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             |  INTRODUCTION   |
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< This issue >

                        Craig Harris

Recent visitors to the LEA World Wide Web site will have noticed that
we have been working on both content and presentation. Mary Anne
Farah's perspective on the Image du Futur exhibition has been
installed. Also, finally LEA viewers will be able to explore the
Drawing on the Brain project, first presented as a profile in LEA
Volume 2, Number 8. More will become available very soon, and we are
working on establishing better navigation through the material on the
site. Thanks to the continuing and expanded support from Interval
Research Corporation, LEA will grow in 1996, with enhanced resources
to develop the web site.

This issue contains a profile of The Digital Village, an exhibition
created by The Art Gallery at the University of Maryland at College
Park. There are both physical and virtual components to the
exhibition, which will be running until December 22, 1995, including
work by Richard Bolton, Alan Dunning, Lynn Hershman, Manual (Suzanne
Bloom & Ed Hill), Christine Tamblyn and Joan Truckenbrod.

The feature article this month is Jason Ohler's "The 4 Rs", which
addresses the importance of incorporating aRt in the complement of
educational domains throughout early education systems. Jason has
been working for several years in the area of distance education, and
has been exploring diverse techniques for incorporating new
technologies in the new "classroom".

Leonardo Digital Reviews includes a set of perspectives, including a
view into ISEA Montreal, a tour through Barbara Lee's installation
"Dream Wheel", and two book reviews.

Next month LEA will contain an exhibition from Brazil, created for
the VIII Sibgrapi, Brazil's annual Symposium on Computer Graphics and
Image Processing. I had the pleasure of participating in this
symposium, which had an important art exhibition component. LEA
readers should find this project interesting from several
perspectives.
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             |  PROFILES   |
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< The Digital Village Exhibition >

The Art Gallery
University of Maryland at College Park
Art-Sociology Building
College Park, MD 20742
Tel: (301) 405-2763
URL:
http://www.inform.edu/EdRes/Colleges/ARHU/ArtGal/.WWW/digvil/digital.htm

The Art Gallery at the University of Maryland at College Park is
collaborating with the Computer Science Department, the College of
Arts and Humanities, and the Corcoran Gallery of Art in Washington,
DC to present The Digital Village November 1 - December 22, 1995. The
multifaceted project includes an exhibition of electronic art by

seven internationally-known artists; an interactive exchange of ideas
and images over electronic networks with school and community sites;
electronic music and multimedia performances; lectures, workshops,
demonstrations, seminars, and a symposium. The keynote address, by
Professor David Gelernter of Yale University, author of The Muse in
the Machine: Computerizing the Poetry of Human Thought opened the
project on November 2, 1995. The project theme is "Connectivity,
Interactivity, and Imagination in the Digital Village." Key aspects
of the project such as the physical elements of the art exhibition,
and several educational and cultural events, will be presented at The
Art Gallery at the University of Maryland, and at the Corcoran
Gallery of Art. Much of the art and communication that is the heart
of The Digital Village will be available to a larger audience world-
wide over the information superhighways of the Internet. Individuals
may participate by subscription to The Digital Village listserv, and
by communicating with individual artists through The Digital Village
web site.

The Digital Village project explores electronic media technology as
an important means of enriching the communication of ideas, expanding
creative thinking, multiplying the effectiveness of education, and
revolutionizing the production of art. Art takes the lead in The
Digital Village. The very concept of exhibition is transformed. The
Digital Village's featured art works combine traditional art objects
(sculpture, painting, photographs, etc.) with screen images,
ephemeral "cyber" spaces, text, and sound. The works exist in "real"
gallery space and in "virtual" electronic space. They are highly
responsive to the "touch" of viewer-participants. Their common theme
is the many ways digital media are redefining notions of society,
community and personal relationship.

The Digital Village demonstrates how the concept of art as a physical
object has been drastically changed as electronic media have been
incorporated into artistic expression. Historically, the exchange of
ideas between artist and viewer/audience occurred as the viewer stood
in contemplation before a painting, sculpture or photograph.
Regardless of the power of illusion evoked by an art object, its
physicality was central to the experience of the work, for both
artist and viewer. Traces of the artist's process -- her/his hand,
and tools -- have been important signs that an object was, in fact
"art," as opposed to some other kind of cultural artifact.

Emerging technologies have played important roles in the development
of artistic expression throughout history. One thinks particularly of
Northern Renaissance painters' revolutionary employment of oil as a
medium to carry pigment, and of the impact of photography on late
19th century French art. In our own time, "computer art" has employed
the visual acrobatics of digitally-created graphics since the '60s.
However, it is only relatively recently that a critical mass of
artists have become fluent enough with digital technology to move
beyond the limited vocabularies of "razzle-dazzle" image-making.
Notably, there is a discernible shift now from "technique-oriented"
work to content directed toward communication and education. Many
artists utilizing new technologies as their media of choice have
demonstrated their commitment to creating an art that is widely
accessible and functional, an art that serves societal and community
needs.

The Digital Village artists have been selected for their thoughtful
and creative uses of technology, for their effective navigation of
electronic highways, and for their attention to the
interface/interspace among artist, media and community. The Digital
Village project provides a structured context for the presentation of
these artists' work. It also seeks a wide ranging and multi-

directional exchange of ideas -- aesthetic, expressive, descriptive, and narrative --among children and adults, artists and scientists, educators and business leaders, politicians, and technicians; and poses critical questions about how digital media are reshaping the world on a grand scale. The Digital Village seeks to: stimulate a dynamic learning process which can be integrated into many disciplines; suggest new possibilities for intimate relationships; reassess traditional definitions and practices of art; and explore the many ways emerging technologies can help to create positive approaches for restructuring society.

The following artists and works are represented in the exhibition:
+ Richard Bolton: "Souvenir"
+ Alan Dunning: "Lost Dimension: An Internet City"
+ Lynn Hershman: "Lorna" and "America's Finest"
+ Manual (Suzanne Bloom and Ed Hill): "Constructed Forest (This is the End - Let's Go On - El Lissitsky)
+ Christine Tamblyn (with Marjorie Franklin and Paul Tompkins): "She Loves It She Loves It Not: Women and Technology
+ Joan Truckenbrod: "everydayfamily"
+ "e-me: Electronic Self-Portraiture"

The Digital Village exhibition will be available to a world-wide "virtual" community through its World Wide Web site. Users running a Web browser will be able to visit the gallery and "virtually" experience the projects and events of the exhibition. The Digital Village Web site consists of a home page which directs users to each of the major components of the exhibition. There are links to pages for each artist's project. Curatorial commentary about the works, and artist Biographies transform the Web site into an "online" exhibition catalogue. Artist pages also solicit viewer participation in the project where such opportunities exist on-line. Some artists' pages also link to outside servers (i.e., other Web sites on the Internet) so that the exhibition is not geographically fixed at the University of Maryland. A "virtual walkthrough" of the exhibition space is available for our virtual visitors, who are provided with digital means to navigate their way through a series of images of the gallery space as it exists during the exhibition. For those artists whose work is not fully available on-line, selected images and video clips of their gallery installations appear in the walkthrough on these Web pages.

Richard Bolton's "Souvenir" consists of photographs, video recordings, stories, and images related to various souvenir objects collected by the artist during a recent artist residency in Abidjan, Cote d'Ivoire. "Souvenir" confronts the provocative issue of what it means to be a "tourist" - especially a white, western artist-tourist - in a previously colonized area in Africa, in this "post colonial" age. It explores the impacts on identity of sudden immersion in another culture. The artist comments: "My interest here is to document an historical moment in which identity is under tremendous pressure and change, a time in which concepts of nation, race, community and self are in great flux, changes which are accelerated through increasingly powerful communication technologies. I am interested in raising questions about cultural and economic exchange between 'developed' and 'developing' nations, including the role money plays in construction of the traveler's experience. I am also interested in the role memory plays in an experience of travel, and particularly the souvenir objects we choose for the sake of our memory. Finally, I am interested in what happens when people - either visitors, or hosts - attempt to construct common meaning across cultural, racial and national differences."

Alan Dunning: "Lost Dimension: An Internet City" involves

participants from around the world in designing and constructing an ephemeral city by entering detailed textual descriptions into on-line computers at their homes, workplaces, or at The Art Gallery site in College Park, Maryland. These verbal descriptions will be continuously translated by Dunning into an ever-changing, interactive, three-dimensional rendering of the city. A "walkthrough" animation allows the viewer in the Gallery to explore this virtual urban environment by clicking on "hypertexted" images on the computer screen. Viewers in the gallery will watch the city being "built," by observing the evolving textual description and the "walkthrough" monitors. Both text and visuals will also appear as large scale video projections on the gallery walls. During the "walkthrough" segment of the project, one enters the virtual city, unaware of the others' presence, except through the indices of absent lives. Invisible virtual nomads and tourists leave only a trace of their passage through the digital city in the growth and decay of the texts and images.

Lynn Hershman is represented in the Digital Village exhibition by two works. "Lorna", a pioneering interactive video disc artwork, allows viewers to experience the life choices of an agoraphobic woman. Lorna is allowed three options: suicide, enduring (e.g. doing nothing to counteract and, thereby, intensifying) her agoraphobia, or starting a new life. The viewer determines Lorna's fate by selecting various CD-ROM channels via a remote control device, meanwhile learning more about agoraphobia from a psychologist and from agoraphobics themselves. The second work by Hershman, "America's Finest", consists of a reproduction of an M-16 rifle in silver, attached to a swiveling mount, and equipped with a video camera activated by its trigger. Viewer/users manipulate the gun, aiming it in whatever direction they wish. Once the trigger is pressed, the objects at which the gun has been aimed are projected within the gun's sight. An image of the user him/herself is merged with the targeted object projected, into a moving collage of documentary film clips of war scenes, and their chaotic and bloody aftermaths. The viewer/user finds her/himself caught in the crosshairs of the gun's sight, embedded in the atrocities of the history of war and gun-induced violence. Schools may use "America's Finest" to explore violence in their communities as well as to envision communities without violence. Elementary, junior, and senior high school classes visiting The Art Gallery can hold discussions about how violence elicits further violence. Teachers may wish to use these visits to the gallery, and access to the Digital Village Web site, to engage students in creating computer-mediated works relating to violence and its prevention. Selected still and motion clips from both of these works will be viewable in Digital Village's on-line Web pages.

[Editor's Note: For a perspective on Lynn Hershman's "America's Finest" readers are directed to Sonya Rapoport's review in Leonardo Digital Reviews, appearing in Leonardo Electronic Almanac, Volume 3, Number 6.)

Manual's (Suzanne Bloom and Ed Hill) "Constructed Forest (This is the End - Let's Go On - El Lissitsky) skeptically explores the changing landscape - a favorite subject in American art - and the role of technology, particularly the computer, and the "new digital world order," as the most recent instruments of humankind's mastery/domination of the earth's fragile ecology. The artists comment: "With the term 'forest', we have in mind the example of those in the Pacific Northwest, contentious sites of production and acrimony. By 'constructivism' we intend the model of Russian Constructivism, understood in its most vital sociopolitical form; i.e., free of Modernism's suffocating embrace." While Manual believes "the EROS of the binary code is also the THANATOS of the 'natural'

world," Manual also intends "Constructed Forest" to be the fire with which to fight fire: this work is their latest chapter in seven years of employing computers in a confrontation with pressing environmental issues. Consisting of 10 large (24" x 40"), electronically-constructed photographs "hung" in walls constructed from raw two-by-four lumber, a digitally-edited video tape documenting logging and saw mill processes, and an interactive CD-ROM containing an interactive dictionary, this work explores parallels the artists have drawn between the historical-materialist ideas of the Russian Constructivist Art movement of the 1920s, and the destruction of forests in the latter part of the 20th century. The interactive dictionary, and the other channels on the CD-ROM, define terms and ideas relating to the convergent/divergent worlds of constructivist theory and art practice, and the processes utilized in destruction of (de-constructing) the earth's forests. Selections from the project will be displayed on Digital Village's Web pages, allowing students and others in the community to utilize the materials as inspiration for projects with an ecological focus.

Christine Tamblyn's "She Loves It She Loves It Not: Women and Technology" (produced with Marjorie Franklin and Paul Tompkins) seeks to encourage a more productive relationship between women and technology. A female cyber-persona guides the viewer through CD-ROM channels packed with text, sound, movie clips and images which describe what the artist calls "privileged instances" of the relationship between women and technology. Included are: commercials depicting women's victimization by - and subversive use of - domestic appliances; industrial film clips revealing pervasive gender stereotyping in the workplace; and science fiction film excerpts that show the invasion of women's bodies by futuristic machines. Autobiographical anecdotes, transcribed as letters to the viewer, are collaged via the CD-ROM with these cultural artifacts. Mechanistic sound effect loops create a textural ambiance. Tamblyn will be in residence for two days at the University of Maryland, conducting seminars on the relationship between gender and technology, and a special workshop for high school women. Segments will also be presented through the Digital Village Web site pages.

Joan Truckenbrod's "everydayfamily" explores alternative family structures and child rearing in the US. The installation simulates a "homey" bedroom, where a video camera and computer are hidden within a night stand and a mirror. A video monitor is disguised as a TV set. Participants explore images, text and sound by browsing through an old scrapbook. As certain scrapbook items are pressed, the hidden video camera captures images of the participant and projects them over images on the TV screen, "embedding" her/him in the "everydayfamily" narrative. The artist's objectives are to "challenge viewers to examine the way they feel about families and alternative family structures, and to stimulate awareness of the need for social, economic and political support for both alternative family structures and child rearing."

"e-me: Electronic Self-Portraiture" is an important educational outreach component of Digital Village. Connecting hundreds of students, kindergarten through 12th grade, from throughout the State of Maryland, and the District of Columbia, "e-me" uses computer technology to produce a monumental collaborative work of art exploring both individual and collective identity. Participating students will gain a sense of how emerging interactive technology opens up future possibilities for artistic expression, communication, and community building. Viewers may access the work either in The Art Gallery in College Park, or via the Digital Village World Wide Web site.
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|  FEATURE ARTICLE   |
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< The 4 Rs >

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About ten years ago I had an experience that changed me irrevocably. I was teaching a class for K-12 teachers about using telecommunications in the classroom. After describing the expectations for the final paper for the course, a student raised her hand and asked, May I submit a video instead of a term paper? What followed in reality lasted only a few seconds. But in my mind an indeterminably long confusion unfolded as old thinking and new paradigms chafed against each other like psychic tectonic plates. I couldn't just dismiss the student's request. After all, as director of one of the most rapidly evolving disciplines at my university – educational technology – I was making a living teaching others how to incorporate the swiftly moving information age into their lives and classrooms. "Sure," I finally squeaked. It was a half-hearted attempt to convince myself that she had a good idea. In fact I was just stalling as I tried to figure out what that moment meant.

I would eventually understand the moment had marked the beginning of my realization that we had indeed entered a brand new world in which the printed word was no longer the primary way to present information or facilitate communication. The student who wanted to create a video was a unique event at the time because she was one of the few who had access to expensive, sophisticated video equipment. But now, with relatively cheap, easy to use multi-media authoring technology available in many schools across the country, students are able to combine words, pictures, sound, and movies in unified presentations. Because of this we are being forced to expand one of the cornerstones of our academic culture. The 3 Rs are becoming the 4 Rs: Reading, 'Riting, 'Rithmetic, and aRt. Thanks to our struggle to use multi- media effectively, the language of art is taking center age.

Multi-media technology is commonly understood to be all that cool "stuff" used to create the desktop equivalent of glitzy television. But it is much more than that. Multi-media technology is assistive technology for the artistically challenged. In much the same way that the world of writing prior to word processing had been limited to those who could master the laborious mechanics of penmanship or re-writing with a typewriter, the artistic world had been reserved for those who spent countless hours learning how to draw, paint, play musical instruments, and manipulate media. We became a two-tiered culture consisting of those who created art and those who appreciated what others created.

Then along comes multi-media. Want to draw a straight line? Make orchestra sounds? Create a movie? Write a rap song? The tools of multi-media can make all this possible. Those who gave up trying their hand at creating art because of the work involved finally get a chance to express themselves in ways they had only dreamt about.

Artists used to working with traditional media have whole new palettes of tools with which to work.

With the growing popularity of multi-media comes a proportional increase in the need for workers skilled in the language of multi-media. A major component of this skill area is an understanding of the "grammar" of aesthetic presentation. Unfortunately, this is the domain of art and design, fields which are currently considered outside the scope of a standard education.

For many years art has generally been viewed as a skill for the hobbyist and the hopelessly romantic to be cultivated only after mastering Reading, 'Riting, and 'Rithmetic. The age we live in has changed this forever. The rapidly growing domain of employment in which presentation, media, entertainment, and education converge now embrace the Arts out of necessity. Each of the 500 inevitable channels of video, the thousands of promised CD ROMs, the millions of incipient World Wide Web home pages on the Internet, and the new media we can't even conceive of, will be a cooperative effort involving some combination of musicians, videographers, graphic designers, script writers, choreographers, creative consultants, and hundreds of other jobs commonly associated with the Arts. In an equation: Art = Jobs.

During the transition period from print to multi-media, teachers will experience a loss of control. They will not be able to guide and evaluate student multi-media projects nearly as effectively as the text-based projects to which they have become accustomed. To help, I see art teachers working across the curriculum with other teachers and students. The most pressing need is for graphic literacy, using pictures to communicate and present information. But once video, sound, music, and animation are better understood in terms of their ability to communicate ideas and information effectively, and the technology that supports them becomes cheaper and less specialist-oriented, art literacy will embrace all of these media and certainly more. As art and design begin to challenge the primacy of text that has dominated our culture since Gutenberg, we should not fear that we will lose text. Instead, we will rediscover it. We will emerge from the current Age of Presentation with a better understanding of when text offers us the best vehicle to achieve communication, the ultimate goal in using any medium.

Is all this a "good" thing? If only life were that simple. It is helpful to remember that print only seems conservative because we have had half a millennium to get used to it. True, books offer inexpensive, decentralized sources of information that don't break down or need 110 volts to work. But they have also created caste systems of literates and illiterates, wreaked havoc on indigenous, non-text-based cultures, and created considerable social upheaval. Similarly, multi-media technology, and the new literacies, offer us much - but also for a price. Even though it is relatively cheap it is still expensive enough to be out of the reach of the information underclass that already exists, further separating the empowered and the disenfranchised. It will demand new, technical skills of artists that will perhaps blur the lines between commercial and fine art more than we would like. And while we expect our students to routinely develop an argument with text to convince the reader of a particular point, when they do so with multi-media it looks suspiciously like advertising. Multi-media will drive home the need for a critical analysis of the relationship between people, technology, and ethics in new and urgent ways.

In the end, however, most parents will stick with the bottom line that I have heard them espouse ever since I entered education over a

decade ago: I want my kid to be able to get a good job. As education
works to become more responsive to preparing students for the world
of work, we must keep in mind that one of the true growth areas in
the future will be the Arts. The literate, knowledgeable person
will be expected to be well versed in the 4 Rs. If we are to be
proactive and give our kids the skills they need for the world that
they will help create, then art and design should become staples of
K-12 literacy.

                                      Jason Ohler (C) 1995
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        |  LEONARDO DIGITAL REVIEWS  |
        |         November   1995    |
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< Conference Review: ISEA 95 >
Montreal
September 17th - 24th

Annick Bureaud
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Everyone in the electronic art community was waiting for this year's
International Symposium on Electronic Art (ISEA) in Montreal. ISEA
Montreal was promising and it kept its promises. Montreal showed,
both in the conference and in the exhibition, a real maturation of
our field. It is impossible to recall all that happened, but three
works, very different in shape, technical treatment and subject
emerged for me and are the clear demonstration of this evolution. All
three are in close relationship to the ISEA theme "Emerging Senses".

The first work is "Osmose", a virtual environment by Char Davies; the
second is "Rehearsal of Memory" an interactive art work to be put on
CD-ROM by Graham Harwood; and the third one is "Communion", a multi
media performance by the dancer Isabelle Choiniere. "Osmose" is the
first "real" virtual environment I have experienced, something that
takes you in another reality, in another space, in another mind.
"Osmose" is composed of five elements: a tree standing in the middle
of a clearing, a forest, water on a lower level, the computer code in
another lower level and the text (poetry, philosophical texts, etc.)
on the upper level. All those elements are not separated in different
rooms as usual in VR but belongs to the same global structure that
you travel through like in a loop. The navigation is based on
physiological movements: you bend forward, backward, left and right
for the horizontal axis and you exhale or inhale for the vertical
one. The interface, together with the smooth colors, is probably one
of the major keys of the achievement of "Osmose". For the first time
you move in a virtual space like you would do in the physical one,

forgetting even the weight of the helmet. The graphics, on the other end, are in a total rupture with the crude, bright-colored computer graphics we are accustomed to. Being not on the realistic side of computer graphics trends, "Osmose" is therefore more real and alien, creating the feeling of floating in space like in weightlessness. With "Osmose" we are within the work but, more powerfully, the work is within ourselves. As we exhale with our breath, intimacy, interpenetration of the work and the I rely on the spectator's body, whose essential movements (breath and equilibrium) are the very conditions for the understanding of the work itself. This belonging to the work is emphasized by the display itself - the spectActor is behind a translucent screen, seen by the audience watching the results of his/her action, like a puppet in a shadow theatre.

Another interesting thing in this work is that, although I am not totally seduced by the art of Char Davies both on a philosophical and aesthetical level, I could have stayed in "Osmose" forever and it has been a unique experience. In this piece, Char Davies by-passes the technology, uses it at its best so that you forget it to focus on this proposed world and your own reactions to it. Beside that, before entering "Osmose", you sign a paper which exonerates the artist and the company from any injury or medical problem which might happen to you while in the VR piece. This is of a tremendous importance because it puts, for the first time, art at the same level as life. "Osmose" is soft and dreamlike. On the opposite,

"Rehearsal of Memory" by Graham Harwood is hard and violent. For this piece, Harwood worked within a psychiatric hospital, in cooperation with patients who have mental troubles and committed serious assaults. This hospital is also a prison under the jurisdiction of the Home Secretary. Using the different stories and bodies of the patients, Harwood created a kind of composite person. A body is projected onto a large screen and serves as the interface for the exploration of the important moments in the life of those people. In front of it, our own "free" body is trapped into the mirror of the other's body, showed by fragments on the screen, squeezed by the frame. The traces (tattoos, scars, words) on this body are the only access to the story. Activated by triggering a joystick, they reveal texts, press clips, interviews, etc. The marked body is the reflection of the psyche. Those legible traces on the body act as mental scars. "Rehearsal of Memory" refers to our normality but also to our voyeurism. Our travels through the work are as many intrusions in the other's life, in his being: we click on the flesh (with the joystick, the point is an arrow on the screen) as if we were doing an injection. But this is the condition of the understanding, an intrusion in our own skin, in our self. It is not an innocent trip and you can't escape from the work; the "out" button is inactivated, as if you can't escape from this hospital. Like with "Osmose", the interface is embedded into the work and, also like with Char Davies, this piece achieves the fusion of a technology, a content and an aesthetic proposition. It by-passes and enhances the technology, it is a work of our time about our world, human and technology together.

These remarks can also apply to "Communion" by Isabelle Choiniere. "Communion" is a multi-media ballet, where the body of the dancer triggers the images and the sounds to some extend. With a very minimal aesthetics (no big machinery seen on stage), Isabelle Choiniere deals with the actual and the virtual body in an electronic life ritual. Choiniere raises in a 30-minute performance the issues of the limits of the skin, of the self, of the internal and external. If Stelarc connects the body to the machine - organic and silicon parts trapped into cables, putting the internal body to the outside - Choiniere frees the cyborg and proposes an expanded and extended body, hollow and dense, a feminine principle to the new world.

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< Installation Review: REAL DREAMS IN DREAM WHEEL >

DREAM WHEEL
By Barbara Lee
Interactive Installation

Reviewed by Molly Hankwitz
Email: MHANKWITZ@aol.com

"In my dreams, I will raise my hands to the sky and give thanks. I will
remember and record all that occurs." --Barbara Lee

DREAM WHEEL, a project by Oakland film/video and multimedia artist
Barbara Lee, looms, a dark, gurgling, bulky mass in the corner of the
studio, as one approaches. From within the parable of a personal
mythology and the demanding trajectory of a creative pursuit, Lee has
developed the first portion of her trilogy representing the Sacred
around a central desire to unlock the unconscious self and her
ability to dream.

Departing from an oral Cherokee ritual which unfurls the art of
dreaming and dream attentiveness into our lived and waking reality,
Lee has created a perfectly circular room in which there is a single
point of entry from behind a curtain. It fills with lush sweet odors
of fresh juniper and cedar chips from the floor and walls as one
enters.

Inside, four panels, composed of translucent plastic material, hang
from the ceiling of the space and are inset informally with small
twigs, wisdom teeth, photographs of her grandmothers and handwritten
letters, or are woven obsessively from community newspapers and tufts
of hair. Each panel represents a direction -- North, East, South or
West -- and, likewise, an existential human category: community,
universe, nation, or family. In the center of this space is a round
wood table upon which is spread an inviting Alpaca fur and a black
and white cowhide. Over the table is mounted a circular piece of
reflective black Plexiglas. One is invited to walk around the circle
and to read and touch the panels then climb onto the bedding which in
turn triggers hidden motion sensors. The bed/table begins to turn in
a slow circular direction. Lying motionless one is reflected back
onto oneself from under the dark Plexiglas while a custom mix of
Bunsen burner and a babbling brook begin to play in Surround Sound.
Nature and science are gently convoluted in the audio. As the wheel
turns soothing voice-overs from the audio ritual entitled "The
Meditation On The Three Gems Of Most Pure Mind" based on the Tsalagi
tribe's traditional teaching story for Cherokee children are heard in
repeating sequences. Subtly, musky smoke from an electric machine
ekes into the space and eventually obscures the circular shape of the
room and the luminous panels.

The space becomes enmeshed in a programmed atmosphere of sound,
light, motion, smell, softness and smoke. One is lulled by a sensory
experience of time and space; an experience which calls into question
the idea of 'self' or the ideology of 'self' often called upon in the
conventional act of viewing art and art objects. By virtue of having
to lie down to fully experience the installation one's perception is
altered. At the end of the experience, the DREAM WHEEL closes down
and the participant leaves having undergone the artist's conceptual
claim on reality.

This first manifestation of DREAM WHEEL is a concrete interpretation
of an actual experience the artist had in learning to dream -- a

human capacity most of us take for granted but which for her was out of reach -- thus it represents a creative journey so palpable and important to herself that she rendered it in wood, technology, fur, smoke, light and drawing for others. It raises some excellent questions in today's quickly revolutionized world of multimedia and virtual technology consumption.

DREAM WHEEL is a venture. It is a mixed media work floating experientially somewhere between a 'think tank', a hot tub, and a time capsule. The piece is contrived to engage us interactively and philosophically. It opens a look into one's self and a momentary connection to Lee's own experience. The content, the self - the participants or the artist's - is focused upon in this work. The atmospheric devices and earthy materials in combination with text and machine enhance that pleasant, strange sense of self-content by connecting experience and art through theatrical means. DREAM WHEEL is also about spiritual return, a questing enacted by artists worldwide in the seventies. Lee's precise use of a simple form and its reference to earthworks, land art, and performance rituals is reminiscent of the spiritual indebtedness to nature and monumentality found in the works of Robert Smithson or Mary Miss. A film/video, graphic design and multimedia artist, Lee uses a simple software construct for this project in which information is brought from motion sensors within the space to a programmable logic controller, the piece of hardware which allows her to program up to 8 events (or i/o's) in a finite environment. The lighting, sound, motion and smoke are then triggered sequentially. The artist plans to include increasingly sophisticated technological forms in the DREAM WHEEL project as she artist moves into the second and third manifestations. In the second space, for example, she intends to design an installation on the idea of the Secular in which the body will be a source of individual information which transforms and simultaneously experiences its own sensory space. The third and final portion will explore the idea of Alternates as a springboard for discourse on the cultural options available to us as we face the techno-corporate future. "Saturated by sculptures or artworks which talk about waste and consumption and which therefore take little distance on it," Lee is determined to engage the reality -- spiritual, physical and emotional -- which operates alternatively to that culture of saturation rather than depicting it or appropriating it back on itself. In this invigorated context, Lee's total concept of the three spaces of DREAM WHEEL, representative of the Sacred, is a forward investigation in which the puzzles, mysteries, simplicities, foibles and facts of technology will have the intellectual presence of poetry and comfort and the appropriation of techniques, technologies and metaphors from mass entertainment (like Surround Sound) will be utilized for art.

As techno-corporate-military-info-complexes promise a substandard mainstream future of multimedia entertainment it is apt to theorize, just as it was with the uses of commercialized TV on mass culture, a crass web-state of co-opted existence: physical, spiritual, and aesthetic, from which we are perpetually alienated and in which we have little control. Thus it is heartening to know that for some artists technology is a practical site of cultural resistance from which one can set one's own agendas for creative survival. This seems to be what Barbara Lee most enjoys about the act of making sculpture and that's important, especially for emerging innovators.

DREAM WHEEL can be visited by group rendezvous at Barbara Lee's studio. For more information contact Barbara Lee via her email address: Bitterbyte@aol.com. or her URL address: http://www.ylem.org/ylem/artists/blee/blee.html.
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< Book Review: Magic Music from the Telharmonium >

Magic Music from the Telharmonium
Reynold Weidenaar
The Scarecrow Press,
Inc., Metuchen, NJ., and London
1995; ISBN 0-8108-2692-5

by Paul Hertz
Email: paul-hertz@nwu.edu

Read any current text on electronic sound synthesis, and chances are that the figure of Thaddeus Cahill will traverse a sentence or two in the historical overview, farther off in the mists than Theremin or Martenot, invoked perhaps in a burst of filial piety as the "father of electronic synthesis." You may also glimpse the shadow of his Telharmonium, looming large as a locomotive, at 200 tons the undisputed heavyweight of electronic musical instruments. Like the dinosaurs, it was destined for extinction. Not even a fossil remains.

Reynold Weidenaar's engaging and scholarly investigation of Cahill and his invention brings both man and machine into closer light. We learn that Cahill, a skilled lawyer as well as a visionary inventor, very nearly made a financial success of his venture to sell electronic music by subscription over telephone wires to New York restaurants, despite the failure of his first company. He sank all his profits into a second venture, and was doomed both by the advent of the First World War, and by the prevailing state of technology. Years later the vacuum tube, the Wurlitzer theater organ, and Muzak would make his vision a reality. Cahill's vast and complicated machine depended on huge generators to create sine waves for additive synthesis, and required musicians to master multiple keyboards for tone generation and expression. Its "unique feature of equal temperament with the option of just intonation" suggests that it was an instrument with a potential beyond proto-Muzak. Unfortunately, no recording is known to survive.

Though it might now find a salient place in Bruce Sterling's Museum of Dead Media, the telharmonium was hailed as harbinger of scientific progress and social equality by the popular press and luminaries of the day. Mark Twain, whose endorsement figured heavily in advertising for Telharmonic Hall, was an early subscriber. Weidenaar captures the careless optimism of an America ready to burst onto the world stage, and views Cahill's invention as emblematic of the time. His portrayal of Cahill's struggle to realize his concept takes place against a detailed background of populist enthusiasm, cutthroat business practices, and boundless expectations of technological progress. While the closing chapter of the text does attempt to assess the social significance of the Telharmonium, it does little more than sketch the emerging relations of technology and society, dwelling instead on the Telharmonium as a significant failure in the history of technology.

Based on the author's Ph.D. dissertation, Magic Music from the Telharmonium provides ample appendices on Cahill's patents, and an extensive bibliography.
==
< Book Review: Shadows and Enlightenment, by Michael Baxandall >

Shadows and Enlightenment
Michael Baxandall
New Haven: Yale
University Press, 1995, 192p

Reviewed by Kevin Murray
Email: KMURRAY@WERPLE.NET.AU

Readers of Baxandall's previous works, such as 'Painting and
Experience in Fifteenth Century Italy', may find his current volume
on shadows a little ephemeral. Indeed, this subtle book, generously
illustrated with black and white engravings and colour plates, lacks
the socio-economical readings of geometry and painting that so
enlivened his earlier studies of art history.

'Shadows and Enlightenment' is something different. Certainly there
are very scholarly summaries of eighteenth-century sciographers, such
as Edme-Sebastien Jeautat, as well as clear accounts of modern
studies of perception. But here and there are dappled nuances of
introspection, as the author contemplates the very painterly
environment in which he is collecting his thoughts. These intense and
intimate excursions into microshadows make Baxandall's book as much a
work of creative writing as art history. This approach for Baxandall
is justified by the very 'equivocal status of shadow', evident in the
phenomenon of 'coloured shadows' studied by Georges-Louis Leclerc,
Intendent of the King's Garden, who rose early to systematically
record the azure shadows cast by the morning sun.

For me, Baxandall's analysis was most compelling in the very final
pages, where he speculates about the 'substance' of shadow. He
compares da Vinci's notion of shadow as an active opponent of light
with Plato's understanding of shadow as imperfect knowledge. Finally,
Baxandall ponders why other senses have no equivalent 'holes': why
there are no 'shadows of cool and quiet in fluxes of heat and sound'.
I wish that he would go further and critically reflect on the
enduring use of shadows in computer screen designs, particularly the
'floating letters' effect in contemporary graphics. With some irony,
perhaps, Baxandall's elevation of art history as the proper subject
for study casts its own shadow.
==
< Reviewer's Bio: Molly Hankwitz >
Email: MHANKWITZ@aol.com

Molly Hankwitz writes on art, technology, urbanism, and public art
for numerous publications and journals. Her mixed-media installations
have been exhibited at Artists' Television Access, the Huntington
Beach Art Center, and the Whitney Museum Independent Study Program.
She lives and works in San Francisco.
==
< Editor's Note: Pioneering Home Pages >
By Roger Malina
Email: rfm@cea.berkeley.edu

Our Leonardo Web Pioneers project is going quite well. In this
project we will create a WWW page in our Leonardo Electronic
Directory for $100 and post it on the MIT press site. This is a very
good WWW "calling card". Let me encourage you to make this
opportunity known to your colleagues.

Pat Bentson is the managing editor of the main Leonardo WWW site.
Email: pbentson@sfsu.edu
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< END LEONARDO DIGITAL REVIEWS NOVEMBER 1995 >
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            |  ANNOUNCEMENTS   |
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< Fifth International Conference on Cyberspace (5CYBERCONF) >

June 6th to 9th, 1996. Madrid, Spain
Hosted by "Fundacion Arte y Tecnologia de Telefonica"

5CYBERCONF
Fundacion Arte y Tecnologia
Gran Via, 28. 2 planta
28013 Madrid, Espana
Tel: 34-1-542-9380
Fax: 34-1-521-0041
Email: 5cyberconf@ceai.telefonica.es
URL: http://www.telefonica.es/fat/

5CYBERCONF is an international conference that addresses the social,
political and cultural implications of cyberspace from a critical
standpoint and encourages discussion between theoreticians and
practitioners. Hosted for the first time in Europe, this fifth
edition of CYBERCONF considers computer-human interface
breakthroughs, our fascination and weariness with disobedient
technology, the role of synthetic behaviour in virtual design, and
the increasing importance of cross-cultural contributions to the
electronic community.

In the 90s cyberspace has reached a critical mass. The tools to
construct and navigate virtual worlds are becoming increasingly
affordable, intuitive and widespread. The rise in bandwidth and
dropping prices have provoked the exponential growth of the online
population (or is it the other way around?). As the net becomes a
mainstream hit, how has the transition from science fiction to
reality changed cyberspace?

*   CONFERENCE FORMAT   *
5CYBERCONF is scheduled to start on Thursday afternoon, June 6th and
take place over three and a half days. There will be 8 keynote
speakers, 18 plenary sessions, special events, a videoconference
link-up and a banquet dinner on Sunday June 9th. All sessions are
designed to foster discussion. Presentations will be in English and
Spanish with simultaneous translation. The six themes are:

INTER-FACE LIFT
How are the boundaries of the computer-human interface disappearing?
Is the "window onto the world" metaphor exhausted? Can we unframe
our synthetic worlds? What can replace the cartesian grid as a
reference for non-linear worlds?

CYBER SICK-AND-TIRED
Who is leaving cyberspace and why? What are the different forms of
cyber-sickness? Is the body rejecting interfaces that ignore it? What
are the old and new psychological disorders manifested in or caused
by cyberspace? What are the different forms of cyber-tiredness? How
can we counteract the disenchantment brought about by the
unfulfilled promises of the cyber-hype industry? Who is buying the
media's portrayal of cyberspace as dirty and dangerous? Who is
winning the battles to control or dominate access?

TECHNOLOGY GOOD, PEOPLE BAD (Virtual Perversions)
When will the predicted death of "outmoded" dualisms finally happen?
Is accepting our own cyborgness the only way to explore post-
humanism, or are there other, as-yet-unimagined, ways? How do we

create new languages to describe unprecedented experiences? How has the language of cyberspace changed since the first CYBERCONF?

DIGITAL THIRD WORLDS
Are there digital ethnic groups? How can ceremony and language be used in the retro-colonization of cyberspace? Can the international economic system be de-virtualized? What kinds of non-digital virtuality are there? What are the experiences of new online communities in countries where access is relatively recent, and how are their contributions changing the time and space of cyberspace? Who are the new marginals? The "Global Village" and other myths.

CRASH TECHNOLOGY
What is seductive about technology out-of-control? What would be the uses of a "personal dis-organizer"? What is technological correctness? How will our ethics be transformed by the ability to "undo" our virtual actions? Will artificial intelligence finally deliver an automaton that disobeys? What is cyber-pain? (and where to find it).

SYNTHETIC BEHAVIOUR (Recombinart)
Can cyberspace behaviour be "rendered" (as in designer-behaviour)? What constitutes interesting behaviour? Will synthetic behaviour change what we mean by normal behaviour? What is the virtual equivalent of the Undead? What proposals challenge the dead/alive binary (videogames, military simulators, etc.) as the primary paradigm of virtual interaction?

*   CALL FOR ABSTRACTS   *
To submit an abstract for the potential inclusion of your paper in the 5CYBERCONF programme, please follow these format guidelines:

Title of the paper
Author(s)
Institutional affiliation, if any
Chosen 5CYBERCONF theme (from the list above)
Abstract, 500 words maximum
Brief biography, 100 words maximum
Audiovisual equipment requirements
Contact information (email preferred)

There are two ways to submit: 1) Email 5cyberconf@ceai.telefonica.es with the subject "5CYBERCONF Submission" or 2) mail both a printed copy and a PC or MAC diskette to the address given below.

The selection will be done by an international and a local committee made up of academics, theorists, artists and technicians in the field. Submission of an abstract indicates the submitter's intention and capability to write and present the corresponding, full length paper, if chosen. Papers will be alloted a half hour for presentation and may be in English or Spanish. Please be advised that the selection committees will not consider abstracts that are not formatted as stated above nor papers that have been previously published.

All papers will be published in a bilingual edition of the proceedings, which will be available in late 1996.

*   DEADLINES   *
Deadline for reception of abstracts: February 15, 1996
Notification of selection for presentation: March 15, 1996
Deadline for registration: May 1, 1996

*   LOCATION   *

5CYBERCONF will take place in the comfortable, modern auditorium of
the Art and Technology Foundation situated in the heart of Madrid.
The historic building that houses the Foundation is within walking
distance of sites of interest such as the Plaza Mayor, la Puerta del
Sol and the Prado Museum. Madrid has a lively street life and is
famous for its tapa bars, Flamenco scene, sidewalk cafes and all
night festivities. June is usually warm, sunny and dry.

* CONFIRMED KEYNOTE SPEAKERS   *
Carolina Cruz Neira (Spain)
Manuel de Landa (Mexico-USA)
Antoni Muntadas (Spain-USA)
Avital Ronell (USA)
Florian Roetzer (Germany)
Allucquere Rosanne Stone (USA)

* SPECIAL EVENTS TO BE CONFIRMED*
Performance by Guillermo Gomez-Pena.
Private screening of David Cronenberg's new film "Crash" based on the
J.G. Ballard novel.

The list of keynote speakers and special events is preliminary; more
to be added. Please visit our Web site for more information and
updates on 5Cyberconf.

*   5CYBERCONF ORGANIZERS   *
Rafael Lozano-Hemmer, Chair
Susie Ramsay, Coordinator
Allucquere Rosanne Stone, Goddess of Cyberspace
****
< The Third International Conference on Auditory Display (ICAD '96) >
                   Santa Fe, New Mexico
                 Dates: November 4-6, 1996

                       Sponsored by
                     Santa Fe Institute

Steven P. Frysinger
James Madison University
College of Integrated Science & Technology
Harrisonburg, Virginia 22807
Tel: 540/568-2710
Fax: 540/568-2761
Net: frysinsp@jmu.edu

Continuing the work of the successful ICAD '92 and '94 meetings, ICAD
'96 will be held November 4-6, 1996 in Santa Fe, New Mexico, USA.
ICAD is a forum for presenting research on the use of sound to
display data, monitor systems, and provide enhanced user interfaces
for computers and virtual reality systems. It is unique in its
singular focus on auditory displays, and the array of perception,
technology, and application areas that these encompass. Like its
predecessors, ICAD '96 will be a single-track conference. Attendance
is open to all, with no membership or affiliation requirements.

Papers are solicited on any aspects of Auditory Display. Topic areas
include, but are not limited to:

   *   Auditory exploration of data via sonification (data-
         controlled sound) and audification (audible playback
         of data samples)
   *   Real-time monitoring of multivariate data
   *   Sound in immersive interfaces (Virtual Reality) and
         Teleoperation

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        *      Perceptual issues in Auditory Display
        *      Sound in generalized computer interfaces
        *      Technologies supporting Auditory Display creation
        *      Data handling and sound synthesis for Auditory Display
               systems
        *      Applications of Auditory Display
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Note: There will be a strong preference for papers with sound, and a
high-likelihood of publishing sounds with the proceedings.

IMPORTANT DATES

Manuscript submission: May 20, 1996
Notification of review decisions: July 15, 1996
Camera-ready copy: September 16, 1996
Contact Steven P. Frysinger for details on the submission procedure.

CONFERENCE CHAIRS

Steve Frysinger, James Madison University & AT&T Bell Labs
Gregory Kramer, CLARITY, Santa Fe Institute

THE SANTA FE INSTITUTE

The focus of the Santa Fe Institute is research on complex systems.
This work encompasses an extraordinary range of topics normally
studied in seemingly disparate fields. Natural systems displaying
complex adaptive behavior range upwards from DNA through cells and
evolutionary systems to human societies. The dynamics of complex
systems are difficult to comprehend and even more difficult to
communicate. Data visualization--and more recently data sonification-
-are emerging as crucial tools for the comprehension and
communication of complex systems data.
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                   |   PUBLICATIONS    |
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< Computer Music: an Interactive Documentary >

Ron S. Nolan
Digital Studios
209 Santa Clara Avenue
Aptos, CA 95003
Tel: (408) 688-3158
     (800) 499-3322
Email: nolan@cyberlearn.com

A new CD-ROM for Macintosh and Windows platforms - "Computer Music:
an Interactive Documentary" is now available. It was designed for use
by introductory college students and in many schools in secondary and
middle school courses in music and technology--as well as by home
music enthusiasts.

Featuring:
* Performers * Researchers * Sound Designers * Engineers * Sampling *
MIDI * Synthesis * Composition * Recording * Digital Recording &
Editing

This new interactive documentary from the CyberLearning Collection
(tm), produced in association with the University of California,
Santa Cruz, fuses video, sound laboratory and workbook into a unique
multimedia experience that will get your foot tapping and your wheels
turning. You may explore features of the CD-ROM and download demos at

our web site:

http://www.netins.net/showcase/macintosh/cyblearn.htm

or request a demo on floppy via email (specify Mac or Windows) and
your mailing address.
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         |  OPPORTUNITIES  |
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< California Assembly of Local Arts Agencies (CALAA) seeks a
President/CEO >

President/CEO Search
CALAA
870 Market Street, #714
San Francisco, CA 94102

Applications are now being accepted for the position of President/CEO
with a nationally recognized statewide arts organization which
advances the professional development and growth of local arts
agencies in California. CALAA seeks an enterprising, seasoned, and
visionary leader with a strong record in building successful
organizations. The successful candidate must have arts experience,
enthusiasm for and a commitment to the mission of local arts agencies
to develop and nurture arts infrastructure in California's
communities.

As the organization's key leader, the President/CEO works with and
motivates the Board of Directors to define CALAA's goals and
objectives, raise its profile and meet its resource needs. As its
chief executive officer, the President/CEO has full charge of CALAA's
management, including its programs/services, finances, personnel,
operations, strategic and operating alliances, communications and
advocacy.

EXPERIENCE: Five years in local arts agency management or executive
level nonprofit administration is required. Evidence is required of
experience in working with a board of directors in a successful
leadership role, in nonprofit fundraising, marketing, financial
management and planning, program development and administration,
conference/events management, arts policy development, communications
and publications. The successful candidate should be familiar with
California's local arts agencies and cultural history. Advanced
degrees, certificate courses and other formal educational background
relating to the position are desired.

SKILLS & ABILITIES: Applicant must have proven skills in program and
board development, and in personnel hiring and management. As the
present staff is very small, the applicant must be proficient in word
processing, data management and on-line communications. Excellent
skills are required in written and verbal communication, as are the
abilities to inspire and motivate, to manage volunteers, and to
manage multiple projects simultaneously. Applicant must be able to
travel frequently.

COMPENSATION/BENEFITS: Salary is anticipated to be in the mid- to
upper-40s, plus benefits.

Mail application, including a professional resume and letter of
interest stating salary requirements to the address above. No
telephone calls, please. An Equal Opportunity Employer

Application Deadline: Position is open until filled. Application review begins on November 27, 1995.

About the California Assembly of Local Arts Agencies (CALAA)

CALAA is a professional association of california's local arts administrators. It provides services to its members in the following ways: 1) professional development and leadership opportunities - training workshops, conferences, institutes; 2) a statewide network of members to facilitate regular and timely communication in the field with a particular sensitivity to regional concerns; 3) resources - information, including a newsletter and other publications, and financial resources as available; and 4) advocacy - at the national, state and local level, within and outside the arts community, to strengthen the base of support for the field.

CALAA has established a statewide network to enable frequent and effective communication between the board of directors, representatives of ten active California districts, members, local arts agencies, and people and organizations that support the growth and accessibility of the arts. Each district is represented by District Co-Chairs who facilitate communication within their districts, and to and from CALAA. Co-Chairs represent their district at quarterly meetings of all Co-Chairs together with the CALAA Board of Directors. In this way, CALAA maintains a direct link to its members and constituents in the field.

CALAA's Board and District Chairs are presently engaged in a pilot online communications project out of which may develop a significant technology initiative.
****
< Composer/Theorist: University of California, Santa Cruz >

Composer/Theorist Search Committee
Music Department
University of California
Santa Cruz, CA 95064
Tel: 408-459-2292
Fax: 408-459-3535

POSITION/RANK: Assistant Professor of Composition/Theory
QUALIFICATION: Doctorate in composition or theory in hand by 6/30/96

DUTIES: Teach first- and second-year theory, literature, and musicianship. Other courses according to qualifications and curricular needs, e.g. beginning theory and eartraining, undergraduate and graduate composition, and a research seminar at the graduate level. (Applicants with a secondary expertise in computer-assisted composition/ analysis OR in the music of a non-western culture are particularly encouraged to apply.)

SEND: 1. letter of application; 2. curriculum vita; 3. list of three references from whom the applicant has requested confidential letters of recommendation, 4. evaluations of teaching from former students, if possible.

DEADLINE: December 8, 1995 postmark for all materials.

Write or FAX for complete information.
****
< Composition, Music Technology Position -
   the University of North Texas College of Music >

Larry Austin
Email: austin@cube.cemi.unt.edu

Send materials to:
David Shrader, Dean
Univ. of North Texas College of Music
P.O. Box 13887
Denton, TX 76203-6887

Full-time, tenure-track assist. prof. Teach composition, computer
music, related courses. Develop new course in music technology.
Advise theses, participate in faculty committees. Other
responsibilities may include directing Center for Experimental Music
and Intermedia (CEMI), coordinating contemporary music performances.
Qualifications: active, productive composer working in a broad range
of mediums, including computer music, with consistent record of
performances. Master required; doctorate preferred. Salary
commensurate with candidate's qualifications and experience. Starts
Aug. 19, 1996. Apply by Feb. 15

Application materials: curriculum vita; transcripts of academic
record; three confidential letters of recommendation; complete list
of works including important performances; and one score and cassette
or CD of the same work. The University of North Texas is an Equal
Opportunity/Affirmative Action Employer.

Interested persons are invited to review detailed WWW information
about the facilities, programs, and faculty at the UNT College of
Music at the following World Wide Web site:
    http://www.music.unt.edu/
and information about the UNT Center for Experimental Music and
Intermedia at:
    http://www.scsunt.edu/cemi/cemi.htm
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|  WORLD WIDE WEB  |
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The LEA Word Wide Web site contains the LEA archives, including all
back issues, and the Leonardo Electronic Gallery. The Profiles and
Feature Articles have been extracted from the back issues, and reside
in their own sections of the site. It is accessible using the
following URL:
        http://www-mitpress.mit.edu/LEA/home.html

Back issues, submission guidelines and LEA Gallery files are
available via ftp anonymous, using the following method:
    ftp mitpress.mit.edu
    login: anonymous
    password: your_email_address
    cd pub/Leonardo/Leonardo-Elec-Almanac

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|       LEA         |
| PUBLISHING &      |
|  SUBSCRIPTION     |
|   INFORMATION     |
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 Tel: (612) 362-9390
 Fax: (612) 362-0097
 Email: harri067@maroon.tc.umn.edu

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< Ordering Information >

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subscribers to the journal Leonardo. The rate for Non-Leonardo
subscribers is $25.00

Send orders to: journals-orders@mit.edu

Please include full mailing address or MIT Press account number,
telephone and fax numbers, and e-mail address. Please send
VISA/MasterCard information as well.

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for details.
========== < End of Leonardo Electronic Almanac 3(11) >
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