

This issue, largely devoted to sound and music, has been edited by John Lansdown. Much of the bibliographical material was supplied by Alan Sutcliffe.

Members are reminded that items of all sorts, particularly visual material, are always welcome by the editor for insertion in PAGE.

COMPUTERS IN ANIMATION: a note by Stan Hayward

Currently there are five distinct areas where computers are used in animation:

1. From alpha-numeric or digitiser input, to animate and shoot directly onto film.
Typical of the Open University 'Moving blackboard' films in the Mathematics series.
2. Modifying existing artwork or film in the characteristic styling of the computer. Usually an Analogue machine that generates oscilloscope type patterns with real images. Latest systems can simulate human movements.
3. Producing hard copy graphics for conventional shooting.
4. Producing punched tape to operate studio equipment.
5. Producing management data for studio organisation.

Film making is rapidly becoming automated, but the tendency is to use dedicated machines. These are often sophisticated beyond the needs or control of the actual film maker, and sometimes so expensive they have to be operated as separate services out of the studio.

There is a growing bias towards video systems that by-pass film-making bottlenecks, but such systems are expensive unless the work is optimised.

The ideal system would combine all the above computer facilities directly with a video system.

A schematic diagram of such a system below shows that the state of the art would allow this to be built now if the demand required it.

Experiments at the Imperial College have shown the system to be workable. We have made two films drawn and animated on the graph plotter, then had these transferred to video tape for synthetic colouring.

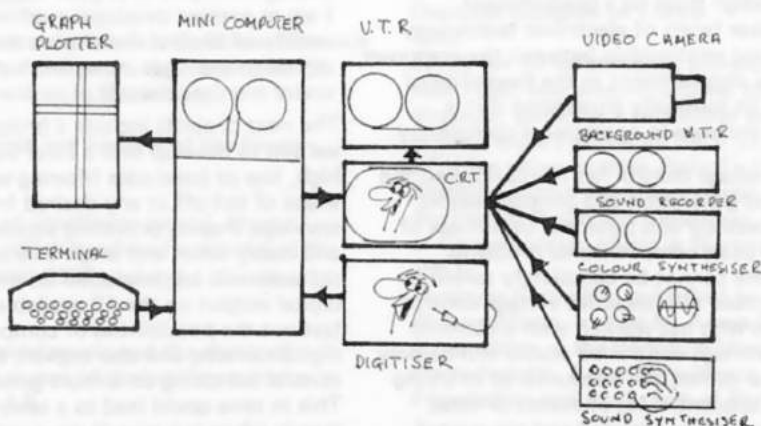
By using different coloured inks and various pen sizes a broad range of effects can be achieved. Future developments will allow the pen to oscillate, rotate, change holders, and include holders for a stylus and light beam to allow masks cut, and photo sensitive paper used.

The main development will be to replace the pen with a small video camera. This will in effect make the graph plotter a reverse rostrum camera with the camera scanning the drawing instead of moving the drawing under the camera as in conventional rostrums. The advantages include being able to shoot blocks of drawings, having these displayed immediately, and the facility of instant editing.

Once the image is onto video tape it can be coloured, stored, optically modified, and matched with the sound tracks of voice, music and effects. The overall ability to make the film 'before your very eyes' doesn't mean that this will make 'film' redundant as continuing developments and investments in traditional film equipment will make it competitive for a long while yet. The video-film will be a guide to timing, editing, layout, etc., of an animated version. The system would produce punched tapes and data as well as the actual artwork, making the shooting a routine operation with small chance of mistakes occurring.

One of the time consuming aspects of animation is breaking the sound tracks down to match the images. By having a punched tape version of the sound to match up frame numbers on the film a large part of the editor's work can be done for him. He does not always need to know what the sound is, but only the duration of it. The animator listens to the actual sound track and checks his images against the frame numbers. It might be possible in the near future to get voice tracks broken down in phonemes by voice synthesisers, even to the extent of having the actors speak into the computer and getting the track broken down immediately.

At the Computer Studio everything from automated knitting patterns to Holography is considered in terms of animation techniques. We believe that the general trend of information processing will make all information end up in a computer or in a film and probably an animated film.



ELECTRONIC AND COMPUTER MUSIC AT DURHAM UNIVERSITY: edited note by Peter Manning

Durham University Electronic Music Studio came into being in October 1970 under the supervision of David Lumsdaine, lecturer in twentieth-century music, and myself working as a research student in the applications of electronic and computer technology to the composition of contemporary music.

Three distinct lines of development have emerged over the year:

- i) The establishment of a normal, voltage control electronic music studio readily capable of practical and reasonably versatile composition.
- ii) Research; musical and electronic into the development of a portable synthesiser specifically for direct use by instrumental performers, and adaptable to the needs of particular instruments.
- iii) Research into digital techniques and the development of hardware capable of being used in a normal studio configuration as a means of increasing its flexibility and sophistication, as well as being compatible with computer operation under program control.

Work on i) is well advanced. The basic equipment at present consists of two "tuned up" V.C.S.3's, a Synthi D.K.1. keyboard with dynamic touch control, two Uher 5-channel mixers, a Heathkit oscilloscope with the added facility of an electronic switch, two high-speed 2-track Revox stereo tape recorders (H.S.77), a normal 19cms/9.5cms 2-track stereo Revox, one Uher 4300 Report stereo 2-track recorder, one mono series 6 Ferrograph tape recorder, one mono mark V Brenell tape recorder, and a variety of microphones.

Playback facilities within the studio consist of a Quad 33/303 amplifier coupled to a pair of large Wharfedale speaker systems. Facilities are available elsewhere in the building for playback under performance conditions in a small concert hall which is equipped with a Uher Royal deluxe recorder driving a Quad 33/303 into a pair of 38cm Tannoy speakers. The latter Uher recorder has interchangeable 2-track and 4-track head assemblies and can be used in the studio for the odd occasion where conversion between the two systems is required.

The interconnection of the various studio components is achieved through two 64 x 64 matrix boards using identical pins to those used on the V.C.S.3 patchboards. Earthing is routed to a common bus rail and signal interconnections made via the pins. Work to date suggests this system is a significant improvement over jackfield methods, not only in neatness and economy of space, but also in audio performance and versatility. Additional "standard" equipment to be added shortly includes a third high-speed Revox, two monitor switchable P.P.M./V.U. meters and a digital frequency meter.

Progress in research at Durham — which falls into category iii) — will naturally prove influential in the long term development of the studio. The main principle behind any advancement in studio design must be a predominant emphasis on adopting those facets of electronic technology which improve the working relationship between the composer and his tools. A technical improvement in the flexibility of sound manipulation will be musically frustrating if it is matched by a significant increase in operational complexity.

Over the last ten years, voltage control has revolutionised the design of electronic sound generation and control devices, greatly increasing the versatility and potential usefulness of electronic studios. Some basic compositional problems remain, however, and these cannot be completely solved by simply increasing the number of interactive voltage control devices available. Anyone who has worked with electronic music in an analogue or voltage controlled studio will be only too aware of the technical difficulties encountered in trying to construct an ordered, sequential set of events or ideas employing a varying degree of interrelated and contrasted

textures. Basic voltage control material in isolation is essentially very crude and all too easily becomes rapidly boring, on account of its inherent redundancy. Long sessions of changing component interconnections, taping, montaging and splicing are necessary to transform this source material into a creative, musical piece. These operational conditions are highly frustrating to a composer, and surprisingly few advances have been made in overcoming these fundamental restrictions, perhaps due to a combination of misguided aesthetics and financial limitations.

We, at Durham, feel that the increasing emphasis being shown by electronics on digital technology holds the key to future studio design. The development of digital systems creates a flexibility which not only overcomes many of the technical problems encountered in the switching and control of interactive devices, but also has the potential to remove most of the fundamental barriers to the final, creative output of musical information.

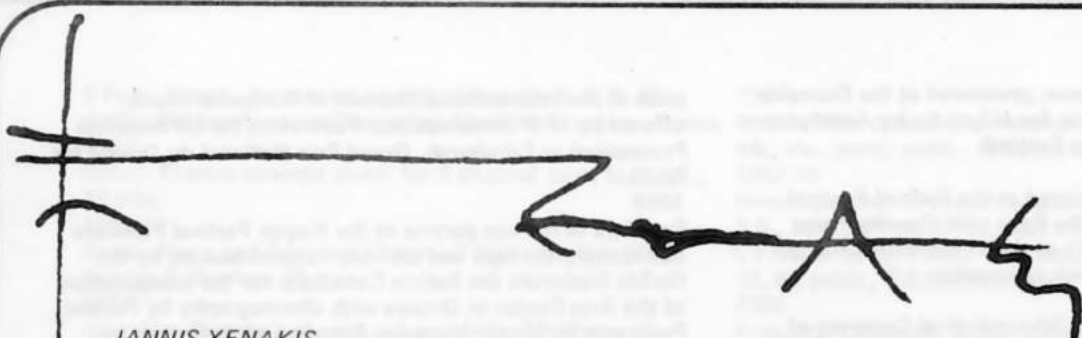
Digital techniques are not new to electronic music. Experimental work on the generation of sound direct from computers has been underway since the early sixties. However, the results at least until recently have been musically disappointing. The fundamental stumbling block has been the necessity to adapt sizeable, and hence costly, computers to perform a function somewhat alien to their normal mode of operation. Such facilities inevitably have to be shared with other incompatible users, usually on such a low priority as severely to restrict their availability to a musician for real time composition.

This state of affairs presents a rather gloomy outlook for the future of direct on-line computer sound synthesis. However, there are other approaches to digital technology which are very much more practical. Several of the big electronic music centres in America are turning to small computer systems, and we are at last seeing such facilities in this country, primarily as a result of the pioneering work carried out by the E.M.S. team at Putney.

The line of approach we propose to adopt is to tackle the problem from both ends; to work backwards from the final sound generation mechanism, introducing devices capable of digital control and switching, and to work forwards from the computer, treating it as a system capable of sophisticated, programmable control of some or all of the studio functions when desired. The fundamental difference in this approach to computers is that a great deal can be achieved through the use of *small* machines, sufficiently low in capital cost to become a possibility as part of a studio budget.

By courtesy of the University Psychology Department, we have been granted time to conduct preliminary experiments on small computer usage, using their IBM 1130 (8K-16 bit word) computer, complete with Disk Monitor system and a W.D.V. interface providing digital and analogue output with good facilities for experimentation. I am at present developing software aimed at creating a variety of control waveforms through the interface's digital-to-analogue converter, using programmable arrays under monitor control.

The next projects include a prototype digital filter, which we aim to develop into a filter bank, offering facilities for high, low or band-pass filtering with a variable degree and shape of cut-off at any desired frequency, and a digital envelope shaper, providing sophisticated control of attack and decay times and shape characteristics. Simultaneously, software will be developed on the computer for programmed digital output on the 16 available lines which can be used to test out the possibilities of computer control of studio digital devices, and also explore the wider possibilities of control switching on a more general front within the studio. This in time could lead to a central computer controlled matrix when our overall development reaches a suitable point.



IANNIS XENAKIS

In keeping with the policy decided last year, the committee has invited the French composer, Iannis Xenakis, to become an Honorary Member of the Society. M. Xenakis has accepted our invitation and has kindly supplied the material from which the biography, list of compositions and discography in this issue has been prepared.

Xenakis is an engineer and architect as well as composer and his immense contribution to the architecture normally attributed to Le Corbusier is not well enough known. Those who experienced the effect on the senses of the Philips Pavilion in the 1958 Brussels Expo will have appreciated the value of

co-operation between great artists in different fields (visual presentation: Le Corbusier; music: Varese; architecture and engineering: Xenakis) and it is a pity that such co-operation could not have continued after completion of that work.

From his earliest days as a composer (1953-54) Xenakis has used mathematical procedures and computers in his work and those unfamiliar with his Methods should read his book *Musiques Formelles: Paris Editions Richard-Masse 1963* and published in English (with some modifications) as *Formalised Music* Bloomington Ind: Indiana University Press 1971.

BIOGRAPHY OF IANNIS XENAKIS

1922

Born in Braila, Rumania, of Greek parents.

1932

Left Rumania for Greece. High school studies in a private Anglo-Hellenic school on the island of Spetsai.

1934

Decided to devote himself to music and sciences. His first professor being Aristotle Koundourof, pupil of Hippolytov Ivanov.

1940

In parallel with his studies at the Polytechnic School of Athens (completed in 1947 with an engineering diploma equivalent to a doctoral degree), he joined the anti-Nazi underground resistance movement, during which he was tortured and imprisoned many times, condemned to death, and gravely wounded on his face.

1947

Escaped to Paris where the architect Le Corbusier entrusted to him engineering and architectural projects among other works. With him he realised the unites of Marseilles and of Nantes, the Monastery of La Tourette, the Chandigarh Assembly and the project of the Bagdad Stadium. During 12 years he was Le Corbusier's close collaborator in almost all his projects.

1948

Studied in musical composition with Arthur Honegger and Darius Milhaud.

1950

Studied musical aesthetics and analysis with Olivier Messiaen at the Paris Conservatory for 2 years. Also attended the classes of Hermann Scherchen in Gravesano.

1953

Married Francoise, a writer and heroine of the French resistance.

1954

Innovated the principle of 'stochastic music'. Wrote *Metastasis* for orchestra which produced a scandal at the Donaueschingen Festival of 1955 under the direction of Hans Rosbaud.

1955

Published a critique of serial music and the thesis of musical composition by means of probability calculus in *Gravesano Review*, nos. 1,6.

1956

Wrote *Pithoprakta* for orchestra; premiered in Munich in 1957. In *Metastasis* and *Pithoprakta* "... he invented several of the compositional techniques that now (1968) constitute the *lingua franca* of the avant-garde". (High Fidelity, June 1968). Conceived the architecture of the Philips Pavilion at the Brussels World Exposition in 1958 (music by Varese, spectacle by Le Corbusier). First prize in composition offered by the European Cultural Foundation. Birth of his daughter, Maa Xenakis.

1957

Wrote *Achorripsis* for orchestra; premiered in Buenos Aires. Published his "Elements of Stochastic Music" in *Gravesano Review*. At the electro-acoustic studio of the French Radio and Television, composed *Diamorphoses* and *Concret PH*, both for 4-track tape.

1959

Duel, game for 2 orchestras, thus innovating "strategic music". *Syrnos* for 16 strings, "Sur un geste electronique", *La Revue Musicale*, no. 224. *Analogiques A and B* for 9 strings and 4-track tape.

1960

Left Le Corbusier. *Orient-Occident*, electro-acoustic music for 4-track tape for the UNESCO film. Member of the jury of Biennale de Paris.

1961

Herma for piano, thus innovating "symbolic music;" premiered in Tokyo in 1962. Invited to the Orient-Occident Congress in Tokyo.

1962

ST/10 for 10 instruments; computed in Paris by the IBM 7090. *Morsima-Amorsima*; premiered in Athens. *Strategie*, game for 2 orchestras and 2 conductors; premiered at the Venice Festival in 1963. *ST/48* for orchestra and *ST/4* for string quartet. *Polla Ta Dhina*; premiered in Stuttgart. *Bohor*, electro-acoustic music for 8-track tape at the French Radio and Television. Invited to the Festival of Contemporary Music in Warsaw.

1963

Musiques Formelles, published by *La Revue Musicale*, Richard-Masse. Invited by Aaron Copland to teach composition at the Berkshire Music Center at Tanglewood, Massachusetts. Artist-in-residence invited by the Ford Foundation and the Senate of Berlin.

1964

Eonta for piano and 5 brasses; premiered at the Domaine Musical in Paris. Stage music for *Hiketides* by *Aeschylus*; premiered at the Epidaurus Festival.

1965

Akrata for 16 winds; premiered at the Oxford Festival. Whole Xenakis festival at the Paris salle Gaveau. Huge scandal created by *Strategie* at the Theatre des Champs-Elysees. He is offered French citizenship.

1966

Travelled to the Phillipines (Musicological Congress of Manila), to Japan (invited by the Festival of Contemporary Music for the Japanese premiere of *Strategie*, to Argentina, Brazil, United States, Germany, and Sweden, when he lectured and gave classes (also in England, Holland and Canada in the preceding years). *Terretektorh* for 90 musicians scattered in the public; premiered at the Royan Festival. Stage music to *Aeschylus' Oresteia* for the Ypsilanti Festival in Michigan. *Nomos alpha* for cello; premiered in Bremen. Founded the Equipe de Mathematique et Automatique Musicales (E.M.A.Mu) at the Ecole Pratique des Hautes Etudes in Paris. Grand Prix National du Disque for the recording by Chant du Monde (*Metastasis*, *Pithoprakta*, *Eonta*).

1967

"Towards a Metamusic" in *La Nef*, no.29. Conceived and realised the Polytope sonic and visual composition at the French pavilion at the Montreal World Exposition. Associate professor and founder of the Center of Mathematical and Automated Music at Indiana University, Bloomington, Indiana. A whole Xenakis day at the Museum of Modern Art in Paris (exhibition of designs, concerts, lectures).

1968

Premiere of *Nuits* for 12 mixed voices at the Royan Festival. New EMI recording (*Atrees*, *Nomos alpha*, *ST/4*, *Morsima-Amorsima*). Balanchine presented a choreography of Xenakis' music (*Metastasis*, *Pithoprakta*) at the New York City Ballet. Whole Xenakis day in Paris at the Days of Contemporary Music. "Towards a Philosophy of Music" in *La Revue d'Esthetique*, nos. 2, 3 and 4 in 1968. First

COMPOSITIONS

1953-54

Metastasis. Orchestra: picc., flk. 2 ob., bass cl., 3 Fr. h., 2 trpt., 2 tenor trb., timp., perc., strings (12, 12, 8, 8, 6); publ., Boosey & Hawkes; 7 min.

1955-56

Pithoprakta. Orchestra: 2 tenor trb., xylop., wd-blk., strings (12, 12, 8, 8, 6); publ., Boosey & Hawkes; 9 min.

1956-57

Achorripsis. Orchestra: picc., ob., E^b, cl., bass c., bassn., contrabassn., 2 trpt., tenor trb., xyloph., wd-blk., bass drum, 3 vl., 3 vlc., 3 cb., publ., Bote und Bock, Berlin; 7 min.

1956-62

ST/10. Ensemble: cl., bass cl., 2 Fr.h., harp, perc. (5 temple-blks., 4 tom-toms, 2 congas, wd-blk.), string quartet; publ., Boosey and Hawkes; 11 min.

1956-62

ST/4. String quartet; publ., Boosey & Hawkes; 11 min.

1956-62

Morsima-Amorsima. Ensemble: piano, vl., vlc., cb., publ., Boosey & Hawkes; 11 min.

1957

Concret PH. Electro-acoustic music for 4-channel tape, O.R.T.F.; 245 min.

1957

Diamorphoses. Electro-acoustic music for 4-channel tape, O.R.T.F.; 7 min.

1958-62

Atrees. Ensemble: fl., c., bass c., Fr.h., trpt., tenor trb., perc. (maracas, susp. cymbals, gong, 5 temple-blks., 4 tom-toms, vibraph.), vl., vlc., publ., Editions Francaise de Musique, O.R.T.F.; 15 min.

prize at the International Contest of Computer Music offered by IFIP (International Federation for Information Processing) at Edinburgh. Grand Prix National du Disque for *Nuits*.

1969

Premiere of *Nomos gamma* at the Royan Festival. Premiere of *Kraanerg* for tape and orchestra commissioned by the Guilde Nationale des Ballets Canadiens for the inauguration of the Arts Center in Ottawa with choreography by Roland Petit, sets by Victor Vasarely. Premiere of *Anaktoria* by the Paris Octet at the Avignon Festival. Premiere of *Persephassa* by the Strasbourg Percussionists at the Shiraz-Persepolis Festival on the Apadana with the public in the middle. Writes *Synaphai* for piano and orchestra. Became attache de recherche at the CNRS (National Center for Scientific Research) of France.

1970

Premiere of *Hibiki-Hana-Ma* for 12 tapes distributed over 600 loudspeakers with automated kinematics of the sound within the Pavilion of the Japanese Steel Federation at the Osaka World EXPO. Sound and light sculpture for the Iranian pavilion at EXPO 70. Travelled in Japan, India, United States, Europe, and gave 32 lectures in the universities and cultural centers together with many radio, television, and newspapers interviews. Grand Prix National du Disque for the 5-record album published by the ERATO company.

1971

Premiere of *Synaphai* for piano and orchestra during the evening "Free Entrance to Xenakis" which lasted 8 hours at the Royan Festival. Composed *Persepolis* for 8-track tape and light spectacle on the mountain; premiered on the opening night of the Persepolis Festival. These two festivals as well as the Composers' Showcase in New York dedicated whole evening to his music. By decree of the French government, is named with Olivier Messiaen as the jury of the 1971 "Prix de Rome". Scholar-in-residence invited by the Aspen Institute for Humanistic Studies, Aspen, Colorado.

1959

Due. Game for 2 orchestras: 2 picc., 2 ob., 2 B^b cl., 2 E^b cl., 2 bass cl., 2 bassn., 2 contrabassn., 4 trpt., 2 trb., perc. (2 snare-drums, 2 side-drums, 4 bongos, 6 congas), strings (2, 2, 0, 8, 4); publ., Editions Salabert; variable duration.

1959

Syrmos. Strings (6, 6, 0, 4, 2); publ., Editions Salabert; 14 min.

1959

Analogiques A & B. Strings (3, 3, 0, 2, 1) and 4-channel tape; publ., Editions Francaise de Musique, O.R.T.F.; 7 min.

1959-62

Strategie. Game for 2 orchestras and 2 conductors; 2 picc., 2 fl., 2 lb., 2 B^b cl., 2 E^b cl., 2 bass cl., 2 bassn., 2 contrabassn., 4 Fr. h., 4 trpt., 4 tenor trb., 2 tba., perc. (2 vibraph., 2 marimbaph., 2 maracas, 2 susp. cymbals, 2 bass drums, 2x4 tom-toms, 2x5 temple-blks., 2x4 wd-blks., 2x5 goat-bells), strings (12, 12, 8, 8, 6); publ., Boosey & Hawkes; variable duration.

1959-62

ST/48. Orchestra: picc., fl., 2 ob., cl., bass cl., bassn., contrabassn., 2 Fr.h., 2 trpt., 2 trb., timp., perc. (4 tom-toms, 5 temple-bloks., wd-blk., side-drum, vibraph., marimbaph.), strings (8, 8, 6, 6, 4); publ., Boosey & Hawkes; 11 min.

Orient-Occident. electro-acoustic music for 4-channel tape, O.R.T.F.; 12 min.

1960-61

Herma. Piano; publ., Boosey & Hawkes; 9 min.

1962

Polla Ta China. Children's chorus and orchestra: 20 children's voices, picc., fl., 2 lb., cl., bass cl., bassn., contrabassn.,

2 Fr.h., 2 trpt., 2 tenor trb., perc., strings (8, 8, 6, 6, 4); publ., Edition Modern (Wewerka), Munich, Germany; 6 min. 1962

Bohor. Electro-acoustic music for 4-channel tape, O.R.T.F.; 23 min. 1963-64

Eonta. Piano and 5 brasses (2 trpt., 3 tenor trb.); publ., Boosey & Hawkes; 18 min. 1964

Hiketides. Women's chorus and ensemble: 50 altos or mezzo-sopranos (with percussion instruments), 2 trpt., 2 trb., 2 v., 2 b.c., 2 cb.; publ. Editions Salabert; 12 min. 1964-65

Akrata. Wind instruments: picc., ob., B^b cl., E^b cl., bass cl., bassn., 2 contrabassn., 2 Fr.h., 3 trpt., 2 tenor trb., tba.; publ., Boosey & Hawkes; 11 min. 1965-66

Oresteia. Music for The Oresteia of Aeschylus. Mixed Chorus and chamber orchestra: picc., lb., cl., bass cl., contra-bassn., Fr.h., trpt., B^b picc. trpt., tenor trb., tba., perc. (traditional and unusual), vlc.; publ., Boosey & Hawkes; 100 min. 1965-66

Oresteia Suite. Concert Version of Oresteia. Mixed chorus and chamber orchestra; publ., Boosey & Hawkes; 46 min. 1966

Terretektorh. Orchestra scattered into the public: picc., 2 fl., 3 ob., B^b cl., E^b cl., bass cl., 2 bassn., contrabassn., 4 Fr. h., 4 trpt., 4 tenor trb., tba., perc., strings (16, 14, 12, 10, 8); publ., Editions Salabert; 18 min. 1966

Nomos alpha. Violoncello; publ., Boosey & Hawkes; 17 min. 1967

Polytope. Orchestra and light spectacle, French Pavilion, EXPO 67, Montreal: 4 identical orchestras — pic., E^b cl., bass cl., contrabassn., C trpt., tenor trb., perc. (large gong, Japanese wd-blk., 4 tom-toms), 4 vl., 4 vlc., publ., Boosey & Hawkes; 6 min. 1967

Nuits. 12 mixed voices; publ., Editions Salabert; 11 min. 1967

DISCOGRAPHY AT END OF NOVEMBER 1971

United States

Angel S-36560

Atrees, Morsima-Amorsima, ST/4
Nomos Alpha

Angel S-36655

Herma. (+
(+ Boucorechillieue +
Jolas)

Angel S-36656

Akrata, Achorripsis, ST/10, Polla Ta Dhina
Diamorphoses.

Boite a Musique 0/0

(+ Ferrari + Sauger +
Philippot + Schaeffer)
Medea, Polytope,

Candide 31049

Syrmos
Akrata. (+ Del Tredici
+ Nono + Takemitsu)

Columbia MS-/281

Atrees, Morsima-Amorsima, ST/4
Nomos Alpha

HMV S-ASD 2441

Orient-Occident.
(+ Berio + Maderna +
Ferrari + Dufrene and
Baronet)

Limelight 86047

Herma. (+ E. Brown +
Reynolds + Takahashi)
Akrata, Pithoprakta
(+ Penderecki)

Mainstream 5000

Nonesuch 71201

Nonesuch H-71246

Bohor I, Concret PH II,
Diamorphoses II,
Orient-Occident III
Eonta, Metastasis,
Pithoprakta

Vanguard Cardinal 10030

1967

Medea. Male chorus and ensemble (E^b cl., contrabassn., trb., vlc., perc); publ., Editions Salabert; 25 min. 1967-68

Nomos gamma. Orchestra scattered into the public: picc., 2 fl., 3 ob., B^b cl., E^b cl., bass cl., 2 bassn., 3 contrabassn., 6 Fr.h., 5 trpt., 4 tenor trb., tba., perc., strings (16, 14, 12, 10, 8); publ., Editions Salabert; 15 min. 1969

Kraanerg. Orchestra and 4-channel tape: picc., ob., E^b cl., bass cl., contrabassn., 2 Fr.h., 2 trpt., 2 trb., strings (3, 3, 2, 2, 2); publ., Boosey & Hawkes; 75 min. 1969

Anaktoria. Ensemble: B^b cl., bassn., Fr.h., 2 vln., vlc., cb.; publ., Editions Salabert; 11 min. 1969

Synaphai. Pinac and orchestra: 3 fl., 3 ob., 3 B^b cl., 3 bassn., 4 Fr.h., r trb., tba., perc., strings (16, 14, 10, 10, 8); publ., Editions Salabert 14 min. 1969

Persephassa. Ensemble of 6 percussionists: timp., bass drums, tom-toms, wd-blks., cymbals, gongs., Thailand gongs, simantra, maracas, siren-whistles,; publ., Editions Salabert; 24 min. 1970

Hibiki-Hana-Ma. 12 tapes distributed kinematically over 800 loudspeakers; premiered at EXPO 70, Osaka, Japan; publ., Editions Salabert; 18 min. 1971

Aroua. Strings (4, 3, 2, 2, 1); publ., Editions Salabert; 12 min. 1971

Persepolis. 8-channel tape and light spectacle on the mountain; publ., Editions Salabert; 57 min. 1971

Antikhthon. Orchestra: 3 fl., (picc) 3 ob., 3 B^b cl., 2 bassn, contrabassn., 4 Fr.h., 3 C trpts., 3 tenor trb., tuba., 1 very large timp, with pedal, 2 snare drums, strings (10, 8, 6, 6, 4); publ, Editions Salabert; 23 min. 1971

England

Cybernetic Serendipity

Music ICA 01, 02

HMV

Strategie excerpts

Nuits

France

Barclay 920217

Boite a Musique

EMI 0063-10011

EMI CVC 2086

EMI MCV 2086 c*

EMI CVB 2190

ERATO STU 70457

ERATO STU 70526

ERATO STU 70527/28

ERATO STU 70529

ERATO STU 70530

ERATO STU 70565

ERATO LDEV 523 (45 rpm)

Anaktoria, Morsima-Amorsima

Diamorphoses

Akrata, Achorripsis, ST/10, Polla Ta Dhina

Atrees, Nomos Alpha, ST/4, Morsima-Amorsima

Atrees, Nomos Alpha, ST/4, Morsima-Amorsima

Herma. (+ Jolas +
Boucorechillieue)

Nuits. (+ Messiaen +
Penderecki)

Syrmos, Medea, Polytope.

Kraanerg
Nomos Gamma,

Terretektorh

Bohor I,
Diamorphoses II,

Orient-Occident III,
Concret PH II.

Oresteia
Medea, Polytope

Le Chant du Monde K60*

Le Chant du Monde
LDX-A-8368
Philips 835485/86 AY
Philips 835487 AY

Philips 836897 DSY
Philips 90 119 CAA*

Philips 6521020
Realisations Sonores, no. 55
(Hugues Desalle, 4 villa du
Pont de Grenelle)

Germany
Hor Zu

Greece
LYRA Athenes 251

Metastasis, Pitho
Pithoprakta, Eonta
Metastasis,
Pithoprakta, Eonta
Orient-Occident
Concret PH,
Analogiques A and B
Orient-Occident
Orient-Occident
(+ Berio + Kagel)
Persephassa
"Xenakis Speaks"

Medea, Concret PH,
Orient-Occident

Metastasis,
Pithoprakta, Eonta

Japan

Issued by Columbia of Japan:
ERATO STU 70526

ERATO STU 70527/28
ERATO STU 70529

ERATO STU 70530

RCA Victor Japan JRZ

2501
RCA Victor Japan SJV
1513
SONY CBS SONC 10163

Syrmos, Medea,
Polytope
Kraanerg
Nomos Gamma,
Terretaktorh
Bohor I,
Diamorphoses II,
Orient-Occident III
Concret PH II
Hibiki-Hana-Ma
(+ Takemitsu +
Takahashi)

Strategie

Akrata (+ Del Tredici
+ Nono + Takemitsu)

* cassette

WRITINGS OF XENAKIS

Books

Musiques Formelles. Paris: Editions Richard-Masse, 1963.
Musique Architecture. Tournai, Belgium: Casterman, 1971.
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Press, 1971 (also London).

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Gravesaner Blatter. Gravesano, Ticino, Switzerland.

"La Crise de la musique serielle," no.1.

"Calcul des probabilites et Musique," no.6.

"A la recherche d'une Musique Stochastique," nos.11-12.

"Elements de Musique Stochastique," no.18.

"Elements de Musique Stochastique," no.19.

"Elements de Musique Stochastique," no.20.

"Elements de Musique Stochastique," no.21.

"Elements de Musique Stochastique," no.22.

"Musique Stochastique," no.23.

"Programme en Fortran de Musique Stochastique," no.26.

(Issued together with the recording of *ST/4*)

"Vers une philosophie de la Musique," no.29.

Published in French, English and German.

Nutida Musik (Swedish radio publication)

"Les Trois Paraboles," no.4, 1958-59.

"Sur un Geste electronique," no.6, 1958.

La Revue Musicale, Richard-Masse, Paris.

"Sur un geste electronique," *Experiences Musicales*, no.244,
1959. In French.

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Decembre, 1961. In French.

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"Musique Stochastique," no.3, February 1964. Translation
of the *Revue d'Esthetique* into Italian.

Music East and West, Tokyo.

Conference reports on 1961 Tokyo East-West music
encounter. *Stochastic Music.* In English.

Preuves, Paris

"La voie de la recherche et de la question," November,
1965. In French.

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1955.

Ongaku Geijutsu, Tokyo

Interview, no.6, 1961. In Japanese.

Slovenska Hudba, Bratislava

Article in Czech, 1964.

Rugh Muzyczny, Warsaw

Polish writings on Debussy and Xenakis, 1961-62.

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Minuit, 1958.

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"Vers une metamusique," no.29, January 1967. In French.

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"Towards a Metamusic," 1970.

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"Towards a Metamusic," Summer 1970.

"Couvent de la Tourette," in *Le Corbusier's Modulor 2.* (Ed.
Architecture d'Aujourd'hui, 1955).

"L'Architecture du Pavillon Philips," *Revue Technique*
Philips, vol.20, 1958-59.

"Le Pavillon Philips," *Gravesaner Blatter*, no.9

"Le Modulor de Le Corbusier," *Gravesaner Blatter*, 10.

"A Propos de Le Corbusier," *Gravesaner Blatter*, nos. 27-28.

"A Propos de Le Corbusier," *Aujourd'hui, Art et Architecture*,
November 1955.

"La Ville Cosmique." ("Cosmic City"). A study of polytopic
urbanism in *L'Urbanism, Utopies et Realities* by Francoise
Choay. (Paris: Editions de Sevil, 1965). In French. English
translation by J. Ashbery. *Art and Literature*, no.10 (SELA,
1000 Lausanne, Switzerland).

Here are some short notes from RICHARD FRIEDMAN

The first is a comment that computer music is not dead completely (direct synthesis, that is). I recently heard some of the work being done by John Chowning at Stanford's Artificial Intelligence Lab. and was extremely impressed. Chowning has extended the Bell Labs Music 5 programs to produce harmonically complex spectra by frequency modulation rather than additive synthesis. After some mathematical investigations, Chowning has discovered that FM computational techniques can be exactly controlled to produce sounds with a life-like quality that surpass anything I've ever heard out of any other direct synthesis system, or any analog synthesizer for that matter — Very exciting.

(I might add that I postulated this technique to the people at Bell and Princeton in '67, who didn't believe it would produce anything they couldn't get by additive synthesis. Unfortunately, I didn't have any D/A equipment to try it out on, even though I went as far as writing a simple program that would produce frequency modulated sounds under exact numerical control.

Understandably, after hearing what Chowning is doing today and after hearing the results, I am extremely excited about the whole thing).

Chowning has also been working on digital synthesis of reverberation and sound positioning using four channels. His work in these areas is extraordinary. At Stanford, Chowning

has available a four-channel D/A converter (12 bits, 25000 bits/second) running off a large PDP-10 complex.

The next comment is that I will be giving a paper at the Los Angeles meeting in May of the Audio Engineering Society describing the project I am now engaged in with Don Buchla, Electronic Music Synthesizer manufacturer. This is to utilize a small digital computer to control a very large analog synthesizer. Our approach is to permit the performer to describe patches, or interconnections between analog modules by patch descriptions entered into the computer through an alphanumeric keyboard and displayed on a TV monitor. A large number of complete patch descriptions may be stored on a digital data cassette and read in almost instantly on call. This permits the synthesizer to be re-patched in milliseconds from one complex network to another. Believe it or not, the program for the computer gets into some very sophisticated state-of-the-art stuff with multi-level interrupts, simultaneous processes, etc. to permit real-time interactions.

Might also mention, that Buchla's "third generation" synthesizer systems are getting more and more exotic, with many modules now incorporating digital logic and MSI. A new catalog will be available soon from Buchla Associates, Box 5051, Berkeley, California, USA 94705.

UND NOW SOMETHING TO READ?

Preliminary Report on a System for general Space Planning. C.M. Eastman

Communications ACM 15, 2 (Feb 1972) pp. 76-87.

An extension of ALGOL for formulation and solutions of problems in space planning.

Music and Computer Composition. J.A. Moorer

Communications ACM 15, 2 (Feb 1972) pp. 104-113.

Bibliography of Electronic Music. R.M. Youngson.

Studio Sound May 1972. pp. 45-49.

Fairly comprehensive bibliography covering some technical aspects of computer music.

Essays Concerning a Generative Theory of Music

The following essays have recently been published and copies are available on request at the Institute of Sonology, Utrecht State University, 14-16 Plompstorengracht, Utrecht, Netherlands.

LASKE, Otto E. (Utrecht State University, Utrecht, Netherlands),

"An Acological Performance Model for Music", Electronic Music Reports, No.4, Institute of Sonology, 1971 (Fall), pp. 31-64.

An investigation of a perceptual model based on a system of acological, that is, meta-acoustical, categories of musical listening as developed by P. Schaeffer.

LASKE, Otto E. (Utrecht State University, Utrecht, Netherlands),

"On Problems of a Performance Model for Music", Institute of Sonology, 1972 (Spring), 136 pages.

An investigation of grammatical and strategical preconditions deemed indispensable for constructing a general model of musical activity and communication.

LASKE, Otto E. (Utrecht State University, Utrecht, Netherlands),

"On Musical Strategies With View to a Generative Theory of Music", Interface, No.2, Amsterdam, Swets & Zeitlinger, 1972 (Summer), 20 pages.

A study in the methodology of a generative grammar for music.

LASKE, Otto E. (Utrecht State University, Utrecht, Netherlands),

"Some Postulations Concerning a Sonological Theory of Perception", Interface, No.2, Amsterdam, Netherlands, Swets & Zeitlinger, 1972 (Summer), 16 pages.

A statement of the indispensable methodologic requirements to be satisfied by a theory of perception formulated on the basis of the sonological component of a generative grammar for music.

Automatic Cartography and Planning

Produced by Experimental Cartographic Unit of Royal College of Art.

Architectural Press, London 1971 232 pp. £8. 50

A pioneer study, concerned with the extent to which new techniques in computer controlled cartography can be applied to the processing and presentation of planning data.

The Scope of Computer Mapping. M S Monmonier

Bulletin 81, Special Libraries Assn., Geography and Map Div., American Geographical Society, New York Sept 1970 pp. 2-14 \$2.00.

Plotter Mapping (GYPSY2 and SURGE2). M S Monmonier

Computer applications in the National and Social Sciences. No. 11, Geography Dept., Nottingham University August 1971 29pp. \$1.50.

Map Making with Electronic Digital Computer. D H Douglas

Quantitative and Qualitative Geography, Occasional Papers, Ottawa Univ Press 1971, pp. 97-114 \$4.00.

New Methodology of Scientific Research into Artistic Phenomenon. E G Camarero

La Scienza e l'Arte. Gabriele Mazotta Editore Milan 1972.

Under the title 'Computer Art' Ernesto Garcia Camarero of the University of Madrid Computer Centre gives a review of computer graphics equipment and methods for art illustrated by the standard works of Naife, Nees and Noll but with special reference to work being done in Spain.

Other contributors are: Birgid Rauen, Kurd Alsleben, Umberto Eco and Xavier Rubert de Ventos.

FUZZY ALGORITHMS — latest News

On the Execution of Fuzzy Programs using Finite State Machines. Shi-Kuo CHANG IEEE Transactions on Computers. March 1972.

FUZZY Algorithms L A Zaden

Inform. Contr. 12 pp. 94-102 (1968)

Probability Measures of FUZZY events. L A Zaden.

J. Math. Anal. Appl. 23 pp. 421-427 (Aug 1968)

JUST KEEP THOSE LETTERS FLOODING IN, FOLKS.
In PAGE 16 (June 1971) I said I would be giving details of Algorithms Procedures and Techniques useful to the computer artist and I was asked recently what had happened to the idea. Well, it's still there: I'm waiting for people to let me have their algorithms but, as usual with requests in PAGE, I've been underwhelmed with replies. Only two so far. Watch this space for further details. JL.

PLADI WORKS!

At the recent CAS weekend on Procedures and Programming for artists, Roger Saunders showed a version of PLADI (see PAGE 16 June 1971) working on the Cybernet Time Sharing System. The language allows designers to specify shapes, where they are positioned on the page and how they are shaded in a sort of Basic English, for example
RECTANGLE AT (12,6) WIDTH 10 HEIGHT 20 SHADED IN ALL AREAS WITH /*.

The grammar is simple, the included vocabulary quite useful and new words can be defined almost at will. More details in a later issue.

HARDY AMIES WORRIED

The Asakura Shoji Company of Japan is manufacturing ties of varied designs produced by computer. The programs have been written by Sozo Hashimoto, one of the world's few professional computer artists.

Hashimoto uses computers for textile designs either by transforming digitised natural images and traditional patterns or by generating geometrical layouts of dots and circles.

Perhaps we should have a CAS tie.

STOP PRESS

Members will be pleased to learn that the Arts Council of Great Britain has offered the Society a grant of £150.00 in respect of our "Creative Computers" Travelling Exhibition. This grant, which has been accepted by the committee with thanks, will be used for the mounting and packaging of further exhibits.

MORE READING YET?

Acoustical and Electroacoustical arrangement for the Dynamically Focussed Room.

Fritz W. Winkel and Manfred Krause.

Journal of the Audio Engineering Society, April 1972, 20, 3 pages 198-206.

Gives, among other things, a description of the sound system employed at the spherical German Pavilion in the 1970 Osaka Expo.

Seeing Sound

Winston E. Kock. Wiley-Interscience 1971 93 pp.

By offering pertinent background information on the nature of sound and sound patterns, this book describes how visual displays of sounds can be made. Also included is a description of holography by sound waves. The book should be useful to kinetic sculptors.

A Computer Program for the Notation of Played Music

J. Sundberg and P. Tjernlund

Speech Transmission Laboratory — QPSR, Royal Institute of Technology, Stockholm. 1970, 2-3 pp 46-49.

SCORE — A Musicians Approach to Computer Music

Leland Smith

Journal of the Audio Engineering Society, Jan/FEB 1972, 20, 1 pp 7-14.

SCORE is a computer program which facilitates composer-computer communication. One of its most powerful features is its capacity to allow repetition of any element of the music which may be designated as a 'motive'. No matter how long or complex, such motives may then be reused in either their original or in some altered form. SCORE can be supplemented by FORTRAN subroutines.

I CAN'T HEAR YOU — I'VE THIS BANANA IN MY EAR

If you think your music is too loud or you suffer from one of the major environmental pollutants — noise — you will find a noise level meter a useful tool. The Noise Abatement Society, 6 Old Bond Street, London W 1, has six different types on sale varying from the "Noise Torch" measuring in the levels 70, 80 and 90 dBA at £10.00 to the "Super Open University" measuring in single decibel steps from 26 to 120 dBA at £30.00.

It is surprisingly easy to reach noise levels of 80 dBA at which prolonged exposure is a danger to sense and hearing (Pop Groups at 4 feet reach 110 dBA)

Electronic music composers please note.

ECOGAMING or 'HELLO, HELLO, WHATS YOUR LITTLE GAME?'

The March 1972 issue of IBM Journal of Research and Development is devoted to Environmental Science and includes the article likely to win the award for the most OK title of the year (the KWIC prize).

Interactive Computer based Game for Decision-making in Ecology.

Other brief titles are:

Raindrop Size Spectrum

Forest Growth Simulator

Sub-surface Hydrology

Subsidence in Venice

Non-Supervised Classification

Air Quality Diffusion Model

Dispersion of Effluents

Overlap Emissivity

PROVINCIAL PAPERS PLEASE COPY

We have been asked to say that there is no truth whatever in the rumour that EMI are to put out an LP called "Gustav Metzger sings the Katy Nash Song Book". Members will be particular disappointed not to hear such goodies as "Zip along with ART2", "I'm Just a Welder by Nature" and "Polar coordinates are Just like a Daisy". A quadrophonic stereo version might come available later.

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 all at £1 or \$3 per year, students half price. Members receive PAGE eight times a year, and reduced prices for the Society's 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 institutions can subscribe to PAGE for £1 or \$3 per year. No other membership rights are conferred and there is no form of membership for organisations or groups. Membership and subscriptions run from January to December. On these matters and for other information write to Alan Sutcliffe.

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