<u>Very Nervous System Installation details and requirements</u>

<u>Technical requirements:</u>
I generally supply video camera, image processor, synthesizer and software. This leaves to the exhibitor to supply:

1/Macintosh with hard-drive and 1 megabyte of memory (preferable Mac II or better, but the system will work with a Mac plus)
2/Stereo sound system (for most spaces, a 100 watt amplifier and suitable speakers will do fine.)
3/Appropriate lighting for the space. (The sensitivity of the system depends partly on the level of lighting. I usually use about 1000 watts of light for every 20 square metres of space, but ideal amounts of lighting depend partially on how high the lights are mounted in the space.

<u>Space requirements:</u>
An ideal space would be an approximately square room, 6 metres by 6 metres with ceiling of 4 metres, with walls on 3 sides. This kind of space allows people to watch others interacting with the system, while keeping people from walking through the space accidentally, interrupting someone else's experience of the piece. This kind of layout has worked very successfully at large exhibitions with heavy traffic flow, giving the person interacting a strong sense of interaction, but offering the rest of the public a view of this interaction.

<u>Variations</u>
I often exhibit variations of "Very Nervous System", involving additional elements, where the equipment and/or space is available. An example would be an installation entitled "(Perception is) The Master of Space". I set up "Very Nervous System" as usual, and then positioned an additional Macintosh just underneath the video camera. This Macintosh displayed an image of an eye, which observed the space (looking left, right, up and down), occasionally blinking, and occasionally interspersed with text commenting on the process of perception, and in particular, the "action" of perception as it exists in "Very Nervous System" (perception manifested as action : perception of motion manifested as the action of sound). The limits of the field of vision of the camera were delineated in the space by walls made up of vertical strings hanging from the ceiling, spaced at 2 foot intervals; this served to enhance the sense of the visual field of the camera as a sculptural space, filled with the 'substance' of perception.
Multiple camera installations are possible although some new equipment might have to be constructed. Exhibits can be mounted with up to 6 cameras and many channels of sound, however such an implementation requires considerably more equipment, time and money to realize. Such an installation could be tailored to fit into a given budget range. New works for the system can be commissioned especially for an exhibition.

<u>Shipping</u>
I generally bring the equipment with me on the plane. This involves no extra baggage charges. Depending on the length of the exhibit, the equipment might have to be shipped back to me. The equipment fits in a box 2/3 meter x 2/3 meter x 2/3 meter. It weighs less than 20 kg.

<u>Other expenses</u>
Other than any travel and accomodation expenses, I generally ask for an artist's fee of USD$2000 for short exhibitions.

Technical Description of 'Very Nervous System'          David Rokeby

"Very Nervous System" is a real-time interactive environmental installation. Its predominant input device is a standard video camera. The images from the video camera are analysed by a hand-built video processor that determines the dynamics of physical gestures that take place within the frame. The initial level of analysis is the comparison of consecutive video frames at 30 frames/second with frames being digitized at 128 x 256 pixel resolution with 6 bits of pixel depth. This information is a representation of what has moved within the frame in the last 30th of a second. This information is further processed to give a sense of gesture history. Gesture histories are comprised of the shifts in dynamics (roughly equivalent to movement 'intensity', a combination of velocity and size of the moving object, a sort of 'momentum' perhaps). From this gesture history, more qualitative information is derived, to balance the purely quantitative character of the initial analysis. Therefore, the gathered information ranges from gross amount of perceived movement to time-based notions of consistency, unexpectedness, and rhythm.

The video image can be mapped into up to 255 discrete regions with separate dynamic histories maintained for each region in the frame. A more complex and interesting mapping is possible as well, in which the frame is dynamically mapped by an algorithm that resolves areas of movement into separate moving objects. Each new area of movement within the video frame that cannot be directly associated with an existing area is identified as a new movement 'object'. For instance, a hand suddenly moving might be called object 1. The other hand might then be called object 2, if it was visibly separate from object 1. The object 1 designation would tend to stick to the first hand even as the hand moves about the frame, stops moving, then continues. This algorithm makes a fair number of perceptual errors, but is certainly consistent enough to be valuable for my installations. Up to 16 dynamic objects can be supported.

The gestural information is further processed by a Macintosh computer. Up to six image processor/camera combinations can be attached to one Macintosh via the SCSI bus. The Macintosh a language that I call 'IntAct'. IntAct is a real-time-modifiable pseudo-object-oriented programming language that allows me to define the interactive behaviours of attached input and output devices. For example, physical movement might be translated into music through one, or a set of 'instrument objects'. An instrument object would be a set of algorithms and decisions used to effect the synaesthetic translation from visually-derived movement information into sound information (via MIDI control codes used to control a synthesizer). Many behaviour objects can coexist simultaneously. Behaviours can be created, and shaped while an interaction is in progress (i.e. during a live performance) adding another layer of interaction.

In general, 'Very Nervous System' is used in a configuration which translates movement into sound or music. It has also been used for gesturally interactive video disc installations and for interactive processing of incoming MIDI data for interactive music performance. The system is modular and expandable so that new types of input and output devices can be easily accomodated.

The system is being used by other artists for their own work, and is also being used at physical rehabilitation centers to enable quadriplegics who can barely move, to create music.

"Very Nervous System"          ("How and Why & comments on the documentation")

In the series of installations that fall under the general title 'Very Nervous System', I use video cameras, image processors, computers, synthesizers and a sound system to create a space in which the movements of one's body create sound and/or music. It has been primarily presented as an installation in galleries but has also been installed in public outdoor spaces, and has been used in a number of performances.

I created the work for many reasons, but perhaps the most pervasive reason was a simple impulse towards contrariness. The computer as a medium is strongly biased. And so my impulse while using the computer was to work solidly against these biases. Because the computer is purely logical, the language of interaction should strive to be intuitive. Because the computer removes you from your body, the body should be strongly engaged. Because the computer's activity takes place on the tiny playing fields of integrated circuits, the encounter with the computer should take place in human-scaled physical space. Because the computer is objective and disinterested, the experience should be intimate.

The active ingredient of the work is its interface. The interface is unusual because it is invisible and very diffuse, occupying a large volume of space, whereas most interfaces are focussed and definite. Though diffuse, the interface is vital and strongly textured through time and space. The interface becomes a zone of experience, of multi-dimensional encounter. The language of encounter is initially unclear, but evolves as one explores and experiences.

The installation is a complex but quick feedback loop. The feedback is not simply 'negative' or 'positive', inhibitory or reinforcing; the loop is subject to constant transformation as the elements, human and computer, change in response to each other. The two interpenetrate, until the notion of control is lost and the relationship becomes encounter and involvement.

The diffuse, parallel nature of the interaction and the intensity of the interactive feedback loop can produce a state that is almost shamanistic. The self expands (and loses itself) to fill the installation environment, and by implication the world. After 15 minutes in the installation people often feel an afterimage of the experience, feeling directly involved in the random actions of the street.

This unexpected sense of almost spiritual encounter informed a lot of the initial development of the installation but is only one aspect of the work. I often feel that it is necessary to work against the momentum of this experience and particularly its lesser manifestations (senses of power and affirmation, or even 'neat'ness) because they can overwhelm and mask underlying aspects of the work that are as important. By adding other sculptural and visual elements to the installation (i.e. "(Perception is) The Master of Space"), I have begun to focus the attention of the interactor away from the excitement, making the interactive relationship more visible.

The installation could be described as a sort of instrument that you play with your body but that implies a level of control which I am not particularly interested in. I am interested in creating a complex and resonant relationship between the interactor and the system.

The videotape documentation starts with two examples of myself informally exploring two different programs for the installation. Then there is some documentation of a large version that I realized in Japan. (██████████). Then there is some tape of the "(Perception is) The Master of Space" version, followed by tape of an experiment using the camera zoomed in on my face, and then two examples of collaborations, one with a dancer Leslie-Ann Coles, the other with video artist Paul Garrin.

(The installation tends to look most impressive on video when the person in the space appears to have complete control over the system, this does not correspond to the best experience for the interactor. Ideally, the response of the system is not entirely predictable but does make an elusive sort of sense. It must remain capable of surprises, though the fact that there is a strong interaction will always be clear)

<u>My use of the Computer as a creative medium</u>                    <u>David  Rokeby</u>

Two things define the computer as an artistic medium. Firstly, it is a skilled chameleon, potentially able to mimic most other types of creative media if properly programmed. Secondly, the computer is capable of being active and responsive.

The first characteristic confronts the artist who uses the computer as his/her medium with a difficult problem. An artistic medium is somewhat like a language, it imposes a set of structures and constraints which become the basis for expression. The computer in itself does not pose such limitations. It must be further articulated (through the means of a computer program) before it has tangible and useable characteristics as a medium. Programs exist that transform the computer into a surrogate for a wide variety of media. To me however, the challenge is to take the flexibility of the computer in hand and create my own programs (and therefore my own media). The aim of this process is to tap the unique potentials that a computer offers above and beyond the mimicry and extension of traditional media. One of the most interesting of these potentials is found in the second point that I mentioned above.

The product of artistic activity with the computer need not be a static object, image or composition. The computer can hold an abstract definition of an artwork in its memory. The audience can be presented with a view of that artwork unique to the instant and context of their viewing of it. Like a hologram, this composition of possibilities offers many possible facets, each to a unique point of view.

Again, this set of facets need not be static. The object itself can change in response to the viewer's path through this set of possible perspectives. The artwork then exhibits a responsive behaviour. At this point, the relationship between the artwork and the viewer expands into full-fledged dialogue and interaction.

The artwork at this point approaches becoming a medium itself, through which the interactor expresses him/herself through their actions and interactions. The final realization of the work is a collaborative act between the audience/interactor and the artist.

In 'Very Nervous System', I have explored this capability of computers in art. A video camera observes a section of gallery space. The camera's stream of images are analysed in order to determine the movements and gestures being made. The sequence of movements are maintained as a sort of short-term historical record. Each gesture in relation to this history represents a unique viewpoint into a composition of sound possibilities. By moving, the interactor realizes a  music or sound composition. Through sustained exploration of the nature of the interaction, the interactor evolves a personal gestural language with which they can navigate this constellation of possibilities. A relationship develops between the artwork and the interactor, and it is this relationship, rather than the sounds themselves, which is the core of the work.