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Contact: Steina and Woody Vasulka

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By David Mather

Steina and Woody Vasulka: Machine Media opened October 18 at the Museum of Fine Arts in Santa Fe. Even as they were preparing for the exhibition opening, the couple took time to talk with *El Palacio* magazine.

The conversation began on a bright morning at the Vasulkas' house in the village of Agua Fria. We settled in while Woody bustled about, making strong coffee and making sure that I was as comfortable as his wife of thirty-two years.

The Vasulkas' living area is integrated into their immense studio that is surrounded on all sides by a mass techno-clutter. Somehow it feels as comfortable to them as Steina looks in the only easy chair. Where they live is where they work.

The Vasulkas' medium is electronics. They may have lived in New Mexico for sixteen years, but their approach to their art is all European: Steina's reveals her Icelandic-Nordic matter-of-factness; Woody's comes through in Central European irony and sense of tragedy.

DESIGN BREAK

David Mather: When you married in 1964, you both were living in Czechoslovakia, Woody having grown up there and Steina having ^{studied} moved ~~there~~ ^{there} from Iceland. So why did you move to America?

Steina Vasulka: After we got married, I wasn't going to live in Czechoslovakia, and Woody wasn't going to live in Iceland. How easy it was to make a decision! We only came to America for a year. We were just going to check it out. At that time, especially coming from Czechoslovakia, America was a benign place. We all wanted to investigate it, because we knew that it was a great country. We didn't come to America to 'make it'. We didn't come with the immigrant's dream. We just came.

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Woody Vasulka: It was a curiosity. My generation severed all these loyalties to nationalism and political alliances, so I had been adrift since I was born. When we were facing deportation ^{from the U.S.} we didn't blink an eye, because we don't come from a loyalist generation. We had no obligations, and we still don't have any obligations. I come from this dream of migration, probably of the Jewish tradition, ^{→ although I am Catholic → vaper.} and hopefully, intellectual migration. What did they say? "Why do we need roots if we have wings?" We aspired to be without alliances, to be world citizens, world artists.

Steina: Remember when the series "Roots" came out? I was just incredulous—"Why do they want to know their roots? We are in America!" This is what I was running away from—those damn roots—because I know even my thirty-fourth grandfather by name. I don't want that.

And then there is all this talk about community here; that's another thing we ^Arun away from, both me and Woody. We don't want any community. The great thing about America is that there is no community. You don't have to go down the street and say "Good Morning" to your neighbors.

It was great to come to America, because we didn't have any obligations to anybody. So we started our own community of people who were drifting over—Czechs, Eastern Europeans, and all kinds of people—who had done the same thing, who had gotten themselves to the States, and we had sort of a blast! Then, we fall into video.

Woody: That's very simplified: "We fall into video."

Steina: Well, we drifted into video. So now we were doing video, and we had our video friends. It was very interesting in the early times of video, because it was stretched from coast to coast, and it was held together by people called The Cosmic Messengers. They would drive buses from coast to coast, and they would come from California and tell us what they were doing. And we would give them our tapes to take with them.

DM: So suddenly you were in a whole new community, one of your own making or at least choosing. Why, when you wanted nothing to do with community?

Woody, unable to suppress a grin: America is stratified by profession and by interests, in contrast to Europe where people are socialized by clannishness or traditions. After all, we do not have anything to say to people who do not have our same interests. It's a further breaking down of community; that which is set up to "love your neighbor." This breakdown by profession is an escape from the obligation of unconditional love.

You know, I grew up under Communism where the unofficial religion was one of community imposed from above—in our case, the State. Everyone was expected to be the same and to—like Christians are taught from the pulpit to do—value his neighbor as himself.

Our idea was that in America there was community by choice.

DM: Steina, you studied violin and music theory in Iceland, Denmark and Germany before moving to Prague in 1959 to attend the Music Conservatory. And Woody you studied engineering in Brno and began making films while in Prague. So how *did* you come to video—and how did you come to it together?

Woody: We met in 1962, when she asked me if I knew how to fix motorcycles. I was a graduate of the School of Industrial Engineering, so had little trouble fixing her bike. We married two years later.

As for video, I didn't find any way of creating the texture of vision in my films. So I was ready. My first encounter with video came at the Howard Wise Gallery. Suddenly, I saw how the electronic image related to electronic sound through the feedback ~~loop~~.

This decided my future by making me realize what I was about. It was that simple.

But video loved me & I could not resist.

→ missing link abt when to film After my technical ed. I ended up in a Communist factory. In order to escape, I organized all of my intellectual energy toward film — the ultimate dream machine. So I went to Prague in order to study film.

I soon realized that I had nothing to add to film



So I went to Prague in order to study film.

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That texture and that behavior, which is not present in film, became a phenomenon that I had to look into. Video has an immediacy and an element of time-manipulation, because the frame can be altered. Video also has colorization, keying, and feedback—none of which are possible in film.

We deconstructed the electronic image, rather than synthesizing it, through our experiments during the 70s. We analyzed the properties of the video signal. It has always been the motive of our work to look into other domains, to identify them, and to learn how to inhabit them.

DM: In order to peer into those other domains, do you need to develop new ways to communicate? New technical languages?

Steina: I speak seven different languages, because speaking Icelandic doesn't get you anywhere in the world. So, in this sense, I am a linguist. But when it comes to syntax, the conventions bore me—I'm against them. I fall back on another convention, which is music, because I studied music. I know something about phrasing, about highs and lows, about the architecture of sounds. So I fall back on that when I'm doing my work. That was the big seduction of doing multiple channels [as for example, she did in *The West*], because music is also composed of different channels.

I don't have the gift of knowing what images should follow other images, but I know what sounds should follow other sounds. Like the case of *Pyroglyph*, **MICHAEL SUMNER HAS THIS ON HIS COMPUTER** it wasn't until I had the sound together that I understood how to edit it. I was totally guided by the sound and by the rules of sound. Woody always laughs at my edits, and the only feedback I get is that it's wrong, so I go back and I try again. At a certain point, Woody says, "This is okay," and I trust that it's okay. He gives me a funny kind of feedback, because he doesn't tell me how to do it.

This is where we're most different—Woody understands the visual and I the aural.

Woody: I was extraordinarily lucky to come to this new way of doing things electronically. I had rejected film. There also was a bit of history about my

connection with electronics from my service in the [Czech] Air Force. I was a radio telegraphist. I understood about the [electronic] signal, since I knew how it bounced around the stratosphere and interacted to make sound textures.

For me there's this connection between the instrument, the signal, and composition that dates back to when I was seventeen years old, and there is a relation between these sound textures and electronic music-making. Later, when I first heard (Karl-Heinz) Stockhausen, it blew my mind—here was an artist who exploited the use of electronic signals by working with the differentiation of frequency by material filters. Later I discovered film, and the switch for me was very organic, from sound-making to picture-making.

We both were dedicated simply to looking at the technology. We were not interested in composition or Art, though, of course, our only reading of the technology was aesthetic. The behavior of the signal, a "professing" of the signal, became almost religious. The observation of time, energy, and the signal's dynamic state was fantastic.

This became a major period of practice for us and for a few others who were interested in these matters.

Steina: We had access to video equipment from various sources, but when we started we had no signal-generating equipment. So, the first thing we bought was an audio synthesizer, because you have to have a signal generator, and we bought it as much to generate audio as to generate video. I always think that this is important—that when we first laid our money down, we put it on a *synthesizer!*

DM: I have heard you say many times that video can escape the narrative restrictions of film, those imposed by the director as what...author? Do you mean that video has the capacity to be interactive in a way film doesn't? And in your video work have you managed to kill the author?

Woody: The author is being killed, not by the instrument, but by the concept of participation, or interactive space, in which the narrative is no longer driven by the author. But, finally, most of the investigation of such systems is

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given to the observers, and the syntactical relationships that are so important to authorship in literature, poetry, music, and film, suddenly become the domain of the observer, who is completely unprepared for it, of course. We call it total degradation of authorship by participation, and an integral part of the new strategy of engagement. A new set of syntactic relations has emerged in which the author has been plunged into a participatory space. It's a syncretic moment where a personal, hidden agenda of the author can be followed only by associated minds and navigated freely in preparation for authorship.

DM: That covers human-machine interaction. Hasn't some of your work been devoted to machine-machine interaction?

Steina: One of our early turns was to systems-performance because we realized that there would be a dialogue, and that whatever the system was—mechanical, electronic, or human—we would have that dialogue. So we pointed the camera into the monitor and the system started performing before our eyes.

Using a recording device, and without any human interference, a wonderful pattern would be taped and could be played back: The system had performed! *And would*
So, we learned very early to not take an active role. The system is always *continue to perform for itself — without you.* there, and at a certain point, the system takes over, and you become its servant.

DM: Are you trying to change the world through your work with machines, or might the machines eventually do that for you?

Woody: Every generation is reformist because they are immediately confronted by an unjust, illogical, and completely improbable world. In a strange way the modern movement was reformist. It tried to replace religion with a new way of thinking, and the art became enough to replace the spiritual need of society. The Modernists always wanted to change the world, but as Buñuel said: "We wanted to change the world, but instead we changed art," and this was the bitter pill to swallow.

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DM: How does the machine relate to this?

Steina: Technology is not something one has to accept or reject any more than nature. It is just here. And just as with nature, there is an opportunity for dialogue. When we turn the machine on, we ask, "What can we do together today?" If my technology does not talk to me, I get nothing done.

Woody: The original idea of the machine as automaton goes very far back. The machine is a divine power that is summoned to re-structure human experience, to bring it closer to Spirit. At the beginning of this century, technology was essentially tended by high priests. They were servants who helped maintain a separation between the populace and themselves.

The 60s threw a monkeywrench into this arrangement, by dissolving the established order. This was a Promethean struggle of taking the fire from the gods and bringing it to the people. By aligning themselves with technology, the youth disassociated themselves from the establishment while maintaining technological knowledge. They brought the Code to the populace.

Apart from that mythological justification, I believe this occurred because my colleagues were the ones who built the machines, and they did so with the intention of utopian integration. We thought that these machines would produce social justice outside of human supervision.

DM So, the utopianism got imbedded *in* the technology?

Woody: Yes, that was the belief at the time, though now the establishment is trying to monopolize and commercialize knowledge again. We can see this struggle for power over the Internet.

DM: Everybody's writing about that fight. Let's get back to the exhibition. Steina, you said earlier that you were all aural. So how did the piece called *All-Vision* come about?

Steina: When we became technically advanced enough to not need each other's assistance, Woody plunged head long into the Rutt/Etra machine, leaving me to ponder about machines and optics. I had wanted to challenge the camera's vision, usually hard-wired to eye-level and pointed at the main event. First, I mounted the camera on my car, then on ever-spinning turntables. I let the camera see the world through moving mirrors, and finally a mirrored ball. When people look at *All-Vision*, they see themselves and, therefore, assume it is about them. But then they leave and *All-Vision* keeps going. **MICHAEL SUMNER HAS ALL-VISION**

If I had my choice, and the Museum had the room, rather than having one thousand viewers per monitor, I would prefer one thousand monitors per viewer. I generally do not like to show in a gallery or museum, frankly like showing my work in alternate spaces—warehouses, hangars, and outdoors.

DM: Woody, explain your shift from experimenting with the electronic signal to constructing mechanical, virtual environments? *The Theater of Hybrid Automata* and *The Brotherhood* series, for example, both of which are in the show. **MICHAEL HAS A TABLE AND SOME FROM THE BROTHERHOOD SERIES**

Woody: It was an interesting possibility to de-materialize the image. The image is not directly tangible but is suspended in force-fields. I organized those force-fields, a process for me that offers a very elegant way of looking at an image. As I was producing many tapes based on this principle I also was collecting military equipment with a seemingly intelligent structure. By intelligence I mean a kind of human, ritualistic character. For example, it is something of a ritual for the machine to calibrate. It's like in the morning you open your eyes and you say: "Where am I? What am I doing here? What am I going to do next? Where am I going to go? Why am I going there? Which way should I go?" These are basic, primitive questions that the machines, guided by a navigational system, have to ask.

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The first piece I made like this was called *Theatre of Hybrid Automata*. YUP, MICHAEL HAS THIS, TOO This piece deals with the ritual of calibration and is named for a term we owe to David Dunn. Hybrid automata deals with the adaptation of a celestial polar navigator—a device that was locked on Polaris to maintain the coordinates of a vessel flying at night, above the clouds and on its way to a target.

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The second one, *Table III* of *The Brotherhood* series, is even more sinister. The rack that forms the center of the table was used to determine the coordinates for a bombing computer. This is the same kind of machine that accidentally bombed a village in Cambodia, described in *Swimming to Cambodia*. I converted it into an audio-visual device that explores the theme of technological ethics. There is no loyalty in the machine in the way it destroys or constructs, but it does so in a pure way; there is no ethical definition.

DM: Woody, you have talked a lot about non-centric space. Care to define it?

Woody: I developed this term to avoid the lack of clarity in the term "polymorphous space." We understand space in theatrical terms, space as a globe and where the galaxies are; we have some idea about what space is.

DM: Are you launching a history of space here...?

Woody continues: But in the media sense, space is what we create. In photography there is a frame. That frame presents space within a cognitive unit, which in turn fills us with a sense of place. Then this framing shifts, because film has the ability to present one piece of space intercut with another piece of space. Faced with that, suddenly the mind collaborates. It's called "cinematic space," and people can exist in that space, stories can be told there, and many events can happen there, too. Cinematic space is machine-made space, and film sequences are manufactured pieces of information that are drawn into a cognitive context. The end product is one born of machinery.

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This strategy continues with the use of computers, with the major difference that the computer comprises all media—not only sound and image, but also alphabetical systems, numerical systems, Renaissance space, matrices of recalculated space, non-existing polygonal, octagonal space, inversions, etcetera. All the modalities of space are represented in that machine by simply organizing data structures, which to me is simply miraculous.

DM: It is, then, literally, a new territory.

Woody: Yes, it is basically a new territory of representation. Computers generate unmatched conceptual spaces. Perhaps we can talk of their place in human consciousness, since we cannot help but be affected by them, but what is our evidence?

Through computers we have discovered an escape from cinematic narrative, which had confined us. Now computers can be treated as a data system themselves, and we can program several ways of decoding or observing this new space. The data-space contains information structures that are not subject to human psychological formulations. They free you and let you criticize the previous system, which is the cinematic.

Every new medium has the function of containing the previous medium but adds something. The driving force behind my thinking is the idea of a new medium criticizing the old one. In order to look critically at cinematic space, you have to invent new spaces from which to look, otherwise you're captive, continually perpetuating cinematic narrative. This is non-centric space.

In fact, I do not know how to define this space; I only know what to call it.

DM: Earlier you talked about a world in which machines would "produce social justice outside of human supervision." Might non-centric space be the continuation of that vision?

Woody: Sure.

ANSWER TO KUM FROM WOODY ON TUESDAY

Steina and Woody Vasulka: *Machine Media* was organized by the San Francisco Museum of Modern Art, and continues through February 3, 1997. The exhibition in Santa Fe is funded in part by the Friends of Contemporary Art at the Museum of Fine Arts, and private individuals.

David Mather is a free-lance writer and video producer living in Santa Fe.

**Notes on Installations:
From Printed Matter to Noncentric Space**

Woody Vasulka

Initially I looked at video installations with a great deal of suspicion. I was a man of Printed Matter. I used to believe strongly in the powers of the immaterial image, in those cognitive units of energy organized in time. I believed that the time had come to do away with the gallery, as the last of the oppressive control of art. And I certainly belonged to the group that Jonas Mekas at the end of the 1960s called the "tribe that worships electricity." So, what is this current obsession in museums and galleries with "TV furniture"?

It may seem ironic that in constructing my new installations, such as Theater of Hybrid Automata (1990) and The Brotherhood (1994-96), that I am filling the space with objects of a menacing character. In my backyard junk pile are some remarkable pieces. The device at the heart of Theater of Hybrid Automata was once a celestial navigator, a double cylinder with optics and sensors to keep the instrument locked to the polar star. Obviously this was a piece of military hardware, designed to drop its deadly cargo somewhere in terrestrial space. The questions: Where am I? Where am I going? How am I getting there? are encoded in intercept plotting tables, gyro-heads of missiles, tracking devices, and other opto-mechanical junk. They are idling in the junk fields of the Southwest, their electronic nervous systems, their hydraulic and pneumatic networks, ripped apart and bleeding.

When I reached an impasse in my work with the cinematic-electronic frame, I turned my attention to this sinister arsenal, giving it a chance to manifest a different final destiny. I had neither the tools nor the knowledge to continue my narrative quest in 3-D graphics. I had battled the software and the machine until I realized that it was my head that needed realignment. This may, at least in part, explain the depth of my betrayal of immateriality and, therefore, the sudden appearance of installations in my recent work.

Of the attempts made to influence the early formation of my ethical code, the one that left the most permanent impression had to do with money. As Catholic boys in the suburbs of a Moravian town, we were constantly reminded by the chaplain, and later by the priest himself, of the dangers of even thinking about money. Later in school, the socialist doctrine was no less compelling. It was inconceivable to lust after money in public or within my circle of friends. We looked down on our fathers' attempts to pocket cash with their petty schemes of smuggling food from the countryside to the city right after the war, when food was scarce. In our youthful utopia, we talked of poetry, modern art, and jazz.

Fortunately, I could not draw. None of my lines or strokes would ever resemble a divine connection with the Ultimate. What remained was writing, poetry, music, and photography. So it was out of my ineptitude that I formed an ethical bond with the concept of Printed Matter. I was committed to the universality of

the replicable template, to all codes conceived in an immaterial context, in a total privacy of time and space, to everything that had to do with facilitating the metaphysical flow of ideas, the most powerful tool of utopia. All of this without the charade of a museum or gallery, without the seduction of the bourgeois, to whom or to what even the most incorruptible sooner or later fall prey. And video? This is Printed Matter par excellence! It was a simple technicality to embrace this ideal, the abstract template of electronic media, duplicable, self-publishable. Without any social status, without having to play the entertainer, clown, or fool, an author, well-hidden in the labyrinth of his mind or in his studio, could suddenly reach out to the world.

In making films, I dreaded the bombastic, public phase. As a shy, young man I found everything associated with public rituals intimidating. My pleasure was to edit film. This intimate protocol of joining two parts to build a far higher meaning suited the temperament of the practicing poet I considered myself to be.

In video, I became an instant voyeur. When I made video feedback for the first time, I would step back, watch, and then quietly slip out of the room, knowing that the feedback was still there, that it was alive and improving itself each moment, and that it was getting more and more complex and robust. I understood the consequences this could have on the rest of my life. Even now, when I seed a bunch of dubious numbers into my computer, I watch the chaos unveil with the same fascination.

Video came so fast; it was so new. We all plunged into a frenzy of handling this hot new stuff called video. There were so many things to learn in a short time: this new picture material, so mysterious and seemingly untouchable, these frames, "drawn" and suspended by a magnetic force on the face of the cathode-ray tube. But there was much more to know: the nature of image elements; the waveforms, their unity and exchangeability with sound, their mutual affinities and interactions; the craft of forming waveforms into primitive aesthetic units, which would survive the critical scrutiny of art.

Analog video was just the beginning. By the mid-1970s, with the aid of the Digital Image Processor (built with Jeffrey Schier), I was peering into an entirely different, completely unfamiliar but even more intriguing window. The process of constructing a digitally organized screen is one of the most exciting experiences I can remember. I saw a linear array of numbers hidden somewhere in a computer come out orderly, constructing point by point a visual, cognitive, perceptual unit--a frame. This point-by-point progression of frame construction is accomplished by the mere addition of the number one. To start constructing the next line, the binary counter steps into the next numerical scheme. This goes forward again and again with the same assurance as the sun rising each morning.

Even more dramatic was the realization of the intrinsic duality of the code that creates the electronic frame. Not only do the counters transform computer memory into the territory of

the screen, each carried an actual image property: the expression of point/image, the number representing brightness or color--a tiny part of the image itself. And that's not all. Deep in the heart of every computer there is the "legendary" CPU (Central Processing Unit). Through it, everything could be reorganized with infinitely changing strategies. The drama comes from watching each line being drawn, each frame as a narrative assembly. No wonder I was transfixed by this kind of television.

Paradoxically, it was this experience that became instrumental in terminating my interest in the image as frame. Although the convenience of a frame is used to pass on an iconic shorthand, I finally realized that the radically new is not in the invention of a new image or even in a new set of syntactic devices as I had expected, but in the form of a gift offered to us by the machine: a new and undefined representation of space.

Cinematic space operates on two opposite narrative vectors. If space is represented by a sphere, the first set of narrative vectors looks at the point in the very center of all possible angles. The other, the opposite set of vectors, looks at the surface of this imaginary sphere from a center point on the inside--again, an infinite choice. For pragmatic reasons, cinema chooses a largely reduced set of vectors. The reduction of cinematic space is related to the strictures of practical access to all these locations by physical means, such as the constraints of horizontality and verticality of the environment, earth gravity, and other physical conditions of space. Above all, the

limits of selecting the set of cinematic vectors depends on the implementation of concepts of psychologically dominant human viewpoints. Cinematic space thus represents a significant reduction of the potential exploitation of the available zones of all-directional space.

There is no convincing or practical method to transpose the filmic world of light and shadow into the world of the computer. It is indeed this generic incompatibility, this artificial condition, that is the subject of my interest. I see film becoming a dysfunctional and alien element in the new digital space. The primary concept of the new space is expressed by the continuity necessary to representing multidimensional image/objects. Once constructed, the scene becomes a subject of recall, held indefinitely in the computer memory with all its previous conditions intact, including the continuity of all surfaces equally significant and accessible from all directions. This is unlike film, where once the frame has been constructed and shot, space continuity is routinely discarded.

Furthermore, digital space has no generic method for looking at the world in the way that a camera does through its pinhole/lens apparatus. Digital space is constructed space, in which each component, aspect, concept, and surface must be defined mathematically. At the same time, the world inside a computer is but a model of reality as if seen through the eye of a synthetic camera, inseparable from the tradition of film. Yet, in this context, no viewpoint is ever discarded, the internal

space is open to a continuous rearrangement, and access to a selection of views and narrative vectors are infinitely available, not only to the author, but also, with the use of certain strategies, to the viewer. Once the author constructs and organizes a digital space, the viewer can enter into a narrative relationship with it. A shot in film indicates a discrete viewpoint. Its narrative purpose is to eliminate other possible views. In contrast, the world in the computer contains the infinity of undivided space, undissected by the viewpoints of narrative progression. In the world of the machine, all sets of narrative vectors are offered in an equal, non-hierarchical way. The machine is indifferent to the psychological conditioning of a viewpoint. All coordinates of space are always present and available to the principles of selected observation.

The new space offered by the computer is a "noncentric" space with no coordinates. One must cross the threshold of the filmic or the electronic frame and fully enter this new space. As in the primordial forest, all directions are equally new, equally important and challenging. And in this forest, the event becomes the narrative drive. Is it the sign of danger that might have caught our attention? Is it the clue left by the predecessor on the forest floor? Is it the sound of the falling tree? Not all the events appeal just to our instincts. Inevitably we bring to the new space our cultural knowledge, our intellectual curiosity. Although the author will prescribe the event, more than ever we become partners in his play.

Theater of Hybrid Automata is a direct result of a discourse between my understanding of traditional cinematic space and a newly emerging digital space. To chart the first set of vectors, I built a camera head capable of being aimed at any location in the space from a fixed point. This elegant version of space exploration would have been a simple project for a computer. Instead, I entered a long and cumbersome period of constructing this physical apparatus.

Again, I had no elegant solution to express the second set of vectors. Jeffrey Shaw brought a brilliant solution to my dilemma in a work titled Golden Calf (199) by using a hand-held monitor with a positional tracking device. By constructing an object completely in the computer memory (including the reflections of the environment on its surface), one can walk around this virtual object by holding a portable LCD screen, looking and observing the virtual version of the object. Through a positional tracking device attached to the computer, the screen becomes the medium between the object and the observer. Any change in the angle of the observer's screen will force the computer memory to reposition the virtual object on that screen. The real and the virtual are in mutual embrace. To me, this presented a clear demonstration of the second set of narrative vectors of cinema performed virtually and in action. These were clearly the opposite vectors to those of my looking-out device. This time I saw the space staring into a point.

get date

The dual concept of the project of Theater of Hybrid Automata--the actual physical construction of space and its virtual representation through the computer--is performed in a strict positional interlock, so that any change in the physical is accompanied by a change in the virtual. The common engine of the computer gives the coordinates to both the physical space, as defined by the robotic devices, and the graphic representation of the 3-D world. For the first time in my work, the images provide a purely referential function. The prerecorded spatial icon represents a mere allegory of space, and the range of numbers are simply consequential symbols of incremental values. Like the voice reading the terrestrial alignments from the perimeter of the compass, the intent to tell the story by images is reduced to their function as indexes. They no longer compete for all-out dramatic attention. Perhaps then the liberated viewer has the opportunity to contemplate events suspended in a web of polytopic and polychronic narrative stratifications.

Hence, Theater of Hybrid Automata gave me a chance to reflect on several questions of space. First, there is the space continuum raging on without known limits. I have carved out from it a form of weather converting unit that I call my studio--a house with floor, walls, and roof. Inside I built the physical construction--the cube as an abstract, dramatic space. The lines of this construction are straight, linear, extraordinarily rational. Next, in my computer, I constructed a representational form of this local space in the form of a 3-D graphic spherical

icon, rendered with a slightly transparent skin and with small referential objects inside (fig. 12).

Outside the cubic construction in the studio is the terrestrial world, bound to the surface of the globe and unable to escape the curvature of the earth. Beyond earth is true space, where nothing is linear, nothing horizontal or vertical. In space, there is no up or down, no roads, surfaces, tunnels, or narrative pathways, no shadow to shield the spirits.

The presentation of the installation in the shell of a gallery indicates the first level of localized Cartesian space. As the camera scans the targets, the words generated by the machine call out the names of the landmarks that surrounded the apparatus at its conception in the Southwest. In the next step of its performance, the machine addresses the extended terrestrial space by calling out the global markers of north, south, east, west. The third level evokes the confrontation of the experience of local and terrestrial space with a graphic representation of space in the moving 3-D graphic icon.

I see Theater of Hybrid Automata as an apparatus that is conscious of space. The basic cyclical ritual of the machine, the process of calibration is a phenomenon performed at each and every moment wherever a machine is to chart its future. Perhaps it is complimentary to our own human experience. From the moment of awakening, our mind begins the search for its identity, its alignment to time, the shape of a room, a street, a city. Finally, the way in which this assembly of objects, systems, and

events behaves may help to trace some points of its original intent: to deconstruct, analyze, and describe the basic behavioral pattern of a techno-aesthetic system.

In the late 1980s I entered the world of interactive performances through experimentation with media on an interactive stage first realized in the design of a performance of Joan LaBarbara's Events in the Elsewhere (1990). It was in that experiment that the video/computer installation of the Theater of Hybrid Automata was first configured. I had experimented with interactivity in voice and vocalized commands using the MIDI (Musical Instrument Digital Interface) code. The MIDI code already carries the basic musical protocol, one that corresponds to the level of my need to control other media devices. An initial experimentation involved robotics and other media controlled by a MIDI code. Later I expanded this interface to a laser disc player.

I had intended to build a fully responsive permanent interactive environment, but instead I found my efforts centering around building a series of tables titled The Brotherhood (fig. 13). The interactivity in Table III is designed to involve the random visitor in the gallery. While I approached this piece with a broad mandate for risk-taking, in the end I limited all possibilities to a few safe options. In principle, the installation performs its preprogrammed audio/video cycle; the overall composition progresses as a single time line unless the audience intervenes. The visual concept is based on a single

check date

light beam, split and redirected to the six coordinates of a cube. At the walls of the imaginary cube, there are six translucent screens, allowing projection of the images on both sides of the screens.

In Table III the interactive laserdisc program is accessed via the audio component, either through a microphone or a drum pad. The MIDI code, extracted from the pitch of the voice, searches a location on the laserdisc. It just so happens that the human voice contains a wealth of musical overtones, and the device is more than happy to interpret them on a tonal register and to activate "jumps" in the laserdisc sequence. The other audio channel is a sensor monitoring the intensity of the drum beat. The assignment is linear--the softer the beat, the slower the laserdisc images, the harder the beat, the faster the images move. A third sensor detects the presence of people in the space. If nothing moves in the environment for a while, the installation goes to "sleep."

As could be expected, the audience splits into two main categories: those who are active, interested in probing the installation, and those who observe, hesitant to join in. The core of active participants are drawn to playing the drum, paying little attention to the change in image they have produced. The microphone seems more intimidating. Loudness seems to be preferred, and usually the participation escalates to a frenzy, followed by an abrupt departure.

For me, the benefit of the interactivity goes to the true voyeurs who are detached from the situation and observing. Here is the moment of reflection, impossible to experience while engaged. But what did I expect from the audience? I have come to realize that I do not fully trust my audience. I do not give them the tool and power of composition--I only allow them intervention. In fact, I recall watching the scene with a great deal of resentment at how my work's "whole" was being chopped into meaningless parcels.

On the other hand, the pictorial and acoustical material of Table III is abrupt and violent in nature. The continuous and aggressive motion forward is designed deliberately to place the viewer in the seat of the projectile. I purposefully stripped all possible associations with a narrative, encouraging the audience to intervene at will and to pursue suggestions made by the author to play the violence of The Brotherhood.

In both Theater of Hybrid Automata and The Brotherhood, I attempt to transform a cubical Cartesian space into a dramatic space (fig. 14). In performance, the machine and the sensors under its internal communication protocol represent the first stage of a narrative probe. There could be many steps between these models and their transformation into the fully realized concept of an electronic stage.

To convincingly operate such a dramatic space, a certain amount of expressive elements capable of monitoring, evoking, or activating events in a dramatic space must be present. They must

be capable of interrogating or reporting on the status and changes in the space, correcting and navigating trajectories of gestures and other events, and initiating changes in space. The success of operating such a space depends upon certain qualities of the sensorial matrix--its density, its ability to discriminate the spatial coordinates, and on the update of rapid time/samples to achieve the necessary dynamic resolution.

This new space offers a non-centric space with no known coordinates. Accordingly, no singular narrative pathway is feasible. The author is like an ancient guide with his instincts and worn-out charts, yet no more secure and surefooted than the viewer.

At least one aspect of thinking about the new space and the role of the gallery has come under revision in my mind. It is becoming clear that the real world has become hostile to any notion of utopian experimentation. The dream of the moderns, to abolish the shrines of art and finally art itself, has moved closer to an absurd reality, though for an entirely different set of reasons. One may say the current state far exceeds the dangers of the bourgeois. But even now, when I contemplate my allegiance with the gallery, am I able to utter my sincere apology? My social code is hopelessly arrested, without evolution or the constant vigor of revisions and contemplation. Somehow I have trusted the dynamics of time, and have believed in the adventure of technology as an automatic and purifying process in itself.

EMD

SUMMER 1995

Lightningwood

P I C T U R E S

INVOICE

#165-E

November 30, 1995

Lightningwood Pictures
EIN#85-0423885

TO:

San Francisco Museum of Modern Art

attn: Bob Raily

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WOODY VASULKA
(Print Name of Licensor)

Date:

12-18-95

FAXED 12-18-95



Steina
Woody Vasulka

via fax: 505/473.0614

FAXED 12-18-95 FORM REQUESTED

December 11, 1995

Dear Steina and Woody Vasulka,

As part of the general information available at the Museum's Internet address on the World Wide Web the San Francisco Museum of Modern Art offers an electronic version of its newsletter *SFMOMA News*. We are now preparing to present the Jan/Feb issue of *SFMOMA News*. We have enclosed the attached form with the hope that you will grant permission to use these images (see attached) on the Internet for publicity purposes. Please note that the image shown on-screen will be a low resolution copy meaning that it will be sufficiently good for on-screen viewing but not good enough for reproduction quality printed material. In other words there is no greater risk of reproduction in this medium than there is in a printed form.

We are working under a very urgent deadline so we would appreciate it if you could please return the attached form as soon as possible. If you have questions please feel free to call me at 415.357.4175. My fax number is 415.357.4158.

Sincerely,

A handwritten signature in cursive script that reads "Genoa Shepley".

Genoa Shepley
Communications Associate

Steina and Woody Vasulka Survey Checklist 8/2/94

Matrix (1970-72)

Steina and Woody Vasulka.

Multiple video monitors, black and white, sound.

Lent by the artists.

Matrix 1--in media gallery

20-24 monitors, b&w or color, 19-21"

version 1: stackable monitors, preferably with lean frame and few controls on the front.

version 2: customized monitors in frames provided by Vasulkas.

Matrix 1 is interactive, will need either multidisk player, or diskplayer with interactive element, approximately \$1200.

will need pedestal.

Matrix 2--on outside curved wall.

same monitor options as Matrix 1, no interactive element. Frame version would probably be better for this one because of wall curve.

Number of monitors to be decided.

Will need pedestal.

Allvision (1976)

Steina.

Closed-circuit video installation, silent.

Lent by the artist.

Two video cameras. Version 1: b&w, chip surveillance cameras; version 2: color chip surveillance cameras.

4 monitors, suspended, hooded, 32".

Mirrored sphere (Vasulka)

Turntable with power supply (Vasulka)

Mechanical arm (Vasulka)

Suspension cables.

Needs to be redesigned for suspension, may need new aluminum frame.

The West (1983)

Steina. Sound by Woody Vasulka.

Two-channel video installation, sound.

San Francisco Museum of Modern Art.

22 video monitors.

Two videodisk players.

Synchronizer.

Museum provides, needs to be transferred to disk.

Borealis (1993)

Steina.

Two-channel video, four-channel installation, sound.

Lent by the artist.

4 translucent screens, \$200.

2 video projectors (3-gun, bright, possibly Sony super-bright)

2 LCD videodisk player (have to be programmable Pioneer)

synchronizer (Vasulka)

2 mirrors, \$200

4 audio speakers

2 audio stereo amplifiers

tables for projectors, \$300 each

column arrangement for mirrors

cost of making disks

The Theater of Hybrid Automata (1990)

Woody Vasulka.

Computer-controlled closed-circuit video installation, sound.

Lent by the artist.

Computer element version 1:

Computer--Toshiba T1200XE laptop, with docking station and extra cards, \$800.

Pioneer LD-V8000 laser disk player \$2200.

Speech box (Vasulka)

Version 2:

Silicon graphic Indie--would include computer, speech box, disk player.

Video camera, single chip, b&w, Hitachi or Toshiba, \$800.

Video projector Sharp LCD XG2000U or equivalent.

5 targets (Vasulka)

1 projection screen (Vasulka)

Robotic device (Vasulka)

Lightning--musical instrument designed by Don Buchla, \$1400.

Motion control motor drive (Vasulka)

Audio sampler--Roland digital sampler S330, \$650.

6 audio speakers--JBL model control 1, \$480.

6-channel audio power amplifier, Rane MA6, \$950.

Lighting grid (Vasulka)

Aluminum tubular frame (Vasulka)

Instrument rack (Vasulka)

Special effects generator/video mixer, \$300

Midi-controllable lighting system, NSI, \$800.

RPT camera head pylon stand (Vasulka).

The Brotherhood (1994-96)

Woody Vasulka.

Four table constructions with computer-driven and motorized instruments.

Lent by the artist.

Table I:

Still in progress.

Plotting table.

Computer.

Stepper motors.

Video camera.

Illumination table control.

Table II:
Still in progress.

Table III:
Aluminum table (Vasulka).
5 screens (Vasulka).
Pneumatic subsystem (Vasulka).
Beam-splitting optical assembly (Vasulka).
Computer--Toshiba T1200XE, \$800.
Stereo audio amplifier, \$200.
Laser disk player.
Slide projector.
LCD video projector.
Docking station.
Midi box.
IVL pitchrider model.
Drum module.
Audio sampler, \$800.
Instrument rack (Vasulka).
2 audio speakers, \$200.
Grid.
2 custom lights.
Microphone.

Need to have further discussion of what Woody provides.
Need to figure out getting compressed air to pneumatic system.

Table IV
Still in progress.
Table.
Video camera.
Video projector.
Projection screen.
computer.
Pen inkfeeder.
Writing medium transport.
Keyboard.
Speech recognition system.
Microphone.
Environment sensors.
Audio sampler.

Videotape Program:

Catalogue Page Breakdown

March 11, 1994

Publication Title: Steina and Woody Vasulka

<u>Element</u>	<u>Pages</u>	<u>Illustrations</u>
Half-title/Frontispiece	2	
Title/Copyright	2	
Table of Contents/List of Lenders	2	
Foreword/Acknowledgments	2	
Marita Sturken Essay (3,000 wds)	7	5 b/w
Woody Vasulka Essay (2,500 wds)	5	5 b/w
Maureen Turim/Scott Nygren essay (6,800 wds)	14	4 ← <u>btw</u>
B. Riley catalogue entries and plate section	20	16 color
Exhibition Checklist	2	
Bibliography. etc.	6	
Total	62	

5,000
 3,800
 5,000

← btw's

TO: ALGA

AUTOMATA

-YELLOW

FROM: BRUCE

PIECE # 1 GRAY WOODEN CRATE

PIECE # 2 CAND BOARD

PIECE # 3 GRAY WOODEN CRATE

PIECE # 4 WHITE FIBERGLAS CASE

PIECE # 5 GRAY FIBERGLAS

PIECE # 6 SILVER METAL CASE

PIECE # ~~7 SILVER METAL~~ NOT SHIPPED

PIECE # 8 SQUARE FIBERGLAS CASE - GREY

PIECE # 9 }
PIECE # 10 } WHITE WOODEN BOXES
PIECE # 11 }

PIECE # ~~12~~ ~~ARMY GREEN BOX~~ ARMY GREEN BOX

PIECE # 13 POWER AMP

13 A - WHEELS

PIECE # 14 MONITOR + KEYBOARD

PIECE # 15^{a,b,c} - STANDS - COMPONENTS

PIECE #

PIECE #

PIECE #

BOREALIS - WHITE

PIECE # | - CARDBOARD BOX - LASER DISC

PIECE #

MATRIX 2 - BLUE

PIECE # 1 - 22 CARDBOARD BOXES
WITH MONITORS

PIECE #

TABLE I - RED

- PIECE # 1 4- LONG CARDBOARD BOXES TAPED
- PIECE # 2 " " TOGETHER " "
- PIECE # 3 WHEELS "
- PIECE # 4 CABLES
- PIECE # 5 CABLES + WIRE
- PIECE # 6 MOTORS DOUBLE (2)
- PIECE # 7 MOTORS SINGLE (2)
- PIECE # 8 SCREENS (3)
- PIECE # 9 CARDBOARD - BIS
- PIECE # 10 CARDBOARD - BIS
- PIECE # 11 LONG CARDBOARD
- PIECE # 12 - BLUE METAL IMAGE PROCESSOR
- PIECE # 13 - LONG CARDBOARD
- PIECE # 14 A → I BASES
- PIECE # 15 a b c d - SPEAKERS
- PIECE # 16^a ALUMINUM
4- STANDS TAPED TOGETHER
- PIECE # 17 WHITE CARDBOARD BOX TAPED
- PIECE # 18 - BLACK PLASTIC CASE

TABLE I - RED

- PIECE # 19 KeyBoard
- PIECE # 20 ~~TRANSFER~~ } MONITORS (WRAPPED
IN BANNETS)
- PIECE # 21
- PIECE # 22 - CARDBOARD BALL
- PIECE # 23 - Brown CARDBOARD ~~BOX~~ (WRAPPED
COMPUTER)
- PIECE # 24 - 3 ITEMS WRAPPED IN BROWN
CARDBOARD
- PIECE # 25 - CARDBOARD WRAPPED INTO 22
- PIECE # 26^a - ~~BUBBLE WRAPPED~~ COMPUTERS
- PIECE # 27 BUBBLE WRAPPED VIDEO MIXERS
- PIECE # 28 - CONTROLLER
RACK
- PIECE # 29 - Power SUPPLY - BUBBLE WRAPPED
- PIECE # 30 CARDBOARD BOX - DOCUMENTATION
- PIECE # 31 BUBBLE WRAPPED COMPONENTS
- PIECE # 32 BUBBLE WRAPPED AIR SWITCHES
- PIECE # 33 BUBBLE WRAPPED TBC (2)
- PIECE # 34 BUBBLE WRAPPED Power SUPPLIES
- PIECE # 35abcd STANDS
- PIECE # 36 - Cardboard box - Projectors

TABLE I RED

PIECE # 37 abc Packs

PIECE # 38 CARDBOARD BOX - white

PIECE # 39 - CARDBOARD BOX - Brown

PIECE # 40 - 4-I BEANS

PIECE #

TABLE III - ORANGE

PIECE # 1 - LARGE METAL CONTAINER

PIECE # 2 - LARGE RECTANGULAR FIBER CASE

PIECE # 3 - LARGE SQUARE CARDBOARD (WHITE) BOX

PIECE #

e: fmpscan s/ sfmoma
word — Woodessay.txt

Notes on Installations:
From Printed Matter to Noncentric Space

Woody Vasulka

Initially I looked at video installations with a great deal of suspicion. I was a man of Printed Matter. I used to believe strongly in the powers of the immaterial image, in those cognitive units of energy organized in time. I believed that the time had come to do away with the gallery, as the last of the oppressive control of art. And I certainly belonged to the group that Jonas Mekas at the end of the 1960s called the "tribe that worships electricity." So, what is this current obsession in museums and galleries with "TV furniture"?

It may seem ironic that in constructing my new installations, such as Theater of Hybrid Automata (1990) and The Brotherhood (1994-96), that I am filling the space with objects of a menacing character. In my backyard junk pile are some remarkable pieces. The device at the heart of Theater of Hybrid Automata was once a celestial navigator, a double cylinder with optics and sensors to keep the instrument locked to the polar star. Obviously this was a piece of military hardware, designed to drop its deadly cargo somewhere in terrestrial space. The questions: Where am I? Where am I going? How am I getting there? are encoded in intercept plotting tables, gyro-heads of missiles, tracking devices, and other opto-mechanical junk. They are idling in the junk fields of the Southwest, their electronic nervous systems, their hydraulic and pneumatic networks, ripped apart and bleeding.

When I reached an impasse in my work with the cinematic- electronic frame, I turned my attention to this sinister arsenal, giving it a chance to manifest a different final destiny. I had neither the tools nor the knowledge to continue my narrative quest in 3-D graphics. I had battled the software and the machine until I realized that it was my head that needed realignment. This may, at least in part, explain the depth of my betrayal of immateriality and, therefore, the sudden appearance of installations in my recent work.

Of the attempts made to influence the early formation of my ethical code, the one that left the most permanent impression had to do with money. As Catholic boys in the suburbs of a Moravian town, we were constantly reminded by the chaplain, and later by the priest himself, of the dangers of even thinking about money. Later in school, the socialist doctrine was no less compelling. It was inconceivable to lust after money in public or within my circle of friends. We looked down on our fathers' attempts to pocket cash with their petty schemes of smuggling food from the countryside to the city right after the war, when food was scarce. In our youthful utopia, we talked of poetry, modern art, and jazz.

Fortunately, I could not draw. None of my lines or strokes would ever resemble a divine connection with the Ultimate. What remained was writing, poetry, music, and photography. So it was out of my ineptitude that I formed an ethical bond with the concept of Printed Matter. I was committed to the universality of the replicable template, to all codes conceived in an immaterial context, in a total privacy of time and space, to everything that had to do with facilitating the metaphysical flow of ideas, the most powerful tool of utopia. All of this without the charade of a museum or gallery, without the seduction of the bourgeois, to whom or to what even the most incorruptible sooner or later fall prey. And video? This is Printed Matter par excellence! It was a simple technicality to embrace this ideal, the abstract template of electronic media, duplicable, self-publishable.

Without any social status, without having to play the entertainer, clown, or fool, an author, well-hidden in the labyrinth of his mind or in his studio, could suddenly reach out to the world.

In making films, I dreaded the bombastic, public phase. As a shy, young man

I found everything associated with public rituals intimidating. My pleasure was to edit film. This intimate protocol of joining two parts to build a far higher meaning suited the temperament of the practicing poet I considered myself to be.

In video, I became an instant voyeur. When I made video feedback for the first time, I would step back, watch, and then quietly slip out of the room, knowing that the feedback was still there, that it was alive and improving itself each moment, and that it was getting more and more complex and robust. I understood the consequences this could have on the rest of my life. Even now, when I seed a bunch of dubious numbers into my computer, I watch the chaos unveil with the same fascination.

Video came so fast; it was so new. We all plunged into a frenzy of handling this hot new stuff called video. There were so many things to learn in a short time: this new picture material, so mysterious and seemingly untouchable, these frames, "drawn" and suspended by a magnetic force on the face of the cathode-ray tube. But there was much more to know: the nature of image elements; the waveforms, their unity and exchangeability with sound, their mutual affinities and interactions; the craft of forming waveforms into primitive aesthetic units, which would survive the critical scrutiny of art.

Analog video was just the beginning. By the mid-1970s, with the aid of the Digital Image Processor (built with Jeffrey Schier), I was peering into an entirely different, completely unfamiliar but even more intriguing window. The process of constructing a digitally organized screen is one of the most exciting experiences I can remember. I saw a linear array of numbers hidden somewhere in a computer come out orderly, constructing point by point a visual, cognitive, perceptual unit--a frame. This point-by-point progression of frame construction is accomplished by the mere addition of the number one. To start constructing the next line, the binary counter steps into the next numerical scheme. This goes forward again and again with the same assurance as the sun rising each morning.

Even more dramatic was the realization of the intrinsic duality of the code that creates the electronic frame. Not only do the counters transform computer memory into the territory of the screen, each carried an actual image property: the expression of point/image, the number representing brightness or color--a tiny part of the image itself. And that's not all. Deep in the heart of every computer there is the "legendary" CPU (Central Processing Unit). Through it, everything could be reorganized with infinitely changing strategies. The drama comes from watching each line being drawn, each frame as a narrative assembly. No wonder I was transfixed by this kind of television.

Paradoxically, it was this experience that became instrumental in terminating my interest in the image as frame. Although the convenience of a frame is used to pass on an iconic shorthand, I finally realized that the radically new is not in the invention of a new image or even in a new set of syntactic devices as I had expected, but in the form of a gift offered to us by the machine: a new and undefined representation of space.

Cinematic space operates on two opposite narrative vectors. If space is represented by a sphere, the first set of narrative vectors looks at the point in the very center of all possible angles. The other, the opposite set

of vectors, looks at the surface of this imaginary sphere from a center point on the inside--again, an infinite choice. For pragmatic reasons, cinema chooses a largely reduced set of vectors. The reduction of cinematic space is related to the strictures of practical access to all these locations by physical means, such as the constraints of horizontality and verticality of the environment, earth gravity, and other physical conditions of space. Above all, the limits of selecting the set of cinematic vectors depends on the implementation of concepts of psychologically dominant human viewpoints. Cinematic space thus represents a significant reduction of the potential exploitation of the available zones of all-directional space.

There is no convincing or practical method to transpose the filmic world of light and shadow into the world of the computer. It is indeed this generic incompatibility, this artificial condition, that is the subject of my interest. I see film becoming a dysfunctional and alien element in the new digital space. The primary concept of the new space is expressed by the continuity necessary to representing multidimensional image/objects. Once constructed, the scene becomes a subject of recall, held indefinitely in the computer memory with all its previous conditions intact, including the continuity of all surfaces equally significant and accessible from all directions. This is unlike film, where once the frame has been constructed and shot, space continuity is routinely discarded.

Furthermore, digital space has no generic method for looking at the world in the way that a camera does through its pinhole/lens apparatus. Digital space is constructed space, in which each component, aspect, concept, and surface must be defined mathematically. At the same time, the world inside a computer is but a model of reality as if seen through the eye of a synthetic camera, inseparable from the tradition of film. Yet, in this context, no viewpoint is ever discarded, the internal space is open to a continuous rearrangement, and access to a selection of views and narrative vectors are infinitely available, not only to the author, but also, with the use of certain strategies, to the viewer. Once the author constructs and organizes a digital space, the viewer can enter into a narrative relationship with it. A shot in film indicates a discrete viewpoint. Its narrative purpose is to eliminate other possible views. In contrast, the world in the computer contains the infinity of undivided space, undissected by the viewpoints of narrative progression. In the world of the machine, all sets of narrative vectors are offered in an equal, non-hierarchical way. The machine is indifferent to the psychological conditioning of a viewpoint. All coordinates of space are always present and available to the principles of selected observation.

The new space offered by the computer is a "noncentric" space with no coordinates. One must cross the threshold of the filmic or the electronic frame and fully enter this new space. As in the primordial forest, all directions are equally new, equally important and challenging. And in this forest, the event becomes the narrative drive. Is it the sign of danger that might have caught our attention? Is it the clue left by the predecessor on the forest floor? Is it the sound of the falling tree? Not all the events appeal just to our instincts. Inevitably we bring to the new space our cultural knowledge, our intellectual curiosity. Although the author will prescribe the event, more than ever we become partners in his play.

Theater of Hybrid Automata is a direct result of a discourse between my understanding of traditional cinematic space and a newly emerging digital space. To chart the first set of vectors, I built a camera head capable of being aimed at any location in the space from a fixed point. This elegant version of space exploration would have been a simple project for a computer. Instead, I entered a long and cumbersome period of constructing

this physical apparatus.

Again, I had no elegant solution to express the second set of vectors. Jeffrey Shaw brought a brilliant solution to my dilemma in a work titled Golden Calf (199) by using a hand-held monitor with a positional tracking device. By constructing an object completely in the computer memory (including the reflections of the environment on its surface), one can walk around this virtual object by holding a portable LCD screen, looking and observing the virtual version of the object. Through a positional tracking device attached to the computer, the screen becomes the medium between the object and the observer. Any change in the angle of the observer's screen will force the computer memory to reposition the virtual object on that screen. The real and the virtual are in mutual embrace. To me, this presented a clear demonstration of the second set of narrative vectors of cinema performed virtually and in action. These were clearly the opposite vectors to those of my looking-out device. This time I saw the space staring into a point.

The dual concept of the project of Theater of Hybrid Automata--the actual physical construction of space and its virtual representation through the computer--is performed in a strict positional interlock, so that any change in the physical is accompanied by a change in the virtual. The common engine of the computer gives the coordinates to both the physical space, as defined by the robotic devices, and the graphic representation of the 3-D world. For the first time in my work, the images provide a purely referential function. The prerecorded spatial icon represents a mere allegory of space, and the range of numbers are simply consequential symbols of incremental values. Like the voice reading the terrestrial alignments from the perimeter of the compass, the intent to tell the story by images is reduced to their function as indexes. They no longer compete for all-out dramatic attention. Perhaps then the liberated viewer has the opportunity to contemplate events suspended in a web of polytopic and polychronic narrative stratifications.

Hence, Theater of Hybrid Automata gave me a chance to reflect on several questions of space. First, there is the space continuum raging on without known limits. I have carved out from it a form of weather converting unit that I call my studio--a house with floor, walls, and roof. Inside I built the physical construction--the cube as an abstract, dramatic space. The lines of this construction are straight, linear, extraordinarily rational. Next, in my computer, I constructed a representational form of this local space in the form of a 3-D graphic spherical icon, rendered with a slightly transparent skin and with small referential objects inside (fig. 12).

Outside the cubic construction in the studio is the terrestrial world, bound to the surface of the globe and unable to escape the curvature of the earth. Beyond earth is true space, where nothing is linear, nothing horizontal or vertical. In space, there is no up or down, no roads, surfaces, tunnels, or narrative pathways, no shadow to shield the spirits.

The presentation of the installation in the shell of a gallery indicates the first level of localized Cartesian space. As the camera scans the targets, the words generated by the machine call out the names of the landmarks that surrounded the apparatus at its conception in the Southwest. In the next step of its performance, the machine addresses the extended terrestrial space by calling out the global markers of north, south, east, west. The third level evokes the confrontation of the experience of local and terrestrial space with a graphic representation of space in the moving 3-D graphic icon.

I see Theater of Hybrid Automata as an apparatus that is conscious of space. The basic cyclical ritual of the machine, the process of calibration is a phenomenon performed at each and every moment wherever a machine is to chart its future. Perhaps it is complimentary to our own human experience.

>From the moment of awakening, our mind begins the search for its identity, its alignment to time, the shape of a room, a street, a city. Finally, the way in which this assembly of objects, systems, and events behaves may help to trace some points of its original intent: to deconstruct, analyze, and describe the basic behavioral pattern of a techno-aesthetic system.

In the late 1980s I entered the world of interactive performances through experimentation with media on an interactive stage first realized in the design of a performance of Joan LaBarbara's Events in the Elsewhere (1990). It was in that experiment that the video/computer installation of the Theater of Hybrid Automata was first configured. I had experimented with interactivity in voice and vocalized commands using the MIDI (Musical Instrument Digital Interface) code. The MIDI code already carries the basic musical protocol, one that corresponds to the level of my need to control other media devices. An initial experimentation involved robotics and other media controlled by a MIDI code. Later I expanded this interface to a laser disc player.

I had intended to build a fully responsive permanent interactive environment, but instead I found my efforts centering around building a series of tables titled The Brotherhood (fig. 13). The interactivity in Table III is designed to involve the random visitor in the gallery. While I approached this piece with a broad mandate for risk-taking, in the end I limited all possibilities to a few safe options. In principle, the installation performs its preprogrammed audio/video cycle; the overall composition progresses as a single time line unless the audience intervenes. The visual concept is based on a single light beam, split and redirected to the six coordinates of a cube. At the walls of the imaginary cube, there are six translucent screens, allowing projection of the images on both sides of the screens.

In Table III the interactive laserdisc program is accessed via the audio component, either through a microphone or a drum pad. The MIDI code, extracted from the pitch of the voice, searches a location on the laserdisc. It just so happens that the human voice contains a wealth of musical overtones, and the device is more than happy to interpret them on a tonal register and to activate "jumps" in the laserdisc sequence. The other audio channel is a sensor monitoring the intensity of the drum beat. The assignment is linear--the softer the beat, the slower the laserdisc images, the harder the beat, the faster the images move. A third sensor detects the presence of people in the space. If nothing moves in the environment for a while, the installation goes to "sleep."

As could be expected, the audience splits into two main categories: those who are active, interested in probing the installation, and those who observe, hesitant to join in. The core of active participants are drawn to playing the drum, paying little attention to the change in image they have produced. The microphone seems more intimidating. Loudness seems to be preferred, and usually the participation escalates to a frenzy, followed by an abrupt departure.

For me, the benefit of the interactivity goes to the true voyeurs who are detached from the situation and observing. Here is the moment of reflection, impossible to experience while engaged. But what did I expect from the audience? I have come to realize that I do not fully trust my audience. I do not give them the tool and power of composition--I only allow them intervention. In fact, I recall watching the scene with a great deal of resentment at how my work's "whole" was being chopped into meaningless parcels.

On the other hand, the pictorial and acoustical material of Table III is abrupt and violent in nature. The continuous and aggressive motion forward is designed deliberately to place the viewer in the seat of the projectile.

I purposefully stripped all possible associations with a narrative, encouraging the audience to intervene at will and to pursue suggestions made by the author to play the violence of *The Brotherhood*.

In both *Theater of Hybrid Automata* and *The Brotherhood*, I attempt to transform a cubical Cartesian space into a dramatic space (fig. 14). In performance, the machine and the sensors under its internal communication protocol represent the first stage of a narrative probe. There could be many steps between these models and their transformation into the fully realized concept of an electronic stage.

To convincingly operate such a dramatic space, a certain amount of expressive elements capable of monitoring, evoking, or activating events in a dramatic space must be present. They must be capable of interrogating or reporting on the status and changes in the space, correcting and navigating trajectories of gestures and other events, and initiating changes in space. The success of operating such a space depends upon certain qualities of the sensorial matrix--its density, its ability to discriminate the spatial coordinates, and on the update of rapid time/samples to achieve the necessary dynamic resolution.

This new space offers a non-centric space with no known coordinates. Accordingly, no singular narrative pathway is feasible. The author is like an ancient guide with his instincts and worn-out charts, yet no more secure and surefooted than the viewer.

At least one aspect of thinking about the new space and the role of the gallery has come under revision in my mind. It is becoming clear that the real world has become hostile to any notion of utopian experimentation. The dream of the moderns, to abolish the shrines of art and finally art itself, has moved closer to an absurd reality, though for an entirely different set of reasons. One may say the current state far exceeds the dangers of the bourgeois. But even now, when I contemplate my allegiance with the gallery, am I able to utter my sincere apology? My social code is hopelessly arrested, without evolution or the constant vigor of revisions and contemplation. Somehow I have trusted the dynamics of time, and have believed in the adventure of technology as an automatic and purifying process in itself.

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Violin Power by Steina.

1970-78, 10:04 min, b&w, sound.

Steina terms this procedural work "a demo tape on how to play video on the violin." Her background as a violinist and her evolution from musician to visual artist is referenced through an analogy of video camera to musical instrument. Steina is first seen in footage from the early 1970s, playing the violin and singing to The Beatles' Let It Be. As succeeding segments trace a chronological progression, Steina layers imagery and time. The violin itself ultimately becomes an image-generating tool, as she connects it to imaging devices, creating abstract visual transpositions of sounds and vibrations. This unconventional self-portrait is a study of the relationship of music to electronic image.

Steina: Selected Works

by Steina.

Bad 1979, 2:14 min.

Urban Epicodes 1980, 8:50 min. Optical Instrumentation: Josef Krames. Produced by KTCA-TV, Minneapolis.

Summer Salt 1982, 18:48 min. (Sky High 2:42 min; Low Ride 2:5g min; Somersault 5:14 min; Rest 2:16 min; Photographic Memory 5:10 min.)

Total program: 1979-82, 29:52 min, color, sound.

Steina's works from the late 1970s and early 1980s are exercises in the phenomenology of vision and the redefinition of space and landscape, as articulated through mechanized, optical and electronic devices. Bad is a technical exploration of several commands in the Vasulkas' Buffer Oriented Digital Device, which controls digital imaging functions such as up/down and right/left movement, as well as the stretching and squeezing of the image. Steina uses her own face as visual material, rhythmically dismantling and reconstructing her self-image. Urban Episodes is a striking phenomenological study in an urban landscape, an exhilarating restructuring of physical space that defies expected modes of seeing and the laws of gravity and reflection. In a public plaza in Minneapolis, Steina set up a motorized, rotating Machine Vision device, which includes mirrors and two cameras that pan, tilt and zoom. Summer Salt is a dramatic exploration of the phenomenology of space and vision, as Steina uses mechanical and electronic devices to physically investigate the Southwestern landscape. This artificial vision allows the viewer altered perceptions and spatial perspectives. The five segments include dynamic exercises with Steina's mirrored globe, the physicality of unexpected camera placement, and electronic manipulation of the textures and colors of the landscape.

Selected Treecuts by Steina . 1980, 8:11 min, color, sound.

Selected Treecuts is a formal examination of the distinction between camera-generated and digital images, and a layered juxtaposition of contrasting representations of reality. The methodology of the tape is simple: a zoom lens moves slowly in and out on a group of trees, alternating between digitized and camera-generated, "real" images. The movement in the tape is produced by the automated zoom lens and rotating prism; the images switch rhythmically between camera images and digital images held briefly in computer memory. The contrast between the "real" camera images of trees and the frozen, digital computer images forms an essay in motion and stillness, the organic and the synthetic, tracing a trajectory from the photographic to the electronic.

Cantaloup by Steina in cooperation with Jeffrey Schier and Woody Vasulka

A production of the TV Lab at WNET/Thirteen. 1980, 27:54 min, b/w and color, sound.

Cantaloup is an informal documentary on the Vasulkas' Digital Image Articulator, a sophisticated imaging device they designed with Jeffrey Schier. Using a cantaloup and the three artist/designers as image material, Steina explains the capabilities of the machine, including its real-time imaging ability and the articulation of

images ill a digital code. She describes the varying sizes of pixels (picture elements), the layers (or slices) of color and tone that can be derived from one image, and techniques such as "grabbing" the image and multiplying it. This document offers a highly informative, spontaneous demonstration of a complex imaging device.

Voice Windows by Steina in collaboration with Joan La Barbara. \Music: Joan La Barbara, 1986, 8:10 min, color, stereo sound.

Sound, as visually manifested through electronic imaging, becomes a spatial component in this exquisitely rendered confluence of landscape, music and digital manipulation. Singer/composer Joan La Barbara performs a series of voice chants and intonations, creating energized patterns on a grid of horizontal lines, that recalls a musical scale. This animated line pattern, vibrating and dancing to the energy generated by La Barbara's voice, is inscribed onto moving imagery of the Southwest landscape. Through electronic imaging, the energized patterns themselves act as "windows" that reveal yet another layer of landscape imagery, creating intricate fields of illusory spatial transformations.

Lilith by Steina in collaboration with Doris Cross. 1987, 9:12 min, color, stereo sound.

In Lilith - a name that evokes biblical and mystical references - Steina alters and manipulates the face of a woman (painter Doris Cross) so that it is submerged within a natural and technological landscape. Employing the imaging techniques of focal plane shift (altering the depth of field) and frame "grabbing" (a succession of frozen images), she creates a constantly shifting visual field in which an image appears to exist in a constant flux of temporal and spatial planes. The woman's electronically distorted speech adds a further haunting dimension to this almost sculptural fusion of human figure and landscape.

Home by Steina and Woody Vasulka. Dual Colorizer: Eric Siegel. Video Sequencer/Video Keyer: George Brown. Line-locked Strobe: Steve Rutt. 1973, 16:47 min, color, sound.

Home is an early experiment in which the Vasulkas transform ordinary household objects through analog imaging devices. With humor and a sense of spontaneous discovery, they animate everyday objects through the application of electronic effects, which serve as a primer of early imaging techniques: horizontal drift of layered image planes, colorizing, keying. Apples, shoes, bottles, teapots come to life in surreal tableaux that suggest psychedelic Magritte paintings, as the Vasulkas transform still lifes through the inner dynamic of electronic image processing.

Golden Voyage by Steina and Woody Vasulka. 6 Input Keyer-Mixer/Gen-Lock System: George Brown. Dual Colorizer: Eric Siegel. 1973, 27:36 min, color, sound.

In this early work, an electronic homage to Magritte, the Vasulkas demonstrate fundamental imaging techniques. Inspired by Magritte's painting *The Golden Legend*, this exercise employs a three-camera set-up, with images layered through a multikeyer, to create the illusion of objects moving through spatial planes. Loaves of French bread embark on a surreal video journey through electronic landscapes, finally arriving in an abstract space. The spectacle of the animated loaves adds a playful spontaneity to this early articulation of illusory space and three-dimensionality in video.

Steina and Woody Vasulka: Selected Works I by Steina and Woody Vasulka.

Solo For 3 4:15 min. Programmer/Multikeyer/

H.D. Variable Clock: George Brown. Dual Colorizer: Eric Siegel.

Reminiscence 4:48 min. Scan Processor: Rutt/Etra. Colorizer: Eric Siegel.

Soundgated Images 9:22 min. Programmer/Multikeyer/

H.D. Variable Clock: George Brown. Waveform Generators: Steven Rutt. Scan Processor: Rutt/Etra. Dual Colorizer: Eric Siegel.

Noisefields 12:05 min. Sequencer/Multikeyer: George Brown. Dual Colorizer: Eric Siegel.

Total program: 1974, 30:30 min, color, sound.

This program presents the Vasulkas' early formal experimentations with analog image processing and their investigations of multiple camera set-ups and keyers to articulate spatial, temporal and sound/image manipulation. Solo For 3 is a didactic yet playful exercise in which three cameras were trained on three different images of the number three. Image planes are layered, arranged and sequenced; the result is a multifaceted choreography of numbers. Reminiscence is an otherworldly record of a Portapak walk through a farmhouse in Moravia, the site of Woody Vasulka's youth, as seen through the transformative effects of the Rutt/Etra Scan Processor, Images become eerily sculptural, fading in and out of abstraction, as if in evocation of memory. Soundgated Images is an early example of the Vasulkas' ongoing explorations of interfacing modes of simultaneously generated sound and image, in which abstract, processed images are transposed as electronic sounds, Noisefields is an important example of these early experiments, a visualization of the materiality of the electronic signal and its energy. Colorized video noise (or snow) is keyed through a circle, producing a rich static sound that is modulated by the energy content of the video.

Steina and Woody Vasulka: Selected Works II
by Steina and Woody Vasulka.

Heraldic View 4:21 min. Multikeyer: George Brown. Waveform Generators: Steven Rutt. Dual Colorizer: Eric Siegel.

1-2-3-4

7:46 min. Programmer/Multikeyer/

H.D. Variable Clock: George Brown. Dual Colorizer: Eric Siegel.

Soundsizes 4:40 min. Scan Processor: Rutt/Etra.

Telc 5:10 min. Scan Processor: Rutt/Etra. Colorizer: Eric Siegel. Total program: 1974, 21 :57 min, color, sound.

Here the Vasulkas continue to develop the imaging potential of artist-designed electronic devices, as they formally analyze and deconstruct the inherent materiality of video.

In Heraldic View, an oscillator-generated pattern drifts over a camera image of bricks and stone, the patterns modulated by sharp bursts of voltage generated by an audio synthesizer. 1-2-3-4 is an exercise in animating numbers, using four cameras and a multikeyer to re-order and layer the image planes. Soundsizes continues the Vasulkas' investigation into the relationship of sound and image. Here a pattern of dots is modulated by sounds generated from a synthesizer, changing size and shape in a visual manifestation of electronic sound. In Telc, a Rutt/Etra Scan Processor is used to transform portapak images from a trip to a town in Southern Bohemia. Like faded memories, images of the landscape and people are sculpted and abstracted, as the energy of the image is translated into electronic scan lines.

Progeny and In Search of the Castle by Steina and Woody Vasulka,

Progeny 18:28 min. In collaboration with Bradford Smith.

In Search of the Castle 9:29 min.

Total program: 1981, 27:57 min, color, sound.

In these two works, the Vasulkas employ imaging tools to transform physical space and alter perception. Progeny is a collaboration with sculptor Bradford Smith. Smith's organic and sensual sculptural forms are transformed by the merging of one of Steina's Machine Vision devices - a rotating, mirrored sphere with pre-programmed camera movements and optical transpositions - with Woody's digital processing. In Search of the Castle is a journey of personal, perceptual and technical transformations. Driving from a city through

Southwestern landscapes, taping through Steina's mirrored globe, the Vasulkas develop the central metaphor of a search. This work traces their odyssey from naturalistic to increasingly complex, image-processed landscapes, until they arrive at an abstract electronic environment, a synthetic space transformed by technology.

In the Land of the Elevator Girls

by Steina and Woody Vasulka. Assistance: Hirofumi Mora, Japan-United States Friendship Commission. Produced by IMATCO/ATANOR for Televislon Espanola S.A, E1 Arte del Video. 1989, 4 min, color, stereo sound.

In the Land of the Elevator Girls uses the elevator as a metaphorical vehicle to reveal an outsider's gaze into contemporary Japanese culture. The continual opening and closing of elevator doors serves as a succinct formal device, as the viewer is offered brief glimpses of a series of landscapes - natural, urban, cultural and domestic. Doors open onto doors to reveal layers of public and private vision, transporting the viewer from theatrical performances and street scenes to an elevator surveillance camera's recording of everyday life.

Woody Vasulka: Selected Works by Woody Vasulka.

Vocabulary 1973, 4:17 min, stereo sound. Multikeyer: George Brown. Scan Processor: Rutt/Etra. Dual Colorizer: Eric Siegel.

The Matter 1974, 3:56 min, sound. Scan Processor: Rutt/Etra. Multikeyer: George Brown.

C-Trend 1974, 9:03 min, stereo sound. Multikeyer/H.D. Variable Clock: George Brown. Scan Processor: Rutt/Etra. Dual Colorizer: Eric Siegel.

Explanation 1974, 11 :45 min, sound. Multikeyer: George Brown. Dual Colorizer: Eric Siegel. Scan Processor: Rutt/Etra.

Total program: 1973-74, 29:01 min, color, mono and stereo sound.

This program of early works includes didactic explanations of Vasulka's image-making tools, and also charts his development of a grammar of these imaging techniques. Vocabulary is "designed to convey in a didactic form the basic energy laws in electronic imaging." Here a hand, as a metaphor for expression and gesture, and a sphere that symbolizes form, are processed with a keyer, colorizer and scan processor. The Matter, C-Trend, and Explanation are methodical, didactic works that deconstruct the essential elements of electronic imaging and then attempt to construct a syntax from those elements. In The Matter, a generated dot pattern is re-sculpted into myriad three-dimensional forms and shapes by waveforms, which also generate sound. In C-Trend, a view of traffic shot from a window is transformed and sculpted into permutations of abstract, three-dimensional forms. Explanation is a computer-generated cross-hatch of lines that becomes three-dimensional, defining shapes in a synthetic landscape of gradually shifting image position and size.

Artifacts by Woody Vasulka. 1980, 21:20 min, b/w and color, sound. Artifacts is a didactic demonstration of the syntax and vocabulary of the digital image, via the electronic capabilities of the Digital Image Articulator. Vasulka's intent is to create a dialogue, a symbiotic relationship between artist and machine. "By artifacts," he states, "I mean that I have to share the creative process with the machine. It is responsible for too many elements in this work. These images come to you as they came to me - in a spirit of exploration." Initiated by basic algorithmical procedures, the images coalesce to form an overall conception of the electronic vocabulary made possible by this technology. Vasulka works with a spherical shape and, in an ironic reference to the "hand of the artist," studies his hand as transformed by the Imager.

The Commission by Woody Vasulka. Camera: Steina. With: Robert Ashley, Ernest Gusella, Cosimo Corsano, Ben Harris, Andrea Harris, David Ossman. Set Design: Bradford Smith. Editor: Peter Kirby. Audio Mix: Baird Banner. Vocoder: Harald Bode. Scan Processor: Rutt/Etra. Dfgital Articulator: Jeffrey Schier. 1983, 44:55 min, color, stereo sound.

Applying his electronic imaging codes to narrative in *The Commission*, Vasulka develops a metaphorical image language to envision an epic electronic opera. The text, which is based on the relationship of violinist Niccolò Paganini (played by video artist Ernest Gusella) and composer Hector Berlioz (composer/performer Robert Ashley), confronts myths of Romanticism, history and art-making. Constructing a fantastic video theater, Vasulka stages a narrative of transformation, an intricately crafted blend of figuration and abstraction, in which imaging techniques serve as expressive visual syntax. Specific video effects are assigned interpretive meaning; reframed images proliferate within images in re-compositions that propel the narrative progression. *The Commission* is a pivotal work in the articulation of narrative strategies through all electronic image language.

Art of Memory by Woody Vasulka. With: Daniel Nagrin, Klein. Voices: Doris Cross. Videotools: Rutt/Etra,

Jeffrey Schier. Collaboration: Bradford Smith, Penelope Place, Steina, David Aubrey. 1987, 36 min, color, stereo sound.

Art of Memory is one of the major works in video, an astonishingly original and mature articulation of Vasulka's inquiry into the meaning of recorded images. Constructing a haunted theater of memory from a spectacle of filmic and electronic images, Vasulka collapses and transforms collective memory and history in an enigmatic space and time. The monumental landscape of the American Southwest is the mythic site onto which he inscribes newsreel footage of war - ghostly images that become malleable, sculptural forms through constant electronic transmutations. In this metaphorical vision, the recorded image becomes a monument to the past; history becomes cultural memory through photography and cinema. Vasulka locates the trauma of 20th-century history in filmic images of violent events, including the Spanish Civil War, the Russian Revolution, World War II and the advent of the nuclear bomb. Presided over by a winged creature of conscience, history and memory are seen to be manipulated by the history and memory of images. In a breathtaking conjunction of the apparatuses of war, history and the media, Vasulka achieves a poignant, ultimately tragic memory theater.

Videotapes

Violin Power, 1970-78
Steina

Violin Power is Steina's "demo tape on how to play video on the violin," a serious joke on the relationship of the video camera to musical instrumentation. This videotape operates as both an autobiographical tracing of Steina's replacement of the violin with the video camera as her primary instrument and as a systematic exploration of the relationship of electronic sound and image. The "power" of the violin is its capacity, when electronically wired, to alter and generate video imagery--to co- create, in effect, Steina's electronic images.

Violin Power begins with Steina's well-known, macro view of herself lipsyncing The Beatle's song "Let It Be," a humorous homage to the power of rock music that predates more recent popular forms of lipsync performance. Steina plays her violin while rewiring it through a series of electronic devices that directly change the video signal through signal disruption, video keying, and the Rutt/Etra Scan Processor. The movement of her violin bow across the strings of the instrument disrupts and transposes the video image, causing the violin bow to squiggle and snake into interlocking forms. The alliance of sound and image in the electronic signal allows the audio vibrations of the violin to create image disruptions. The violin is thus a means through which electronic sound can be spatialized to create an image performance. In the beginning of the tape, in 1970, Steina is experimenting with the new tools of video; by its end, in 1978, she is reorchestrating the electronic space of sound with kinetic force and exposing the essential materiality of the electronic signal.

Orbital Obsessions, 1975-77, reedited 1988
Steina

Steina's Machine Vision project, which she pursued throughout the 1970s, is an investigation into the capacity of electronic machines to reorchestrate space. In the mid-1970s, she produced a series of videotapes that combine mechanical and electronic elements to rethink the video camera's relationship to space. In these works, her image material is her equipment-filled studio in Buffalo, New York. Orbital Obsessions combines excerpts from Signifying Nothing (1975), Sound and Fury (1975), Switch! Monitor! Drift! (1976), and Snowed Tapes (1977) to present an accelerated view, so to speak, of the development of Machine Vision.

The elements of Orbital Obsessions are both self-evident and densely layered, presented in a casual style that almost mask a rigorous refiguring of space. Steina begins by placing the video camera on a turntable and then walks through a series of process each of which take the image further from its original static frame. Several camera scan each other, keying devices layer images, and a Flip/Flop Switcher rapidly switches between two camera views. Throughout these works, Steina places her body as image material within the frame, leaning into the camera, swaying back and forth, and moving in a quasi-choreography of image space. These Machine Vision videotapes thus constitute "acts" in a process to rethink electronic time and space. In each, the real-time aspect of the tape creates an experience for the viewer of phenomenological time--the viewer learns at the same pace as Steina how each added device will further complicate the image. The obsessions of Orbital Obsessions are its preoccupations with the circularity of the video camera's orbit of vision and the means by which the mechanical can inform and enhance electronic media.

Artifacts, 1980
Woody Vasulka

Artifacts is both a document of the capacities of Woody's Digital Image Articulator, a device which he designed in the late 1970s with Jeffrey Schier, and an aesthetic interpretation of the potentials of digital image language. Woody presents the work as evidence of his collaborative relationship with the machine. "By artifacts," he states in the videotape, "I mean that I have to share the creative process with the machine. It is responsible for too many elements in this work. These images come to you as they came to me--in a spirit of exploration."

The image forms generated by the Digital Image Articulator are based, like all digital images, on basic algorithmical procedures that transpose visual elements into mathematical components. Woody demonstrates the capacities of digital imaging in an eclectic and informal fashion, using a spherical shape and his hand as basic "artifacts" that the image device converts into compellingly alive digital forms. These transformations are performed in "real time," so that the viewer sees the image created in a performative mode rather than as the final product of a hidden image process (such as those of commercial computer special effects). This is a primary element in Woody's "dialogue with the machine," that the image itself reveals the process of its construction. Artifacts marks the Vasulkas' collective step into digital imaging and examinations of the relationship of the analog and digital image. With the image of Woody's hand as its primary motif, it is a work that reflects on the history of craftsmanship and the human hand a source of creativity, one that moulds, in tandem with the digital machine, the forms of electronic space.

Summer Salt, 1982
Steina

Summer Salt marks for Steina a continuing exploration of the phenomenology of space, yet with a shift in image material. Here, Steina transposes her explorations of Machine Vision from her studio to the landscape of New Mexico, to her backyard's realm of earth and sky. Summer Salt is emblematic of her melding of self-humor and physical jokes with systematic reconfigurings of the physical within the electronic. This work is an exploration of physicality--the body within the camera frame, the actual body of the camera itself, and the physicality of material space within the spheres of electronic space.

Each section of the videotape builds upon the previous one to create an increasingly multifaceted sense of spatial dimensions. In Sky High, the camera is attached to the roof of a moving car with a mirrored lens that creates a 360-degree "distortion" of the New Mexican sky, curved into a spherical merging of landscape and horizon. Low Ride takes the camera to the opposite extreme, with it strapped to the front bumper of the car as it drives through desert bush. The bumping, scraping, and scratching of the camera on the prickly desert plants and sandy dirt exposes the body of the camera itself, with its built-in microphone, banging into its subject matter--an aspect of camera-generated images that is usually hidden from the image. In Somersault, Steina playfully does gymnastics with her camera and its mirrored lens attachment as a means of producing a 360-degree image of a torso wrapped around the camera lens. As she spins the camera and bounces off her hips in a humorous joke on the material nature of the camera, a kind of slapstick exercise on the notion of the camera as an extension of the body. Rest allows the camera to rest in a hammock,

exhausted, in effect, from its physical exertions, as Steina uses digital effects to refigure the surrounding trees. Finally, in Photographic Memory, seasonal landscapes are interwoven, shifted, pixilated, and layered in sequences that insist on the tension between moving and still image. Summer Salt thus traces Steina's merging of analog and digital tools, and her project to strip the camera down to its essential physical nature.

The Commission, 1983
Woody Vasulka

A prototype for the new form of "electronic opera," The Commission represents the capacity of electronic media to create narrative form through visual codes and digital effects. Woody's purpose in this work is dualistic: to use digital processes to produce a vocabulary of electronic language, and to examine the mythologies that infuse the role of the artist. He chose the rivalrous relationship of two musicians, Hector Berlioz and Niccolo Paganini, as his romantic and tragic subject. The story centers on a commission a patron wanted Paganini to present to his rival Berlioz. Paganini, whose role is interpreted by video artist Ernest Gusella, represents the flamboyant yet destitute artistic genius, a pariah rejected by the church, whereas Berlioz, interpreted by performer/composer Robert Ashley, is pompous and detached, the artist as ego.

Yet, Woody's central purpose is not to tell this story but to examine how narrative elements can be visualized through digital media. He wants to subvert narrative into anti-narrative strategies, to expose its framework. In each of the tape's eleven segments a different effect is deployed for specific narrative meaning: the echoes of Paganini's music are depicted in pixilated digital shadowings, a flip/flop device creates tension as Paganini passes the commission to Berlioz by rapidly switching between views of each, and the Rutt/Etra scan processor gives a skeletal effect to Paganini's corpse as it is embalmed.

The Commission thus provides evidence of a language of electronic image codes, one for which Woody has spent years working to formulate a "vocabulary." The primary story it tells is an image journey, a mapping of the potential of the digital image, through which the ephemeral, the emotional, and the peripheral can be evoked.

Voice Windows, 1986
Steina in collaboration with Joan La Barbara

Voice Windows builds on Steina's earlier works, such as Violin Power, as an investigation into the essential relationship of electronic imaging to the space of sound. The voice of avant-garde musician Joan La Barbara forms the videotape's guiding image device in a work that aims to visualize the physicality of the human voice. Here, La Barbara's voice creates a "window" from one landscape, the open desert, to another, the city of Santa Fe. This process builds throughout the tape, beginning with a simple grid of musical scales that offers glimpses onto a landscape with every note sung by La Barbara and moving into more complex layerings. As La Barbara sings, hums, chirps, chants, and blurts notes in a form of half-song almost-speech, her voice is the device that interfaces landscapes, distorts shapes, and creates new forms. Voice Windows reveals the capacity of sound to reconfigure image and the malleability of the electronic signal as image/sound. This work demonstrates the fundamental alliance of sound and image in electronic media, both derived from the electronic signal and symbiotically each a part of the other. Here, "voice" and its expression of aliveness represents the capacity to reshape geography and to move into new spaces unconfined by

material forms.

Art of Memory, 1987
Woody Vasulka

Art of Memory is both a reflection on the discourse of history and the fragmentary experience of memory and an exploration of the potential of the electronic image to become an object and depart from the two-dimensional video screen. This compelling work, which is comprised of image forms that radically redefine the electronic image, is concerned with both historical upheaval and the transposition of the photographic and cinematic into the electronic.

The subject of Art of Memory is the catastrophic events through which 20th-century history has been defined--the Spanish Civil War, the Russian Revolution, World War II, the nuclear bomb--and, by extension, the images of those events that have formed a public memory. Woody creates three-dimensional digital forms through which these images of history are transformed until they can only be read as elements in the cacaphony of history and memory, as shredded bits of time. He places these forms within electronic images of Southwestern landscapes, enveloping yet not swallowing the images of the past. Art of Memory reflects on the fragmentary yet powerful capacity of memory to resurge, to present the voices and images of the past in new media with new meanings, and to reconfigure the present. Images of the past haunt this work, speaking to the legacies of these violent and cataclysmic events. Art of Memory foregrounds the role of the camera in creating history and the capacity of electronic media in building upon and finally usurping the phenomenology of the media which preceded it.

Lilith, 1987
Steina in collaboration with Doris Cross

The landscape of the human face and the mythical status of earthly forms and their spiritual shadows provides the impetus for Lilith. Here, Steina treats the face of painter Doris Cross as a canvas onto and through which a forested scene is realized. Lilith is a mythical figure, whose many roles and meanings are evoked in Cross's strange gestures and expressions. Lilith is the first wife of Adam, a witch or menacing female figure, and a goddess figure with mythical powers. In Lilith, Steina is clearly paying tribute to the complexity of the aging female face, its lines and expressions indicating experience and knowledge.

At the same time, Lilith can be situated within Steina's tradition of rethinking landscape and reconfiguring space. She deploys an array of analog techniques to merge Cross's face with the landscape, to key it into and within its surroundings so that it too is a field onto which image elements are mapped. Cross's haunting, slowed speech, which Steina manipulates into abrupt half-sounds and guttural utterances, evokes a primordial presence of figures through the ages. The Lilith in this work is finally a figure of enigma and wisdom, difficult to read yet commanding attention in her merging of earth and human form.

In the Land of the Elevator Girls, 1989
Steina

In the Land of the Elevator Girls is a travelogue through the land of electronic imaging in which geographies can be transcended and the images of electronic media offer glimpses into other, possible worlds. Steina takes as her first level of subject matter the urbanscape of Tokyo, where young

women, known as "elevator girls," offer introductions to the various floors of elaborate department stores. As they announce polite phrases of greeting and departure, the elevator doors open first upon crowds of shoppers, and then through Steina's imaging upon landscapes of Japan, performance rituals, and urban scenes. Thus, at the moment when an elevator girl announces an arrival and the doors open upon a steaming volcanic landscape, the viewer is unexpectedly transported through the doors into another geographic realm.

The elevator doors, in both video image and digital remake, are the means through which the viewer and Steina, as outsiders, are allowed to catch glimpses of the rituals of Japanese culture, from time-honored traditions, such as sweeping a rock garden, to more recent techno-rituals, such as a virtual reality demonstration. A primary subtext of the tape is the fact that elevators are now automated, hence the elevator girls remain intact not through necessity but as a vestige of cultural norms in which the transition from one space to another is announced and accompanied. This threshold, marked by Steina through the motif of opening and closing doors, represents the movement not only between cultures but from analog to digital space, from inside to outside, and from commercial urbanscape to rural landscape. While offering a sense of the role played by the foreigner peering in at Japanese culture, *In the Land of the Elevator Girls* is primarily a visual enactment of the passage from one world to another.

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**Steina and Woody Vasulka:
In Dialogue With the Machine**

Marita Sturken

Machines have been commonly regarded as antithetical to the spontaneity and originality of the creative process. Deep ambivalence pervades cultural attitudes toward the machine, and Western cultures often portray the late twentieth century as an era of technoculture in which the human condition is mediated only through machines. Hence, the machine figures significantly in the collective imagination, prompting various questions: Do machines enable a creative process or limit and structure human integrity? Are computers replicas of human thinking or crude versions of creative thought?

The machine has often been a central and controversial subject in the history of art in the twentieth century. For modernists, the machine was a source of aesthetic pleasure, testimony to the seductive narrative of progress and the beauty and tactility of the mechanical. The mechanical machine was modelled after the human body, its various components assigned roles as specific organs and limbs in an effort to mimic the efficiency of the human model. The mechanical machine defined the future.

In the 1960s, the use by artists of electronic tools in the production of art pushed cultural attitudes of the relationship of technology and art into new territory. Electronic technology raised concerns about authorship, artistic integrity, and the "taint" of mass culture. In the late twentieth century,

proclamations about both the promise of technology in its increasingly global reach and concerns about its potential to increase alienation are reiterated with little understanding that they reflect time-worn ways of thinking about the question of technology. The notion of a thinking or artistic machine troubles entrenched cultural oppositions of technology vs. art and technology vs. nature, precisely because the concept of machine agency forces a rethinking of human agency itself.

For Steina and Woody Vasulka, the creative process represents a "dialogue with the machine," in which they are not masters of a tool but interpreters of its capabilities. Woody has said, "I have to share the creative process with the machine. It is responsible for too many elements in this work."¹ The Vasulkas' work can be positioned at the juncture of the mechanical and the electronic machine, posing crucial questions about the capacities of machines, the language of electronic syntax, the phenomenology of visual media, and the spatio-temporal dimensions of electronic space.

In the multi-monitor installations and single-channel videotapes that they have produced collaboratively and as individual artists for twenty-five years, the Vasulkas have systematically pursued two allied projects: an investigation of the agency of the machine and a phenomenological project of mapping the intrinsic properties of electronic media as they affect the viewer. Their work stands not only at the juncture of the mechanical and the electronic, but also between modernism and postmodernism. One could define it as a modernist project--to

define the aesthetic language of a specific media and to distinguish the properties of those media in relationship to other systems of visual representation. Yet, in their continuing investigations into the tenuous nature of authorship in relationship to the machine, their work can also be seen as a postmodern questioning.

While they have worked collaboratively as an artistic team, the Vasulkas have produced two very unique bodies of work with separate though allied agendas. Their interests in electronic media began with different perspectives. As a former filmmaker, Woody was initially driven to deconstruct electronic media in order to distinguish it from the codes of narrative cinema. His work has evolved from an interest in electronic language and image vocabularies, to a project of understanding the relationship of the image to the object, and now to a concern with the protocol of machines--how machines interact among themselves without human contact. As a violinist, Steina began by treating the mechanisms of the camera as an instrument, a tool through which movement and spatial relationships could be examined. Her work has focused on reorchestrating space and landscape and translating to video the movement of natural processes.

The Vasulkas can both be situated as artists whose vision of the potential of electronic media was molded at a very particular moment in the relationship of art and technology. In the "utopic moment" of video's emergence as an artistic form in the late 1960s, cultural, social, and political unrest converged in the

United States in such a way that social structures appeared mutable and artistic rules were defied.² As recent immigrants to the United States in this historical period, the Vasulkas saw the emergence of the video form as a radical means to rethink previously-held truths about language form, the photographic real, the structure of narrative, and the role of the machine.

While this was a time of artistic and social upheaval, it was also a time of intense grass-roots technological activity and utopian notions of the possibility of refiguring the power relations of technology. The Vasulkas worked with a community of engineers and artist-engineers, such as Eric Siegel, George Brown, Steve Rutt, and Bill Etra, among others, to design tools that could "open the box" of technology and that were as much about redefining the designer-user relationship as they were about experimenting with the potential of media outside of the limitations of commercial devices. It is testimony to the power of that historical juncture that the Vasulkas' work has never lost its ability to convey a sense of possibility in its exploration of the electronic machine.

Video and the Legacy of Cinema

Unlike most other video practitioners, Woody began his investigations into video through confronting its formal differences from film. The specter of cinema looms over considerations of video's phenomenology as a medium. Video inherited from film certain codes of moving images: camera movement, editing techniques of montage and decoupage, and the

frame. However, the electronic nature of the video medium irrevocably distinguishes it from the photographic nature of cinema. Woody states, "Each medium of the future will play host to the phenomenology of the moving image, which will live through that medium to the next medium, accumulating the language of each."³ Nevertheless, as viewers we bring deeply embedded and very different cultural associations to film and video. Despite its role in producing "historical" images, the electronic image is often coded as the immediate, instantly transmitted, live television image, and the cinematic image, especially in black-and-white film, is coded as history. In the videotape Art of Memory (1987), Woody poses this distinction when he places black-and-white photographs and films of the Spanish civil war and World War II against a video tableau of the Southwestern landscape. Here, the framing video image marks the archival film image as a relic of history, a fragment of the past contained within the present.

In their early experiments with video, the Vasulkas were interested in manipulating the electronic signal without actually generating camera images. In this way, they felt they could explore the properties of video apart from the legacy of photography and film. This meant, above all, focusing on the electronic signal, its rendering in both sound and image, and its malleability. Many of these early experiments involved playing images across banks of monitors, in both a casual engagement with the aesthetics of multi-monitor matrixes as well as an early interest in the capacity of the video image to travel out of the

monitor frame and across an array of screens. The Vasulkas felt that the fact that image and sound in video were inseparable (whereas in cinema they are recorded separately and only combined in the final print) offered an important aesthetic and technological break with the past. They produced a number of works in which both images and sounds were derived purely from the machine. Matrix (1970-72) exemplifies these early experiments in which shapes and forms metamorphose across multiple screens as a means of depicting sound travelling through geometric space to our ear. Here, the Vasulkas realize sound visually by interpreting its movement. The matrixes serve to redefine the video frame by extending the image across its perceived boundaries and to realize fully the electronic alliance of sound and image.

The examination of the video frame has been a central aspect of Woody's project to distinguish film and video. The cinematic image is constructed of individual still frames that are recorded and projected at the speed of twenty-four frames per second. Whereas film is rigidly structured on the frame, the video image is not technically confined within the frame. For Woody, the video frame must be released from the rectangular frame of the viewfinder:

I recognize video as frame-bound and frame-unbound. In frame-bound video, you're basically following the cinematic reliance on the frame. Cinema can't leave the frame unless it makes a special effort. But with the new generation of tools in digital video, it is possible to remove the image from the frame and treat it as an object.⁴

The frame-unbound video image can appear to lift off the video screen and can be reshaped into an object like the archival images in Art of Memory. It is thus divorced from its photographically-defined role as a depiction of reality.

Woody notes that the film frame is essentially vertical, while the video frame is horizontal. One of the Vasulkas' first experiments with the video image was to release the video frame from its standard position and allow it to drift horizontally--a technique they call "horizontal drift." Their early videotape Evolution (1970) humorously uses horizontal drift to comment on the notion of the development of moving image technology from praxiscope to film to video to computer image (fig. 1). An image of the standard evolution chart of human development (the image of Cro-Magnon man and Homo sapiens so ingrained in our memories) is released so that it moves backward, rewinding across the frame and in time. Since this early, rudimentary work, the Vasulkas have deployed horizontal drift as a central visual motif, in particular to create image compositions that move across multi-monitor installations.

Analog and Digital: Questions of Language

Since the mid-1970s, several tools have been influential in the Vasulkas' aesthetic as both instigating factors in and receptors of their style. The Rutt/Etra scan processor (designed by Steve Rutt and Bill Etra), which the Vasulkas acquired in 1974, is a device that reduces the electronic image to the component scan lines of the electronic waveform, rendering a topographic effect to the imagery (fig. 2). When an image is seen through the Rutt/Etra, it is reduced to its electronic waveforms (the basic element of the video signal), forming a kind of skeletal image; the light density of the image is spatialized (the bright areas of the image are raised, the dark areas lowered) and rendered three-dimensional. For Woody, the Rutt/Etra is a central tool in establishing a vocabulary of electronic images; for Steina it is an important aesthetic and deconstructive device. It allows both artists to strip the electronic image down to its essential components, and, as such, it offers a means to deconstruct the nature of the video image apart from its capacity to register the "real."

For these reasons, Woody saw it as the first step toward understanding the "code" of an electronic language.⁵ This attempt to use a model of language for understanding the construction of electronic media inevitably led to designing his own machine. In 1976, Woody began working with Jeffrey Schier in Buffalo, New York, to build the Digital Image Articulator, designed specifically to digitally process imagery in real time. At this

time, electronic media was hovering at the juncture between the analog and the digital. The construction of the Digital Image Articulator was a step from analog (in which manipulation of the image is produced through the regulation of voltage changes and can be changed through "knob-twisting") to digital electronics (in which the electronic signal is constructed in discrete picture elements, or pixels, and then mathematically stored so that it can be sampled at different intervals). Its construction was a laborious process; its various stages are documented in Woody's Artifacts (1980), Steina's Cantaloup (1980), and Digital Images (1979). Yet, while it represents a major technological and aesthetic step for the Vasulkas, it was not one in which the digital replaced the analog. Rather, each image form reflects and builds on the other, serving as testimony to different kinds of malleability. For Woody, the precision of the digital image both inspired and dictated an exploration into the vocabulary of images. The electronic language he envisions is mediated through the machine.

Narrative Form and Antinarrative Strategies

From these concerns with an electronic vocabulary, it was perhaps inevitable that Woody would turn to the issue of narrative structure. Similar to the capacity of the Digital Image Articulator to create an image from pixel fragments, narrative structure is the way in which we give our experience meaning. The narrative form, with its elements of climax, closure, cause, and effect, is not intrinsic to human experience, rather it

structures fragments of memory. Elements of narrative hover over all forms of visual representation. While the Vasulkas' early works have been primarily viewed as didactic and formal statements on the possibilities of electronic imaging technology, they are also replete with narrative elements. The highly manipulated images of the Moravian landscape in Woody's videotape Reminiscence (1974) forms a narrative tracing of Woody's memory, a re-seeing of the past through the murky veil of the present. Certain elements are highlighted via the Rutt/Etra--drawn out like memories and made three-dimensional and vivid--while others recede. In the videotapes of Steina's "Machine Vision" series, including Signifying Nothing (1975) and Switch! Monitor! Drift! (1976) (which are excerpted in a later version, Orbital Obsessions [1988]), Steina's methodical construction of increasingly complex machine mechanisms contains elements of suspense and search for a resolution. Her integration of working method into the videotapes themselves allows the viewers to engage with her process of discovery.

For Woody, it is the artificiality of narrative--the way in which narrative structure is mapped onto human experience--that deserves exploration. His concept of narrative is highly ambivalent; he embraces an antinarrative strategy that is both seduced by and hostile to the traditional narrative form. As someone who grew up in Eastern Europe in the 1940s and 1950s, he sees narrative structure as inherently political, representing the voice of the state; it is linear and without nuance. He says:

We all knew about how narratives are constructed and about symbolic language. In communism you must disguise everything in symbolic language so it is a fluid form of expression. I wanted to purge it. I came here to be free of it and that's why it's a continuous temptation I have with narrativity--I cannot accept or practice it.⁶

The Commission (1983) and Art of Memory have been heralded as Woody's entrance into narrativity, yet each can be seen as a highly ambivalent narrative text. In conceiving The Commission, Woody looked for, in his words, the most "banal story of the nineteenth century, to pay tribute to the nineteenth century with an incoherent text, a kind of free treatment of real-time panels." He chose the "banal story" of a rivalry between two male art heroes, composers Niccolo Paganini and Hector Berlioz, to be played by two alter egos, artists Ernest Gusella and Robert Ashley.

The narrative and antinarrative strategies of The Commission are concerned with the tragic consequences of the various roles played by artists--the martyr, the starving genius, or the prima donna, dependent on patrons and government funding--and the corrupted aspects of art-making. Yet, the central theme of The Commission is how specific electronic imaging techniques can be used to represent narrative. In the opening sequence, images burst forth from a central point on the screen to fill the frame in order to depict an image stream of Paganini's ramblings. As Paganini plays the violin, digital sampling is used to create a shadowing of his movements, so that their digitized traces evoke the energy of the music. When Paganini hands the commission to

Berlioz, a flip-flop technique is employed, so that the videotape flips back and forth between two revolving images of Berlioz and Paganini circling each other, emphasizing the tension of the exchange. As Paganini's body is embalmed, the Rutt/Etra renders his corpse as a skeletal and eerie texture (fig. 3). The videotape can thus be seen as the posing a number of questions: What does each analog or digital effect mean in narrative terms? How can it offer us an alternative to the codes of cinematic language--montage, the fade, the zoom, the cut? How can it deconstruct narrative? At the same time, this work is as much about the seductions of narrative as it is a project of antinarrative. It tells a compelling story, with the characters of Paganini and Berlioz often merging with those of their portrayers.

Since he identifies the strategies of montage and decoupage so heavily with cinematic narrative language, Woody's counter-strategy is to avoid any instance of cutting directly from one image to another. In both The Commission and Art of Memory, he structures images in forms that avoid the cut. In Art of Memory, this means rendering the video image frame-unbound by turning it into a three-dimensional object that removes it from any reference to representations of reality. This is the image as object, an attempt to avoid the tendency of the camera image to fetishize and to counter dominant narrative form. Working with the Rutt/Etra and the Digital Image Articulator, Woody transforms newsreel footage and documentary photographs into strange, almost organic shapes that stand out from the landscape as cinematic

artifacts refusing to conform with electronic space. These image objects are strange and evocative, sometimes resembling large movie screens in the desert, other times awkward, bulky, and indecipherable shapes (fig. 4). As three-dimensional objects they radically decontextualize the images of history.

Narratives of Memory and History

The different relationship of the electronic image to the photographic image's role of furnishing evidence is thus a central aspect of Woody's project. Art of Memory reflects on how the construction of memory and history is mediated through the camera arts. It takes as its material the black-and-white photographic and film images of historic events of the first half of the twentieth century: the Spanish civil war, the Russian Revolution, World War II, and the atomic bomb. Woody establishes the process of history-making as his central topic, but reorchestrates historical images in a jumble of objects and frames; this is a text of memory, fragmented and refusing simple coherence. Some images assert themselves, emerging to suggest narratives--such as Robert Oppenheimer's famous post-atomic bomb speech, in which he quotes the Bhagavad Gita--but are then resubmerged in the flow of images and the rush of history.

Yet, within this dense layering of images, Woody does hint at a narrative. A mythical winged figure sits on a cliff. Seeing it from a distance, a man tries to capture its attention. He tosses a pebble at it, and then, when it turns toward him, he photographs it, causing it to rise up and swoop down upon him.

The creature is unexplained but it suggests many possible meanings. An unattainable mythic man/beast that the nervous and distracted middle-aged man, haunted by the images of history, tries to capture with his camera, as if he is trying to photograph the well-known "angel of history" described by Walter Benjamin:

His face is turned toward the past. Where we perceive a chain of events, he sees one single catastrophe which keeps piling wreckage upon wreckage and hurls it in front of his feet. The angel would like to stay, awaken the dead, and make whole what has been smashed. But a storm is blowing from Paradise; it has caught in his wings with such violence that the angel can no longer close them. This storm irresistibly propels him into the future to which his back is turned, while the pile of debris before him grows skyward.⁷

Benjamin wrote of the angel of history while witnessing the rise of fascism in the 1930s, and his words echo through the image forms and haunting voices of Art of Memory with its sense of history propelling forward. Woody's alter ego tries to capture the creature photographically, to hold it in place and prevent it from hurtling toward the future. Yet Art of Memory proves that the photographic image is ephemeral, its meaning shifting. The images of history lose their individual meaning and become a tangle of memories swallowed by the electronically rendered desert landscape. Voices echo these images; we cannot understand them, but we know, with their scratchy sound and intonation, that these are the voices of history.

The form of Art of Memory reveals not only the malleability of historical images but also of the different cultural meanings

of film and video. Here, the image objects deny the possibility of finding a truth in historical artifacts. The incongruity of these images of history set against the dry forms of the American Southwest evokes a kind of timelessness; the desert landscape is emblematic of time marked within the earth, the past and the future merged. Art of Memory is thus an attempt to situate the images of history within the fluid terrain of time, to mark their ephemerality.

It is the camera image that provides us with cultural memory, yet it is a memory that shifts and changes, and is constantly reinvented and reenacted. The fragmented film images that form Woody's image objects and the static photographs of figures of history--from the anarchist Buenaventura Durruti of the Spanish civil war to the revolutionary Rosa Luxemburg--that scroll across the screen are processed until they are translucent, shredded as though by the passage of time. Hence, Art of Memory reflects not only on the memory of this history, but also on the final days of cinema.

Machines Remapping Space

The eulogy to the cinematic image in Art of Memory operates to finally contain the question of cinema for Woody. Since its completion in 1987, he has moved into a completely new arena of investigation, beyond the question of the code and the meanings of the image object to a concern with machine systems and their capacity to reconfigure space. In this move from cinematic space (light, shadow, and projection) to video space (the waveform and

the signal) to computer-generated space (mathematical coordinates and the virtual), Woody has undertaken a systematic project of mapping. His attempts to understand machine protocol--how machine systems speak and interact with each other--have also pushed his explorations of machine agency into new territory.

The computer is a more effective antinarrative tool for Woody than the camera. Ironically, his move to understand electronic redefinitions of space and to be completely rid of narrative structure has allowed for other kinds of engagements with the past. The move toward machine systems is an investigation into the ancient sciences of navigation and calibration. In both Theater of Hybrid Automata (1990) and The Brotherhood (1994-96), the military applications of these sciences are primary subtexts of the act of mapping and the designation of territory. Both works pose another register of questions about the agency of the machine and the relationship of the electronic machine to the mechanical.

Theater of Hybrid Automata consists of a computer-driven mechanism that calibrates and maps a space defined by several target screens, using the rules of dramatic presentation (the "theater" refers to Giulio Camillo's ancient Theater of Memory) to examine the rules that define the intersections of physical and virtual space. The installation represents what Woody calls an "enlightened interactive tool" that integrates the viewer into its mapping project, thus both "internally interactive" and viewer interactive. By calibrating the exhibition space according to the placement of several "targets," one of which represents an

imaginary north point, the device operates in "pointer" mode in which the system indicates prescribed locations, and "locator" mode, in which the sensors scan the space and report on coordinates. In its mix of technologies, robotics, calibration, and forms of navigation, Theater of Hybrid Automata is about contextualizing virtual space in the history of measurement and mapping, but it is ultimately about the impossibility of mapping in that the space remains to a certain extent elusive and distinct from its calibrated models. It is, in Woody's words, a "confrontation" between a physical space and its synthetic model.

Theater of Hybrid Automata thus poses particular questions about both the location and the agency of the viewer. It demands engagement from the viewer, but it does so in order to demonstrate that it can render the human presence superfluous. It plays off traditional notions of Cartesian space and the laws of perspective while situating the viewer, yet continuing to map by itself. Through its self-orientation, the machine thus acquires "memory." This work can be seen as an engagement with the question of memory in virtual space--Camillo's Theater of Memory was about mapping the cosmos and containing memory--as well as the implications of man's urge to map, calibrate, and navigate.

While issues of masculinity and mapping space underlie much of the Theater of Hybrid Automata, with its inferences of military science and the marking of territory, it is in The Brotherhood that Woody allows the subtext of gender identity to fully emerge. In this work, the "brotherhood" is established through the tools of military hardware, which represent the

alliance of technological devices to the service of war. This is not a moralistic or antimasculine move; rather, as Woody puts it, the work examines the "dilemma of male identity" that arises from the "general compulsion of mankind to reorganize nature itself." He adds, "This work does not argue for a reformist agenda or a strategy of defense. It stands sympathetically on the side of the male but it cannot resist an ironic glance at his clearly self-destructive destiny."⁸

In the series of table installations of The Brotherhood, Woody again returns to the mechanical in order to investigate the virtual, continuing his project of grounding new technologies in the phenomenologies and histories of previous ones. The tables integrate scraps of industrial and military waste--tables from Los Alamos and various junkyards, an intercept table for war games, a writing instrument--with new systems technologies--such as computer systems and three-dimensional images. In a sense, Woody comes full circle in The Brotherhood to unite the junkyards of the post-World War II culture of his youth with his vision of the ways in which electronic technologies can reconstitute the meanings of time and space.

The tables of The Brotherhood, with their automated parts, moving mechanisms, image screens of war, and insistence on viewer interaction, are also about exposing the narrative of artificial intelligence. On the one hand, Woody is lovingly crafting machines that intrigue, demand, and perform; on the other hand, he is actively working against a simple notion of machine intelligence, whether it be the concept of a "smart weapon" or

the thinking computer. Yet, these tables are also exquisite tributes to the intricacies of the machine itself, in the pleasures of their mechanisms, and in their bridging of the optical, the electronic, and the mechanical.

Steina: From the Instrument to the Machine

Both of the Vasulkas have explored the capacity of electronic technologies to remap space; while for Woody this has been a project of mapping virtual and cartographic space, for Steina this has meant a concern with the viewer's phenomenological relationship to the landscape and natural processes. Indeed, one could say that while Woody has investigated the mapping of virtual and physical "indoor" space, Steina has mapped "outdoor" space--sky and landscape. Whereas Woody has explored the history of human catastrophe, war, and upheaval as contained in the camera image, for Steina history is inscribed not in fragments of archival footage but within nature; it is not the history of mankind, but the history of geological process, of fire, water, and earth.

While Woody has moved toward the question of the machine as an instrument, this was Steina's point of departure. Her conceptualization of the machine takes place through a physical engagement with the camera-instrument. Yet, like Woody, she has been intrigued by the possibility of an autonomous machine. She states:

Having been an instrumentalist in music, I regarded the camera as an instrument from the beginning....From my own camerawork, I saw that you are subjected to a very

heavy editorial view. I started very early to think about how much better it would be if the camera image was not subjected to one person's vision.⁹

The videotape Violin Power (1970-78) demonstrates Steina's replacement of the violin with the video camera. Violin Power, which begins with a straightforward image of Steina playing a violin, represents an increasingly complex relationship of sound and image. Steina rigs her violin to imaging devices so that the music not only transposes the image of her playing the violin but actually generates it--the movement of the bow across the strings causes the image to erupt into a tangle of raster lines. She later examined the relationship of electronic sound and image in collaboration with singer Joan La Barbara in several works, including Voice Windows (1986), in which La Barbara's voice creates a visual interplay of a musical scale on a moving landscape. These works are, in essence, video compositions, in which the video image is both a visual realization of the musical form and an instigator to it.

In the mid-1970s, Steina began working on a project called "Machine Vision," a group of videotapes and installations concerned with finding a camera view that moves beyond the idiosyncracies and restrictions of the human eye (fig. 5). "Machine Vision" is a project of dual purpose: to explore the question of machine autonomy and to attempt to realize a world view beyond limited human vision. One of the first "Machine Vision" works, Allvision (1976) consists of two live rotating cameras facing a mirrored sphere that reconfigures the

surrounding space so that the viewer's position within it is entirely mediated by the machine. Through the reflective sphere, the cameras scan the space and remap it. The image of the viewer entering the installation is thus transposed via the mirrored sphere into the abstract virtual space of the video monitors. Allvision redefines space so that concepts such as inner/outer, left/right, forward/backward, and up/down have no meaning. Steina states:

The cameras alone scan the whole room. The idea was of course that the whole room can never be perceived or understood by human vision. Inserting the sphere in between emphasized the absurdity. When I mount the camera on the car, I define it as machine vision, but when I use the sphere, it is the concept of allvision.¹⁰

Steina attempts to strip the camera of intentionality and to detach it from human intervention, while at the same time knowing the impossibility of this task. She presents it as a kind of half-joke in which the viewer is always complicit.

Throughout the 1970s, Steina explored "Machine Vision" in many works in which she orchestrated increasingly complex machine setups. First, she rotated a camera on a turntable, then added another camera and placed two cameras watching themselves on rotating monitors. She gradually began to use mirrors, spheres, and other optical devices. The result was essentially a reenactment and redefinition of the actual codes of cinematic movement: the pan, the tilt, and the zoom. In reinventing these codes and representing them within a mechanical framework, Steina

attempts to strip her video work of its relationship to cinematic language. She presents instead a self-reflexive camera vision in which the movement of the camera is divorced from the narrative meaning assigned to cinematic codes.

The videotapes of "Machine Vision" include Signifying Nothing, Sound and Fury (1975), Switch! Monitor! Drift!, Snowed Tapes (1977) (which are compiled in the later version Orbital Obsessions), and Urban Episodes (1980). Each of these process videotapes represents a journey in which Steina is both an actor and director, revealing her conceptual explorations by demonstrating in real time her step-by-step complications of camera machines. The viewer is thus privy not only to her thought process but also to her phenomenological interaction with electronic space. Steina sets up cameras facing each other and then uses a flip-flop switcher to alternate their images; she places herself within the frame, almost appearing to peek in and out to see how the machines are reconstituting her image. She uses her body as a mediating force, as if it were a found object through which machine capabilities can be charted. Steina's movement before her camera mechanisms creates a tangible presence--the mechanical within the electronic and the body within the camera space.

In later works, such as Summer Salt (1982), with its sections Sky High, Low Ride, Somersault, Rest, and Photographic Memory, the exploration of the mechanical and the body within electronic space is mediated through a lens attachment that mimics the mirrored sphere. Images are transposed out of the

standard rectangular frame--horizons become circles and simple landscapes appear to form microcosms of the world, orbiting within the frame. Each section of Summer Salt contains a different camera-defined viewpoint. In Sky High, Steina attaches a camera with a mirrored lens on the roof of a moving car, turning a highway into a global rush of images. In Low Ride, she drives with the camera on her bumper through a field of grass, an effect that creates tension through both its irreverence for the camera's safety, and the tactile audio/visual impression of grass, loudly thumping against the microphone. The humor of Low Ride is echoed in Somersault, in which Steina performs gymnastics with her camera with the mirrored lens attachment, swinging it through her legs, bumping it with her hips, and creating a globalized circular impression of her torso (fig. 6). In decentering the viewer's sense of gravity and inserting her body as an active force within the frame, Steina is creating a physicality with the camera, which provides a means to choreograph a space defined by the interaction of body and camera. One's lasting impression of Summer Salt, however, is one of irreverence and humor. Steina seems to be saying that the camera is a playful object that can comically demonstrate new perspectives--the view of a car bumper, the vision from a gymnast's props. The pleasure in this work is precisely in its refusal to be serious.

Marking Landscape

Perhaps because of her background as a musician, Steina has a tendency to treat content ambivalently; space is her subject matter. Whether that space is her studio or the landscape of the Southwest is initially unimportant to her; what matters is how it can be reconfigured in video. After the Vasulkas moved to New Mexico in 1980, Steina began to work with the Southwestern landscape. While landscape can now be seen as a central theme in her work, she does not actively situate the work in the tradition of its visual representation in art. She is primarily concerned with how different geographies can be reconfigured through her machine mechanisms. She says:

I moved here because I wanted to experience what it is to live in beauty. I did not want to think that it was going to affect my images as much as it did. For the first two years I resisted it. First of all because the beauty of the West is so seductive. And, secondly, I didn't feel up to it. I mean are you going to take on God? I had always had large interiors in which to work, and suddenly we were restricted to a small house. I just went outside one morning and said, "Well, my studio doesn't have any walls and the ceiling is very high, and it's blue." I just adopted the whole Southwest as my studio. So that's when I made my peace with the idea that the landscape of the Southwest was going to be my image material.¹¹

The exercise of placing her body and camera outdoors in Summer Salt moved into a more conscious engagement with the Southwestern landscape in the installation The West (1983). In this work, Steina examines the relationship of landscape to time, in particular the way in which the desert symbolizes both geological time and human imprints on the land. The dry conditions that preserve evidence of ancient civilizations are

also responsible for the presence in New Mexico of various scientific enterprises, including the Very Large Array (VLA) radio telescope systems, a line of huge satellite dishes listening in the desert. Thus, the Southwestern landscape represents technological change and acts as a symbolic indicator of the progression from the human mapping of the land to the mapping of space.

Steina puts the stationary landscape of the Southwest into movement in The West. Working with horizontal drift, she orchestrates two channels of video so that two constantly sliding and overlapping images give the impression of the video frame being in constant motion. In the circular shape of the mirrored sphere, the desert landscape takes on global proportions, spinning and revolving, with no horizon; the Native American ruins appear overlaid with the space-age telescopes. Simple concepts of the land are thwarted. Indeed, The West is a work that borders on a romantic vision of the landscape, only to pull back and juxtapose the incongruous.

Refiguring the Elements

The landscapes that are charted through The West are strikingly immobile; they are only set into motion through the carefully choreographed motion of Steina's devices. However, the movement of nature has been a constant theme in her work. In Flux (1977) she examines the phenomenology of running water, creating a sensual and aesthetic engagement with its quality of motion. Using a flip-flop technique to switch rapidly between two images

of rushing water, she creates a tension of expected movement. Then the images are transposed by the Rutt/Etra to create an electronic waveform that echoes the physicality of the water. The movement of nature is thus juxtaposed with the corresponding motion of the electronic waveform.

One can easily read in works like Flux, Geomania (1989), and Borealis (1993) the pleasure that Steina takes in deconstructing the movement of nature. Indeed, it is as if Steina has used the medium of video to effectively reorchestrate the geological processes so evident in the shifting terrain of her native Iceland. The use of the analog and digital imaging as both geology and geography compels her later work. In the installation Geomania, she uses video to ironically combine the volcanic and oceanic scapes of Iceland with the dry desert of the Southwest-- waves wash over the desert and volcanic gases bubble up through rocky terrain. Thus, analog video techniques take on the metaphoric role of merging the landscape of Steina's various homes--the arid and still desert with the fluid, churning, mutable landscape of a volcanic island. For Steina, the earth can be reconstructed through video in defiance of its materiality.

In Borealis, a dark room with suspended video projection screens encompasses the viewer in the visceral interplay of natural processes. Water is electronically reorchestrated through direction reversals, layering, and flip-flopping. This is not the stationary landscape of The West but rather nature pushing at the screen, rushing at the viewer. On the large screens, the water is oversized and dizzying. Steina then takes her camera into the

rough terrain, bumping it into frozen plants and thumping and scratching the earth's surface. This is a heightened sense of water and land, up close and in your face. Borealis is about getting as close as possible to the constant movement and fluidity of nature seen as powerful and unstable. The darkened room and projection screens force the viewer to step into the moving image and its audio/visual textures. Borealis thus circles back to Allvision in its desire to decenter viewers and set them in motion.

In Lilith (1987), Steina continues this concept of integrating the body into the landscape in a more literal fashion. She uses analog effects to render Doris Cross into a hybrid of human and nature. Cross's face is integrated into a forest-like tableau through analog processes, giving her a primordial and eerie presence. Lilith is the mythical first wife of Adam, and Cross embodies, through her slowed voice and craggy features, a strange figure of mystery. Yet, there is nothing particularly mystical about this transposition. Cross's face is as much a tribute to an aged and well-worn face as it is a study in the deteriorating human corpse reintegrating into the earth.

In all of Steina's landscape work, the view of the earth is both of awe and irreverence; on one hand paying homage to the aesthetics of nature, on the other deliberately reconstructing it into new, "improved" forms. One has the sense that Steina is choreographing the earth. Yet, at the same time, she is clearly resisting simple cliches about nature and its meanings. The humor in her work and its disdain for simple concepts of beauty

prevents it from fulfilling any essentialist concept of woman and nature. Indeed, one could say that Steina is countering any reverence for nature with a technological retort of "what if?" What if waves could wash through the desert? What if water ran backwards? What if we could stop it all in a frame?

In the videotape In the Land of Elevator Girls (1989) and the installation Tokyo Four (1991), this refiguring of space is transposed to the terrain of Tokyo, where she creates visual motifs to enact her role as an outsider peering in. It is testimony to Steina's indifference to subject matter that she can take an urban setting and treat it as a landscape. She uses horizontal drift to create a motif of opening and closing--a proscenium that lets the foreigner in, but then shuts them out again. The framing device is the constantly moving elevator doors of Tokyo department stores, accompanied by the elevator girls whose job it is to greet shoppers and usher them in and out. The elevator doors, recreated in digital effects with horizontal drift, open onto scenes of Japanese life: Shinto priests sweeping their gardens, train conductors at rush hour, a volcanic landscape, a virtual reality demonstration, the choreographed movements of a dance troupe. In this work, horizontal drift is deployed as a metaphor for the observations of the visitor to Japanese culture, glimpsing particular moments and experiencing the layered impressions of the rhythms of daily life. The elevator doors are both an entryway and a barrier that closes on the viewer's desire to see into the rituals of the city.

Within all of Steina's work, a series of questions is thus posed: What does it mean to reconfigure space, to reorchestrate landscape, or to remap nature? What does it mean to change the viewer's relationship to space? From the redefinition of space in Allvision, which situates the viewer in between physical and electronic space, to the remappings of nature in The West and Borealis, to the depiction of cultural voyeurism in the closing doors of In the Land of Elevator Girls, Steina forces the viewer's body into the work. In her work, there is no central point of perspectival vision, no center from which the viewer posits his/her self, but rather a construction of space in which the viewer floats in the rotating spheres of landscape and studio space, ever in motion, never static. The viewer's position in Steina's work is defined not by physical space and geometry, but from within an electronic space--of transmission and reception, in which geographies are malleable and the physical can be transgressed. Its meaning is precisely in demonstrating the intangible of physical space and the natural world.

Machine Media

A journey through the Vasulkas' work is thus a journey through the history of the machine and an investigation into the importance of the past in the present and the historical machine in the technologies of the future. Their work defies simple narratives of technological progress, precisely because of the ways in which it situates new media within their technological legacies. For the Vasulkas, the machine is both a creature of autonomy and a source of possibilities. From the elemental nature

of the Digital Image Articulator to the bulky machine images of Art of Memory and the contained arbitrariness of the machines of Theater of Hybrid Automata and The Brotherhood, from the mirrored mechanical "Machine Vision" device of The West to the projected world of Borealis, the Vasulkas have created several generations of machines that defy simple notions of agency and programming. These machines dramatically pose questions about the category of authorship as the Vasulkas consistently attempt to award them autonomy and to speak their language. These are machines that command our attention and demand a dialogue.

¹ From the videotape Artifacts (1980).

². See the catalogue for the show, curated by the Vasulkas, Eigenwelt der Apparate-Welt: Pioneers of Electronic Art ed. David Dunn (Linz, Austria: Ars Electronica, 1992); and Martha Rosler, "Video: Shedding the Utopian Moment," and Marita Sturken, "Paradox in the Evolution of an Art Form: Great Expectations and the Making of a History," in Illuminating Video: An Essential Guide to Video Art eds. Doug Hall and Sally Jo Fifer (New York: Aperture, 1991).

³ Woody Vasulka, interview with Gene Youngblood and Peter Wiebel, Santa Fe, New Mexico, October 12, 1986.

⁴ Ibid.

⁵. See Lucinda Furlong, "Notes Toward a History of Image-Processed Video: Steina and Woody Vasulka," Afterimage 11, no. 5 (December 1983): 15.

⁶. Woody Vasulka, interview with Marita Sturken and JoAnn Hanley, Santa Fe, New Mexico, July 24, 1987. Unless otherwise noted, all subsequent quotes are from this interview.

⁷. Walter Benjamin, "Theses on the Philosophy of History," Illuminations (New York: Schocken Books, 1969): 257-58.

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- ⁸. Artist statement, 1994.
 - ⁹. "Studios," Steina & Woody Vasulka: Videastes 1969-1984: 15
Annees d'Images Electroniques ed. Dominique Willoughby (Paris:
Cine-MBXA/Cinedoc, 1984).
 - ¹⁰. Artist's statement, 1976.
 - ¹¹. Steina, interview with MaLin Wilson in the exhibition
brochure, Scapes of Paradoxy: The Southwest and Iceland
(Albuquerque: Jonson Gallery, University of New Mexico, 1986).

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word - videography.doc

From: Marita Sturken <sturken@almaak.usc.edu>
Subject: videography

NEEDS FORMATING!!!

Selected Works

Included are only those videotapes that are complete and extant. Running times for installations indicate the length of a tape shown on a continuous cycle.

Steina and Woody Vasulka Videotapes

Participation, 1969-71, 60 min., b&w

Sketches, 1970, 27 min., b&w

Calligrams, 1970, 12 min., b&w

Sexmachine, 1970, 6 min., b&w

Tissues, 1970, 6 min., b&w

Interface, 1970, 3:30 min., b&w

Jackie Curtis' First Television Special, 1970, 45 min., b&w

Don Cherry, 1970, 12 min., b&w In collaboration with Elaine Milosh.

Decay #1, 1970, 7 min., color

Decay #2, 1970, 7 min., b&w

Evolution, 1970, 16 min., b&w

Adagio, 1970, 10 min., color

Swan Lake, 1971, 7 min., b&w

Discs, 1971, 6 min., b&w

Shapes, 1971, 13 min., b&w

Contrapoint, 1971, 3 min., b&w

Black Sunrise, 1971, 21 min., color

Keysnow, 1971, 12 min., color

Elements, 1971, 9 min., color

Spaces 1, 1972, 15 min., b&w

Distant Activities, 1972, 6 min., color

Spaces 2, 1972, 15 min., b&w

Soundprints, 1972, endless loops, color

Home, 1973, 16 min., color

Golden Voyage, 1973, 28 min., color

Vocabulary, 1973, 5 min., color

Noisefields, 1974, 13 min., color

1-2-3-4, 1974, 8 min., color
Solo For 3, 1974, 5 min., color
Heraldic View, 1974, 5 min., color
Telc, 1974, 5 min., color
Soundgated Images, 1974, 10 min., color
Soundsized, 1974, 5 min., color
Six Programs For Television: Matrix, Vocabulary, Transformations,
Objects, Steina, Digital Images, 1979, 174 min. total, 29 min. each, color
In Search of the Castle, 1981, 12 min., color
Progeny, 1981, 19 min., color In collaboration with Bradford Smith.

Steina and Woody Vasulka Installations

Matrix, 1970-72, multi-channel installation, many versions, b&w
Continuous Video Environment, 1971, multi-channel installation, b&w
The West [early version], 1972, three-channel installation, 20 min., b&w
Electronic Environment, 1974, multi-channel installation, b&w
Ecce, 1987, two-channel installation, 4 min., color

Steina

Videotapes

Let It Be, 1970, 4 min., b&w
Violin Power, 1970-78, 10 min., b&w
>From Cheektowaga to Tonawanda, 1975, 36 min., color
Signifying Nothing, 1975, 15 min., b&w
Sound and Fury, 1975, 15 min., b&w
Switch! Monitor! Drift!, 1976, 50 min., b&w
Snowed Tapes, 1977, 15 min., b&w, silent
Land of Timoteus, 1977, 15 min., color
Flux, 1977, 9 min., b&w
Stasto, 1979, 6 min., b&w
Bad, 1979, 2 min., color
Selected Treecuts, 1980, 8 min., color
Cantaloup, 1980, 25 min., color
Urban Episodes, 1980, 9 min., color
Exor, 1980, 4 min., color
Summer Salt (includes Sky High, Low Ride, Somersault, Rest, Photographic
Memory), 1982, 18 min., color
Voice Windows, 1986, 8 min., color In collaboration with Joan La Barbara.
Lilith, 1987, 9 min., color In collaboration with Doris Cross.
Orbital Obsessions, 1988, 25 min., b&w

Vocalization One, 1988, 12 min., color In collaboration with Joan La Barbara.

In the Land of Elevator Girls, 1989, 4 min., color

A So Desu Ka, 1993, 10 min., color

Steina

Installations

Allvision, 1976, video installation, many versions, b&w

The West, 1983, 2-channel installation, 30 min., color

Scapes, 1986, 2-channel installation, 15 min., color

Geomania, 1989, 2-channel installation, 15 min., color

Ptolemy, 1990, 4-channel installation, 10 min., color

Vocalizations, 1990, 4-channel installation, 9 min., color. In collaboration with Joan La Barbara.

Tokyo Four, 1991, 4-channel installation, 23 min., color

Borealis, 1993, 4-channel sound, 2-channel video installation, 10 min., color

Pyroglyphs, 1994, 6-channel sound, 3-channel video installation, 15 min., color

Steina

Video Performances

Violin Power, 1991, multiple versions

Hyena Days, 1992, multiple versions

Woody Vasulka

Videotapes

Explanation, 1974, 12 min., color

Reminiscence, 1974, 5 min., color

C-Trend, 1974, 10 min., color

The Matter, 1974, 4 min., color

Artifacts, 1980, 22 min., color

The Commission, 1983, 40 min., color

Art of Memory, 1987, 36 min., color

Woody Vasulka

Installations

Theater of Hybrid Automata, 1990, installation, color

The Brotherhood, 1994-96, computer-driven electro/opto/mechanical constructions