

Early in 1969, we consulted with Lawrence Morton, the Museum's Curator of Music, on the possibility of inviting a musician-composer to work in A & T. At least one corporation, Ampex, was available and capable of providing sound equipment of various kinds. Lawrence Morton recommended that we contact the German composer Karlheinz Stockhausen, and offered to write to him for us. Morton outlined for Stockhausen the nature of the program, and inquired about his interest in and availability for participation. The composer was at that time living in Madison, Connecticut, and from there he replied on February 15,

... one of my projects is to make open-air events together with Otto Piene, the German founder of the light-ballet in the ZERO group. We intended to work together for the World's Fair (Expo 70), and as there is—at least for the moment—too much inner-German politics involved, we are looking for the next chance. He is . . . at M.I.T. as a member of the visual research group of artists and has done several open air shows on large fields with helium-balloon sculptures that are blown up, carried, directed in their movements with the participation of the public under his guidance, and especially at night the whole quality of his events becomes extremely beautiful. The balloons (of strange shapes, also changing in shape) are filled with colored gas, and huge light projectors are criss-crossing through the air and playing with the balloons. Some are 1200 feet long: they make wonderful movements.

We have met several times during the last months, and what we want to do is this: combine sound (on multi-channel tape) with the movements of his air-sculptures in a really meaningful polyphony. I would produce the sound material on tape in my studio, but in order to *perform* this material in reaction to the sculptures, I would need various electronic equipment, and Ampex could indeed provide it. Piene and I could perform together and as often as desired (2-3 times per week). We could do it in a place where the sound does not disturb others (small air field, large plaza or whatever is good for the public). I am *not* disturbed by airplanes.

Please tell Mr. Tuchman, he would really have a wonderful thing, if he can get Piene . . .

In March, we arranged to have both Stockhausen and Otto Piene come to Los Angeles to discuss setting up a series of performances, of the kind described by Stockhausen in his letter, to take place at the Museum during the time of the A & T exhibition. The two artists spent several hours looking at the Museum site and environs, and found a particular area of the park, to the North and East of the Museum buildings, suitable for their events. At this point, having ascertained that both Piene and Stockhausen were interested in doing the series of per-

formances and were willing to come to Los Angeles for three or four weeks at the time of the exhibition to prepare them, our problem became that of finding, on the one hand, the company or companies to supply and assemble the elaborate sound equipment Stockhausen required, and on the other to find some way of procuring Piene's giant balloons. We went to considerable lengths to resolve these problems. In Piene's behalf—he wanted several huge, colored balloons to hover, secured from the ground, at heights of up to 50 feet—we approached Goodyear and Allied Products; none of our investigations were fruitful. Stockhausen's requirements were written up by us so that we could attempt to find means of fulfilling them (Ampex had by this time indicated that they were not able to take on the project, since much of the equipment needed was not manufactured by them). The statement of the composer's needs is as follows:

Sixteen outdoor speakers with individual amplifiers are required. To give an estimate of the power of one speaker in relationship to the space it has to fill with sound, in my experience a capacity of at least 400 watts per speaker is necessary.

Twelve of the speakers will be mounted on high towers arranged to circumscribe an oval-shaped area of about 600 feet long by 400 feet wide, and four of the speakers will be suspended in the central area by moored, helium-filled balloons.

For the reproduction of sound, two four-channel tape machines are needed with one-half inch or one inch tape. The two machines will be used only for playback, not for recording. Each of the four channels of each machine will be connected to an individual group of speakers. Both of these four-channel machines should be continuously variable in speed within a minimum range of two octaves (e.g. 3¾" to 15" per second). The speed control should be provided by two generators with continuously variable frequencies driving the motors, and special amplifiers. The two four-channel tape machines could be installed inside the Museum buildings, although the sound projection will take place in the outdoor environs of the Museum.

In order to control volume, rhythm and pitch, a control console is required. For this console, eight sliding potentiometers are needed (like the MAIHAK-W66C type which is used in all German radio studios) for the eight independent sound channels that are pre-recorded on the two four-channel tapes.

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At the inputs of the eight potentiometers, eight push-buttons with an on-off function are needed so that each channel can be interrupted by depressing the corresponding button. Each pushbutton should be mounted on a coil spring, so that the sound is interrupted only while the button is held down (comparable to a Morse code device). When each pushbutton is manipulated, the on-off transition should not produce any click. The eight pushbuttons are played with two hands (eight fingers) by the performer, in order to produce rhythmic patterns, and the same eight figures are manipulating the eight potentiometers (distanced approximately like piano keys). The same console houses two generators (placed one to the right and one to the left of the eight potentiometers), controlling the speed of the two four-channel machines. Attached to each of the generators should be a knob with 180 degrees turning radius, with a semi-circular, marked chromatic scale of 25 steps for two octaves, each step being a minor second in pitch.

The control console will be installed in a control tower in the center of the area surrounded by speakers. The console should have eight inputs for the eight channels and sixteen outputs, two parallel outputs per channel.

A meeting was held at the Museum with several gentlemen from the J.B. Lansing Company, a company called Medico Electric (a subsidiary of Ampex) and the Langevin Corporation, in order to obtain technical advice on the quality and type of speakers and other equipment, including the console, and to perhaps solicit the companies' participation in the undertaking. The result of that meeting, essentially, was to demonstrate that the expense and complexity of this apparently simple project were unexpectedly great.

On the basis of this meeting, we wrote to Stockhausen for more precise information to use in projecting an estimate for the equipment. The reply, written by a friend of the composer's, Rolf Gehlhaar, indicates the magnitude of Stockhausen's intentions:

Stockhausen asked me to answer your letter:

Point 1. The complete loudspeaker system should effect a loudness comparable to that of a large orchestra, ca. 100-110 phon (the noise level of the traffic on the surrounding streets lies, as you know, fairly high, about 60-70 phon).

Point 2. 20-15,000 Hz.

Point 3. 40-10,000 Hz.

Point 4. The SPL must be great enough so that a sound that is to be heard moving between only *two* loudspeakers can actually be perceived as doing so; this means that at any

point within one of the circles of speakers, two opposite speakers of that circle must add up to approx. 110 phon.

Point 5. From sine waves to white noise, covering the whole harmonic spectrum in between.

Point 6. The area of the park, i.e. 600 by 400 feet; this was agreed upon in Los Angeles and Piene would certainly not agree to the plaza area in front of the museum. If the above mentioned area (600' x 400') is the park, then no space outside of it will be required.

Point 7. Stockhausen has never worked on a project of this nature and magnitude before, especially what concerns the diffusion of sound over a large area outdoors; perhaps Altec-Lansing 9 foot speakers are suitable.

As the project evolved, we realized that there would necessarily be as many as six or seven different companies involved in seeing it through, and no one corporation was in a position to coordinate the process, or take special proprietary interest in it. Under these circumstances, we were unable to proceed.