suggested in PAGE43. However, it will appear in a later edition; exactly when depends on both our financial position and the rate at which suitable material is received.

Anyone who was not included in Part 1, and who has made a significant contribution to their field is invited to submit manuscripts and illustrations. (see back page for submission guidance). PAGE aspires to represent all the Arts, and I would like to receive more work from composers, poets, choreographers, sculptors, film-makers and writers, etc. Studios are also eligible.

When preparing material for the Survey, please remember that each contributor is allowed a double-page spread. The aim of the Survey is to document the state-of-the-Arts, and to this end only recent work will be accepted; i.e. completed no earlier than 1977. Exceptions may be made for earlier work provided it has not been published before.

Dominic Boreham

LETTERS

Dear Sir,

I refer to the issue of **PAGE 43** entitled "International Survey of Computer-Assisted Art". I specifically refer to the announcement by EMAS (the Electro-acoustic Music Association of Great Britain) on page 36.

After reading the resumé of electronic music in Great Britain and a description of the work going on in this country, it is as if there has been some deliberate Eastern European type purge on the work done by EMS (Electronic Music Studios) and its associates.

The people concerned are not mentioned and it seems as if the work that they carried out was never done and, indeed, needs now to be done again.

By the people I mean Tristram Cary, David Cockerell (who must go down in history as the world's best electronic music engineer and the first to be concerned with computers), Peter Grogono, Alan Sutcliffe and myself.

By the work I mean the establishment of a renowned computer music studio which was as advanced, in some ways, as anything elsewhere — for instance in the computer manipulation of real sounds transformed into the digital domain and in the composer/machine/programme interface. I also mean the development of software which controlled the studio and which allowed composers to easily express their musical ideas without having to also learn to become computer operators and programmers.

Here are some examples of the achievements of EMS.

- 1967 The first electronic music sequencer
- 1968 2nd Prize for ZASP, a computer composed and realised composition composed on an ICL 1900 and realised at EMS.
- 1969 The first portable synthesiser (VCS3) — several thousand of which have now been sold all round the world.
- 1970 The world first computer music concert in which a computer composed and played live on stage. This was the first of a series of electronic music concerts, often to

- packed audiences, at the Queen Elizabeth Hall and the Royal Festival Hall.
- 1971 The world's largest synthesiser with digital memory (The Synthi 100). This instrument now exists in many studios (there are about thirty all over the world), including Cologne, BBC, Moscow, Glasgow, Aberdeen, Cardiff, Belgrade, Athens etc.
 - 1972 First British computer controlled synthesiser
 - 1973 First British computer Music course (under the auspices of the Arts Council.)
 - 1974 Computer controlled analysing filter bank (64 semitone intervalled filters) for the analysis of concrete sounds.
 - 1975 1st prize for the world's best computer music programmes for **Musys** given by the ISCM (International Society for Contemporary Music).
 - 1976 First digital oscillator bank (200 oscillators, digital waveform, envelope on each oscillator, 16 bit tuning, 15 bit 50Khz conversion). Similar in concept to the new Ircam approach.
 - 1976 First computer composed and computer spoken poem. (World first).
 - 1977 First computer controlled vocoder and Computer Synthi.
 - 1978 First application of Fourier analysis to the generation of electronic music.
 - 1979 Z80 microprocessor used as a polyphonic sequencer and effects generator for a small synthesiser (20 minutes polyphonic 5 octave memory).

Besides these milestones I would like to mention the comprehensive set of programmes under the title **Musys** for the processing of analysed sounds. The compiler was written by Peter Grogono and the Fortran manipulative programmes by Alan Sutcliffe. These programmes deal with musical as well as scientific concepts and must constitute the most versatile and elaborate — as well as debugged — set of computer music programmes yet devised. There is still much good work that could be derived from them.

Many composers of repute have used the EMS studio; for instance both Birtwistle and Henze have realised at least half a dozen pieces each there.

EMS has spent about £400,000 over the last decade in time and money on the computer Arts. It sold and designed synthesisers for the sole purpose of financing the studio and the people who worked in it.

The influence of EMS must be very great where there is any experimentation in electronic music. Hardly an academic institution in the world with an electronic music capability does not possess one or other of the EMS range of synthesisers. This is especially true in Europe.

The EMS studio has been on offer to the Nation for much of the time of its existence — with the sole proviso that a good environment could be found and that the research could be continued. For the last 3 years it has been on loan to the Music Faculty at Oxford University and it was intended that it should become a permanent part of that establishment.

However due to the difficulty scientists and musicians often find in dealing with business people and due to the lack of help from the British authorities and the banking management EMS has been forced into liquidation and much of the work in computer music is bound to be lost.

I would end by castigating EMAS. Despite several overtures this organisation has done nothing to save the work or equipment I have mentioned above. The purge that I note in their review of British computer music as applied to EMS also applied to their reaction when EMS appealed to them to help save the studio. It was as if we did not exist and had nothing to contribute. In the end the studio is to realise perhaps £20,000. This sum is peanuts, and represents only a tiny fraction of its real value. Why didn't the Electro-acoustic Music Association of Great Britain tackle the problem and go at it hammers and tongs?

On the other hand I would like to thank CAS and John Lansdown personally for the help — both psychological and physical — that he has given and is still giving over the best disposal of these assets.

Yours Sincerely,

Dr. Peter Zinovieff

Fearn
Isle of Raasay
Inverness-shire

Editor's note. It may be worth mentioning that Simon Emmerson's article was not part of the "International Survey of Computer-assisted Art", and did not appear as such in the list on the cover. The total absence of computer music from the "Survey" was due entirely to the fact that not a single composer or studio contributed any material for publication. I hope this state of affairs will be remedied in Part 2. D.B.

Simon Emmerson replies —

It has never been my desire to cross swords with Peter Zinovieff or EMS Ltd. Two of their synthesisers sit in my front room, another two in the studio where I work. The contribution of EMS to British and indeed international electro-acoustic music has been fundamentally important. Where there are many trying to bridge the 'Art/Science' divide, all too few, Dr. Zinovieff being one, have attempted to bridge the wider gulf to business and industry. It remains very tragic that EMS Ltd. has been forced into liquidation and the valuable work of that studio lost.

However I must just make a few short points in defence of EMAS.

- 1) A misunderstanding of **PAGE 43**: no purge intended. What that list of work represents is a catalogue of research papers given to the EMAS Computer Music Conference in Edinburgh in April 1980. No complete coverage of UK. work was claimed, I hope at future conferences EMS Ltd work may be included.
- 2) "Despite several overtures this organisation has done nothing to save the work" Two members of the EMAS committee visited the EMS Ltd Studio in June 1979, EMAS was officially four months old, perhaps a half year longer including an 'ad hoc' period. We are a group of composers, performers and studios, having at that time barely even our milk teeth. We were told that much of the information given to us at the time of our visit was confidential, and we did our best through informal channels to contact funding bodies. That was the only overture we received, there was no further correspondence and no appeal for help from EMS Ltd.
- 3) Most important of all and a reason why EMAS did not pursue the matter "hammer and tongs" at that time has not been mentioned by Dr. Zinovieff. Within a few days of our visit, I understand that an offer from the National Theatre for the studio was received, and that the EMS studio in fact lay in packing cases at the National Theatre for several months. I was led to believe this was a solution to the problem, the NT could certainly have become a centre for Electro-acoustic music. EMAS wrote to the NT giving its full support to this proposal and offering full technical co-operation. Apparently — again tragically — the money was not finally found.

In conclusion I must underline my rejection of a repeated phrase in Dr. Zinovieff's letter. EMAS aims to represent the widest possible interests in all branches of Electro-acoustic Music. No *purge* has ever been carried out against EMS Ltd. In view of my opening sentence it would be unthinkable.

Simon Emmerson
Hon. Sec. EMAS

To the Editor of PAGE
From Alan Sutcliffe

Dear Dominic,

PAGE and the CAS have a tradition of giving space to anything that is submitted. I support that. It is enough that someone thinks that what they have done is worth showing that some of it at least should be shown. But it is still the editor's job to edit, and I was disappointed by PAGE 44. Chris French had something to say and his stereo pairs were interesting. I wonder, by the way, how many people can, like me, cross their eyes at will, and so get the 3—D effect without the use of glasses or any kind of viewer.

However, it was not worth devoting so much space to and I think you should have cut out half of it: in particular, all the puerile and gratuitous drivel that he chose to intersperse throughout the article — which would hardly raise a titter among a class of repressed and backward pre-pubescents. If PAGE is to contain offensive material, let it be to some purpose. Remember Gustav Metzger.

Alan Sutcliffe

Chris French replies:
The Editor, PAGE

Dear Dominic,

Oh dear... I'm sorry Alan Sutcliffe has been upset by my little piece of artistic licence. It is not the first time that I've observed that some people object to the serious and jocular being

interspersed even when this is done to make a point... Interesting! Humour — like art — is subject to the vagaries of taste. One person's meat is another person's poison...

Ask a painter what he is trying to achieve and very often you'll get incomprehensible twaddle. After all had the message been explainable in a few simple words then he or she would not needed to have created the painting in the first place (at least that is what some people would say). If the artist explains his work in simple, mundane terms that anyone can understand then obviously there's no mystery, no mystique and the painting must be trivial and trite... Interesting!

Picasso wasn't the only artist to have trouble with his jokes. He became established in the end tho' — perhaps because he never explained them? Salvador Dali too has done well by keeping a straight face. I thought just about everyone knew that symbolism (sic) was so very important in art. If you are in any doubt then please read Brian Champness' excellent recent psychological contribution to the area... It's very interesting. It is now clear to me that much of my work has been stimulated by the umballicus (sic).

And *do* read Shaw's *Hyprocrisy about Art!* It provides the most valuable perspective to art that I know.

Yours sincerely, Chris French

additional reference:

Champness, Brian G. *Deumbilification: The unkindest cut of all*, In: *Bulletin of The British Psychological Society*, 1980, 33, 117-120.

The Editor replies:

Dear Alan,

Whether or not Chris French's article is offensive is a matter of subjective taste depending entirely on one's individual emotional capacity to be offended. Personally I do not find the article in the least offensive, although (again personally), I do not like his style of presentation. However, I think there has to be a line drawn between a democratic editorial policy and one's own personal tastes.

In his first letter to me Dr. French said. "A light-hearted presentation was chosen to get away from the occasional pomposity of some "art" writings, but I hope my ideas will be taken seriously." Chris took a great deal more trouble than any other contributor preparing his manuscript; readily producing better quality photographs when I objected to his original submissions. I think his pictures are interesting, and need the amount of space I gave them. One or two of them have artistic merits that put many professional artists to shame. Also his description of his working procedure and the rationale of image manipulation is an excellent example of intellectual creativity, which many artists would do well to emulate.

In view of this, and the Society's democratic policy, I decided that he had earned the right to present his article in the way he wished. Even so, I made a number of editorial cuts both to the text and the illustrations. With the exception of the first paragraph which occupies one twenty-third part of the article, I do not think there is much else that can fairly be described as gratuitous. Proportionately, this is only one quarter of the space you have devoted to telling us that you can cross your eyes at will.

Postscript, to all members.

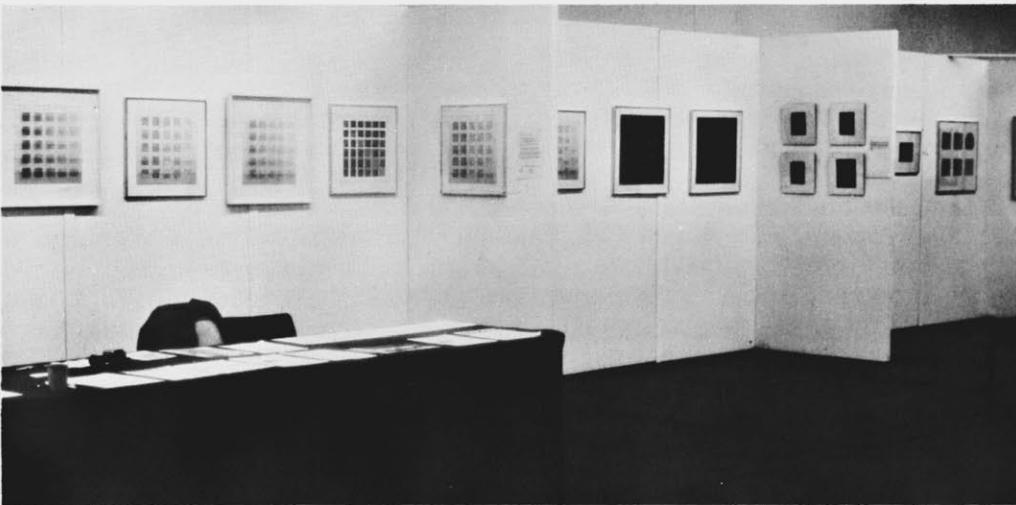
One must allow that readership response is low owing to PAGE being still convalescent from a prolonged period in limbo. Nevertheless I am disappointed that it has taken frivolous references to genitalia to provoke someone to actually write a critical letter to PAGE. If this is the only sort of material capable of eliciting some response from members, maybe I should adopt a policy of publishing pornographic computer art.

Doesn't anyone care about artistic standards, intellectual contributions, topical coverage, or the informative level of articles? Where are the incisive articles condemning the appalling artistic standards still evident in many computer graphics devoid of aesthetic sensibility, and which would never attract anyone's attention but for their being the output from a computer? Art schools, designers and the art world in general are still highly sceptical of and prejudiced against the computer. The poor quality of much "computer art" is largely to blame for this situation. Does anyone care? The "art world" has for years complacently spoken of the Avant-garde as conceptually and practically anachronistic, whilst systematically ignoring the best of important new developments taking place in the computer-assisted arts. Who is attacking this prejudice; who is even attempting to inject a new and dynamic conceptualism into the flabby and complacent drivel churned out by well-established art journals? How many so-called computer artists are even aware of the current paradigms and debates that pre-occupy the professional art-world?

Is there any point in asking these questions yet again? PAGE 40 was entirely devoted to raising these and similar issues. The response was zero.

Dominic Boreham

EXHIBITIONS



COMPUTER ARTS SOCIETY INTERNATIONAL EXHIBITION 1980

Held at CAD80 4th International Exhibition and Conference on Computer-aided Design, Metropole, Brighton, England, 31 March —2 April 1980

The Society exhibited at CAD80 as guests of the organisers, Computer-Aided Design journal, who gave us a generous space equivalent to six stands. Happily we were able to fill the space with work of an outstanding quality, and even spilled out into the rest of the hall, where Paul Brown hung three of his large paintings, which contributed much to the visual elegance of their surroundings.

Ten artists from six countries exhibited. It says something about the advance of computers into the art-world to note that all of the participants are professional artists.

In addition to the paintings mentioned, Paul Brown showed his MODULUS (8) series, based on the proposition that changing the colours of an otherwise consistent set of forms will significantly change their nature. He also showed a series of drawings representing successive stages in the process of a three dimensional probability lifegame.

Dominic Boreham showed examples from his major series of computer-assisted drawings; STOS, OVST, IM, and COS, which use two super-imposed matrices of intervalic structures. Their interaction leads the viewer to make different perceptual interpretations of identical forms. This process was more obvious (being less ambiguous) in two 'relief drawings', OS series R 5/6, in which one of the matrices is drawn onto the perspex frame, separated 1 inch from the other matrix.

Another artist whose work explores perceptual problems is Tony Longson, who is particularly concerned with visual space and its graphic representation. He showed two 'Triangular Tonal Drawings', and two perspex constructions — 'Black Square Tonal Drawing'

and 'White Square Tonal Drawing'. In these constructions, the movements of the viewer significantly effect his perception of structural and spatial relationships.

Herbert Franke showed some interesting drawings (paintings ?) realised by means of an ink jet plotter. His 'Metamorphosis' graphics are the result of an inter-active process which transforms an initial structure by means of a series of two-dimensional mathematical operations.

Sozo Hashimoto exhibited 4 poster-sized photographic images from his 'Universal Mandala' series. Aaron Marcus contributed 4 lithographs — 'Urbane Nova', 'Shades of Hades', and 'Evolving Gravity', which were much admired, not least for the subtlety and elegance of their colour.

Tamsin Giles showed drawings based on permutations of sets of units, one series of which was done collaboratively with Marcus West. In this particular series, the permutations for each drawing remain constant, whilst the ratios of the configurations are altered so as to produce sets of variations.

Manfred Mohr had some further developments on the theme of the cube. Perhaps the most sophisticated and visually satisfying were the drawings based on the graph of a 4-Dimensional hypercube. This is divided into 4 groups of 8 lines, each group containing one randomly chosen but distinct edge of the 8 cubes inherent in a hypercube. The groups are arranged in a 4 x 4 matrix so that the sum of all chosen edges adds up to the complete structure in all directions.

Torsten Ridell exhibited some drawings from his series 'Permutation de lignes'. In these, lines are distributed either systematically or aleatorically within a cubic matrix. Serial progressions of lines are organised on plane sections through the cube, where the distance between each line is equal to the distance between each section. He obtains some very interesting results by rotating the cube matrix on its axes, so that we can perceive the serial progressions from different viewpoints.

Greta Monach contributed some examples from her series of abstract (i.e. non-semantic) poems, 'Automatergon'. The words in each poem are related both visually and audiotively, and grouped in categories. The computer program allows the words to spread in chains through the compartments of a 2-dimensional grid. The relationships between words then operate in all the directions of the picture plane, so that poems are multi-interpretable, varying with the wanderings of the eye.

Information about an International Exhibition entitled: COMPUTER ANIMATION unfortunately arrived too late for inclusion in the last issue. The exhibition was organized by the GALERIJA NOVA, Zagreb, who showed computer works on film and videocassettes, between 16—20 June 1980. Galerija Nova published a catalogue of the exhibition. Anyone who wishes to follow this up could contact:

Galerija Nova, Centar za kulturnu djelatnost SSO, Mihanoviceva 28/1, 41000 Zagreb, Jugoslavia.

BOOKS

LIGHTS & PIGMENTS Colour Principles for artists.

By Roy Osborne; John Murray; £5.75 P/B £9.50 H/B

Drawing has a time-honoured tradition as a didactic discipline. In fact, it often provides the first and most structured activity in Fine Art instruction. Because the variables of drawing are relatively few, it is possible to confront students immediately with the essential conceptual and expressive concerns of the activity.

However, teaching about colour is another matter. Perception of colour, response to it, and the necessary familiarity with colour making materials are vital and fundamental concerns to artists, but nevertheless there is little consensus as to ways of helping students arrive at a better understanding of the subject. Or rather, subjects; for "colour" has so many aspects and such complex inter-connections that the array of variables seems limitless. Probably for this reason many text-books on colour appear to concentrate on one or another isolated aspect, often linked to some subjective theory relating to "harmony", etc. Students (rightly) spot the partiality of the information and therefore tend to reject it as a whole. At the other extreme from loaded information is no information. Refuge is taken in the proposition that "drawing is the basis of painting" and students are left to muddle along as best they may.

So I welcome Roy Osborne's book; in only 129 pages of text he supplies basic introductory information in all areas relating to light and colour which might be of interest to a student in 1980. The physics of light, additive colour, and reflective coloured surfaces, the action of colour on the retina, the response to colour (physiologically, psychologically, and emotionally), the nature of pigments and subtractive mixtures, the measurement of colour and

colour technologies of today, including photography, printing, tv, video and holography are all succinctly described. He also covers historical colour theories, models, and the strategies developed by different artists for handling colour in their paintings. His information is sound, impartial, and bridges the gap between scientific and technical concerns on the one hand and the expressive and practical concerns traditionally handled by fine and applied artists on the other.

Obviously no subject is covered comprehensively, but one of the appendices gives a substantial bibliography for further in-depth study. The other appendices are: a glossary of terms, biographies, and a list of pigments.

This is a generally useful introductory handbook. It will be helpful to the artist and art student wishing to back up intuition with theory; and it will provide the technician with insight into the expressive colour language of artists. But there is a particular way in which this book can be useful to anyone involved in computer art.

For reasons already discussed, many "fine artists" are inadequately grounded in colour theory; and if and when they wish to explore possibilities offered by computers, they may find it necessary to go back to the basics of scientific and technical information in order to assemble in a satisfactory way colour data for programming. It is also a fact that many adept programmers are insufficiently alive to the aesthetics of colour action. Their use of colour, however sophisticated, remains curiously phenomenological: it fails to transcend this level, and we are left with the unsatisfactory feeling that this is not art. It seems that currently there is a need for the artist to become more technically sophisticated and for the software experts to improve their aesthetics if the potential of colour is to be developed in computer art. To this end, Roy Osborne's book is a valuable contribution.

Tamsin Giles

VISUAL ART, MATHEMATICS AND COMPUTERS: Selections from the Journal LEONARDO

Edited by Frank J. Malina Pergamon Press, 1979 ISBN 0 08 021854 7 \$55 £25

In this his second collection of articles from *Leonardo*, Frank Malina has excelled himself. Compared with *Kinetic Art: Theory and Practice*, this volume is more important and more universal in its applications to visual art in general. Perhaps the most noticeable difference is that *Kinetic Art* was predominantly a collection of artists' writings about their *finished artifacts*; whereas the present volume is much more concerned with theory, argument, procedure, concept and paradigm. It is thus more of a source book of ideas, that will stimulate and nourish further artistic explorations.

The book contains 53 articles, grouped into 4 sections. Part 1, entitled: Art, Science and Mathematics — General, contains articles by: Franke, Loeb, Fischer, Whyte, Apter, Rapkine, Monod, Mandelbrojt, Jones, Land, Arnheim, Tigerman, Carleton, Harary, Ruggini, Tolansky, and Harries. Part 2, Computer Art — General: Thompson, Apter, Malina, Gips & Stiny, Thompson, Kodratoff, Thompson (yes again), Harary, Nash & Williams, Williams, Gillenson & Chandrasekaran & Csuri & Schwartz, Franke. Part 3, Pictorial and Three-Dimensional Art-Applications of Mathematics, contains articles by: Ascott, Johnson, Hill, Hayter, Davis, Challinor, Whipple, Noble, Hill, Nightingale, Kostelanetz, Wise, Martin, Sebastian, Freeman and Havill. The final section, Part 4, Pictorial and Three-Dimensional Art Works-Applications of Digital Computers: Franke, Land, Bonačić, Sýkora & Blažek, the Bangerts, Molnar, the Leavitts, Hammersley, Cornock & Edmonds, and Edmiston.

Viewed as a source book of conceptual and technical approaches, this is a unique collection of essays, indispensable to anyone seriously involved in rational aesthetics. The mine of information contained in over 300 pages makes it cheap at the price. Viewed as an art book, my reactions are not so enthusiastic. It is not, of course, a coffee-table book that relies on sumptuous reproductions as a selling point. Nevertheless one feels that the clarity of the line-drawings and diagrams is not matched in quality by the half-tone illustrations, whilst of the 20 colour plates at the back of the book, very few are of a standard one expects in a book of this price.

However, with very few exceptions (!) it is not the illustrations of completed artworks that lend weight to the volume. At the end of his Introduction, Anthony Hill asks the question: will the new developments in science and technology bring about a synthesis of art and mathematics? He comments: "Some artists welcome the computer not only as a means for quantity production of objects of art but as an aid to creativity. However, at this stage, it seems to me that many are fascinated more by computer technology than by mathematically oriented visual art, exceptions will be found in this book." Several of the exceptions I found set me thinking along somewhat different lines to Hill, and to wonder whether the association of computing with mathematics is not symptomatic of the rather restricted view of computers as mathematical calculators. He barely touches upon the possibilities and implications of

computers as intelligent rule-following systems. In this respect some of the most interesting essays on computers and art are concerned not with mathematics, but with algorithmic procedures, simulation, and most importantly, linguistic methods of computing. The important essay by Gips and Stiny quotes D.E. Knuth:

"It has often been said that a person doesn't really understand something until he teaches it to someone else. Actually a person doesn't really understand something until he teaches it to a computer, i.e., expresses it as an algorithm..."

Their paper is followed by Michael Thompson's essay commenting on their 'Investigation of Algorithmic Aesthetics', pointing out that their system is not specific to aesthetics, and referring to the above quote: "That they use a human being to ensure the aesthetic content of their system is probably a sign that they do not really understand the aesthetic."

The arguments go back and forth, and the variety of conceptual models described or implicit in the various authors' presentations are more than just a rich collection of information. For anyone who enjoys thinking, they provide an endless stimulus to explore and reconsider one's own assumptive paradigms. This is an important book of our time; a must for anyone involved in computer-assisted art, or indeed, anyone concerned with making intelligent art, (in all senses). In addition, it does much to promulgate the richness and potential of rational practice, which contrasts sharply with the complacent rhetoric and self-indulgency of so many other areas of contemporary art.

It leaves me with a feeling of optimism, a hope for the future, that in some way is expressed in a sentence by Herbert Franke, about the role of art in the modern world. So I will give him the last word, in a quote taken, appropriately enough, from the very first essay in the collection: "I submit that the function of art is to stimulate the development of human explorative capabilities".

Dominic Boreham

1% DISORDER by Vera Molnar

Wedgepress & Cheese

Edition of 500 25 pages (loose-leaf), 170 x 170mm ISBN 91 85752 16 9 \$7.50 + postage

This delightful "Artist's Book" by Vera Molnar is in the tradition of such things, i.e., a piece of "bound art", (except that it's not bound). It is beautifully printed and comes in an attractive white card folder. The book contains 20 computer-assisted drawings, each one printed on a square of heavy art paper. The drawings are variations on Vera Molnar's familiar theme of beginning with a completely regular order, and introducing a controlled amount of "disorder". In her brief introduction she says:

"I have come to vary this disorder within a single image, and I have found that, for my personal taste, the more I diminish the disorder, the more the plastic beauty of the image increases. However, a small amount of disorder is necessary. One per cent for example. Like in this book. Here are twenty unnumbered images. You must decide the sequence. You have the possibility to turn or reverse each one of them in four different ways. With these twenty images, you can form 2,675,004,047,229,796,708,138,352,640,000 series of images, each one different. Try it. Then you will see the unbelievable richness of any plastic creation that seeks to be systematic".

Wedgepress & Cheese are a new publisher of "Artists Books" and other apparently impossible printed works. Since the Summer of 1978 they have published 16 titles and have 9 titles under preparation. Their motto is:

"The totality does not get more total by its parts; i.e., only the unspoken is true."

Orders should be accompanied by a cheque payable in US dollars and include \$1.00 for postage. Wedgepress & Cheese, Leif Eriksson, Leifs väg 11, 237 00 BJÄRRED, SWEDEN

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Herbert E. Bruderer ist Leiter des Instituts für nichtnumerische Informationsverarbeitung, CH-9400 Rorschach, und Berater der Kommission der Europäischen Gemeinschaften, Brüssel und Luxemburg.

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COMPUTER ARTS SOCIETY

BRITISH COMPUTER SOCIETY SPECIALIST GROUP

AIMS AND MEMBERSHIP

The Society aims to encourage the creative use of computers in the arts and allow the exchange of information in this area. Membership is open to everyone at £4 or \$10 per year. Members receive PAGE four times a year, and reduced prices for the Society's public meetings events. The Society is a Specialist Group of the British Computer Society, but membership of the two societies is independent.

Libraries and institutions can subscribe to PAGE for £4 or \$10 per year. No other membership rights are conferred and there is no form of membership for organisations or groups, though members of other organisations are welcome to join the Society as individuals. Membership and subscriptions run from January to December. For further information write to John Lansdown, Dominic Boreham, or Kurt Lauckner (U.S.A.)

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LONDON MEETINGS

The Society holds regular meetings at 7.30pm on the 1st Monday of each month at John Lansdown's office, 1st floor, 50/51 Russell Square, London WC1. Members and guests are welcome; there is no charge.

PAGE

COMPUTER ARTS SOCIETY QUARTERLY

PAGE is published quarterly, and mailed to subscribers, (see under Membership). Articles, papers, news, reviews, pictures, announcements, should be submitted to the Editor at least eight weeks prior to the month of publication. Please submit manuscripts typewritten. Photographs should be of good quality, high contrast and definition, and either the actual size intended for publication, or larger. Pages are laid out with 1 inch margins, leaving a maximum size for photographs of 6¼ x 9¾ inches. Please document photographs clearly on the reverse, with author, title etc., and indicate which way up they should be. It usually helps with layout if diagrams, flowcharts, etc., are presented in landscape format rather than portrait. Please enclose a pre-paid mailer if you wish your manuscript to be returned.

The Editor is pleased to receive articles from anyone with an active interest in the use of computers in the Arts, whether or not they are members of the Society.