WESLEYAN UNIVERSITY

THREE PIECES

by

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A Thesis submitted to the Faculty
of Wesleyan University in partial fulfillment of
the requirements for the degree of Master of Arts

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CONTENTS

NICHE

performance 1978

Architecture considered as reflection and extension of body.

A network of ropes and pulleys translates the performer's position into the shape of a canvas tent. A feedback system, instigated by the tent's creaking, detects and reveals in sound the changes in the acoustical character of the space that accompany any motion of the canvas. The performer walks, creating a sequence of personal architectural spaces.

Preparation

Acquire sails, awnings, tarpaulins, drop cloths, old tents, or any other large pieces of canvas or similar heavy, tightly woven fabric. Join the pieces together to form a single sheet approximately the size of the performance area. Spread it out and center it on the floor. Tie ropes to each of the corners and to any number of points on the surface of the sheet. Fasten a pulley to the ceiling directly above each rope.

Pass the ropes through the pulleys and raise the sheet to form a tent. Attach additional pulleys to the ceiling, walls, and floors, wherever needed in order to run the ropes from the sheet, up to the ceiling, out to the walls, and back into the center of the space at floor level without obstructing the raising and lowering of the tent. Arrange the ropes and pulleys with radial symmetry, so that the paths from the walls to the center resemble the spokes of a wheel.

Fasten one-inch iron or brass rings to parts of your body (for example: tie one to your belt, lace one onto a shoe, strap one onto a wrist). Tie a snap to each rope. Clip one snap onto each of the rings. When you walk through the space the tent will "follow" you as the ropes raise and lower its various sections. Adjust the lengths of the ropes to maximize both the accessible walking area and the excursion of the tent. You may tie off some of the ropes at the ceiling or at the base of the walls to create fixed points of support, but leave at least four lines moveable. Disconnect them from your body and snap them all onto a single 2"-3" ring. The tension of the ropes should equalize so as to center the ring and support the tent at a median height.

Attach a contact microphone or phono cartridge to one of the pulleys. Mount a shotgun microphone in a desk stand near the center of the floor and aim it at an angle up towards the ceiling of the tend. Connect the microphone cables to a 7 1/2 i.p.s tape head delay with compressors or limiters. Mix the outputs of the delay and send the signal through an amplifier to a tweeter speaker. Place the tweeter face up under the tent at least six feet from the shotgun microphone. Place the delay unit and amplifier at the periphery of the space where they can be reached when you are attached to the ropes.

The creaking of the miked pulley "seeds" feedback between the speaker and the shotgun microphone. The response of the tweeter limits the feedback to mid-range and high frequencies only. At these frequencies canvas acts like a solid wall which reflects and absorbs sound. Movement of the tent effectively changes the size of the room as "seen" by the feedback. By locking on pitches whose wavelengths are integral to some dimension of the tent, the feedback will monitor closely any such change. The directionality of the shotgun microphone increases the system's sensitivity to small movements.

Prior to the performance tune the gain controls carefully so that the feedback is not continuous. The contact microphone should trigger both sustained feedback and damped ringing, depending on the shape of the tent. Then shut off the electronics and begin the performance out of silence.

Performance

Walk to the center ring. Detach the ropes. Snap them onto your rings. Move to the edge of the space. Turn on the electronics.

The position of your body at any moment is reflected in the shape of the tent, which is in turn described by the sound. Use your kinaesthetic and aural intuitions to guide the construction of a personal architectural space or the evolution of a series of spaces that together form a comfortable architectural "rate of change".

Walk slowly across the floor. Move that part of your body connected to the miked pulley only in order to initiate feedback-- do not move it while feedback is sounding. Generally move slowly enough to be able to detect and evaluate the slightest change in the acoustics of the tent, but occasionally perform sudden, disjunct actions. Generate difficulty by turning and tangling yourself in the ropes, leaning to the point of losing your balance, crouching beneath low portions of the tent, working at the limit of a rope's movement, etc.

Follow a pre-determined path across the floor or devise one as you go. Terminate the performance at the end of the path. Shut off the electronics. Disconnect the ropes from your body and snap them back onto the center ring. Leave the space.

Alternate Performance Realizations

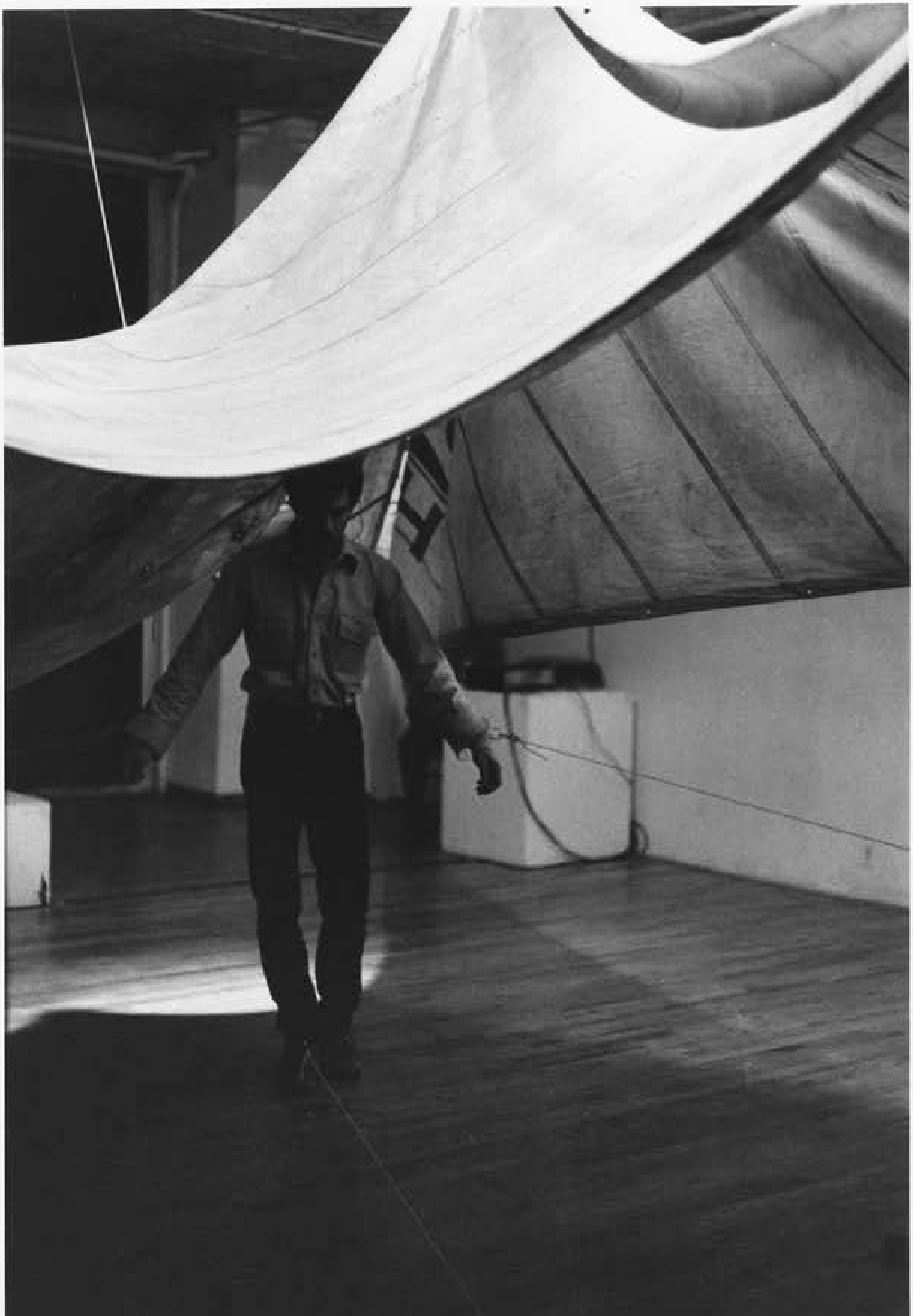
Two or more persons attach themselves to the tent and attempt to construct their mutual image of an ideal space.

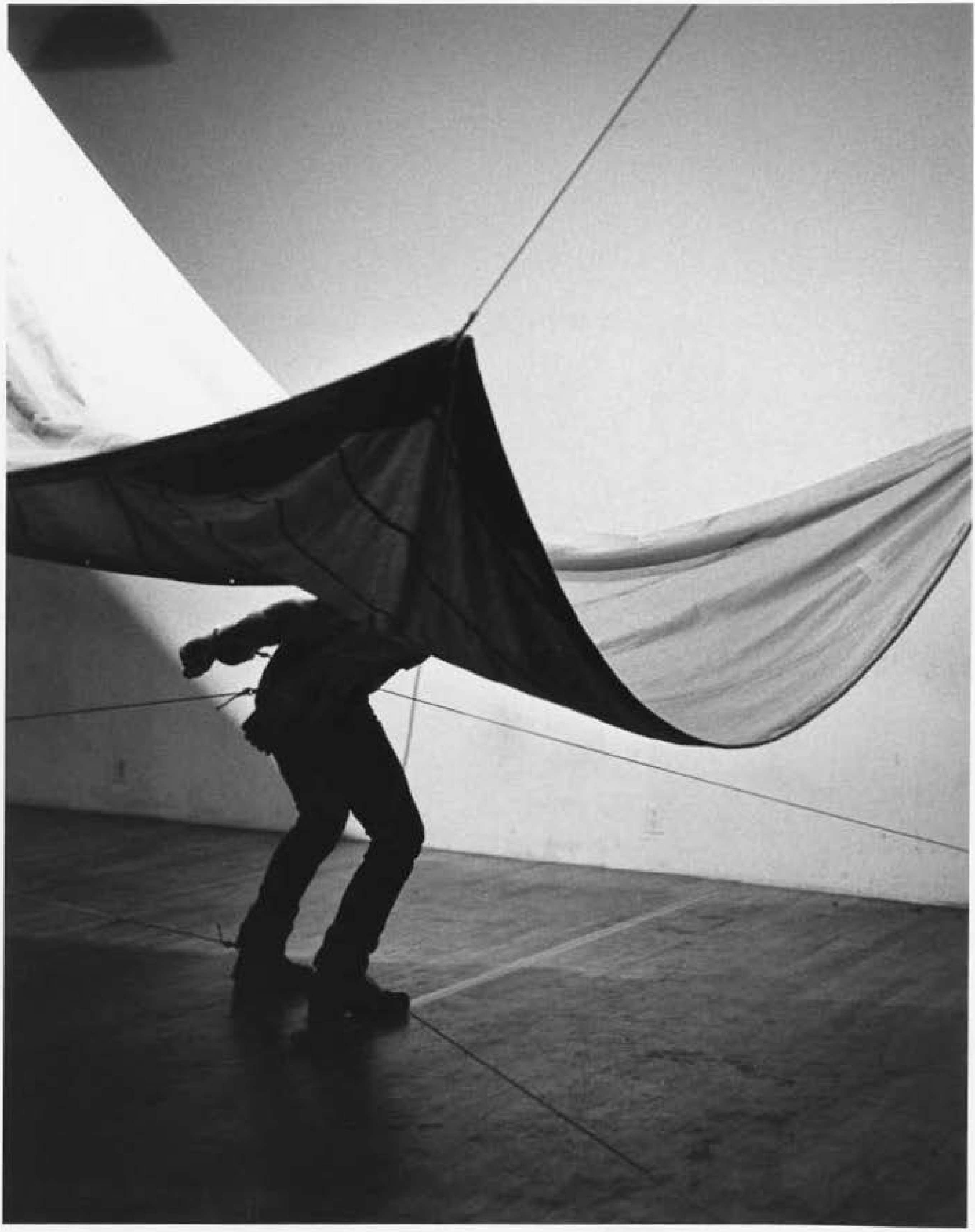
The tent weighs as much as the performer, who works suspended in mid-air beneath it.

Use other sound systems to detect and describe acoustical changes within the tent.

Photographs by Mary Lucier of a performance

of <u>NICHE</u> at the Kitchen, New York City, April 1978





NICHE

installation 1979

Niche operates as a dynamic model of sound activity. It responds to the changes in loudness within it: large changes are translated into large, sudden movements; small changes yield small, slow movements.

A tent of sails is suspended from several points. Ropes run through pulleys from two points on the tent to a pair of winches, each of which has an electromagnetic clutch and brake. Through a set of relays a microcomputer directs the winches to hold, raise slowly, or drop suddenly either section of the tent.

With a microphone and an analog-to-digital converter, the computer measures the loudness of sound beneath the tent several times per minute. It stores each value of loudness in its memory. After each measurement it compares current value to the previous one. If the current number is slightly larger than the previous one, the computer raises one section of the tent; if the number is considerably larger, it drops that section. If the number is slightly smaller, the computer raises the other moveable section; if the number is considerably smaller, it drops that section. If both values are equal, the tent remains stationary. Sensing circuitry signals the computer to release the appropriate winch when either section has been raised to its upper limit.

Occasionally the computer will transform a sequence of stored values into a string of sound. As the computer continues to acquire data, it can produce longer and longer strings.

The extent of movement after each measurement, the time between measurements, and the pitches and durations of the strings are all calculated by the computer from the data it accumulates and from scaling factors set by the programmer.

The canvas acts like a solid wall to mid-range and high frequency sound. Movement of the tent significantly affects the acoustics within it.

One can use Niche as a performance space for another musical work. The sails will develop shapes reflective of the dynamic structure of the performance, and, if the piece is acoustically responsive, movement of the tent will in turn affect that piece's character.

Special thanks to: Thomas Hale, Martha's Vineyard Shipyard; Richard Young, Wesleyan University Machine Shop.

NICHE

Program, March 1979

Synertek VIM 1 Microcomputer

Zero Page Program Variables

01	large change value
02	small change relay on-time scaling
03	large change relay on-time scaling
04	wait scaling
05	upper limit release time
06	audio frequency range scaling

Zero Page Registers

10	count index
12	current difference
14	current value
15	wait register
22	difference, for string boundaries
24	value, for string boundaries
30	string begin address
31	string end address

Input-Output Memory Locations

1810	Analog-to-Digital converter
AC00	relays

Constants for Relay Control

#00	equal, off
#10	smaller
#20	very much smaller, release B
#40	larger
#80	very much larger, release A

Memory Used

01–31	zero page
200–3EE	program
500–5FF	accumulated data

Main Program

200	EA EA EA		NOP
203	EA EA EA		NOP
206	EA EA EA		NOP
209	78 D8 EA	INITIALIZE	SEI , CLD
20C	20 86 8B		JSR ACCESS
20F	A9 00 EA	count	LDA#00
212	85 10 EA		STA count index
215	A9 FF EA	relays	LDA#FF
218	8D 02 AC		STA DDRB
21B	EA EA EA		NOP

21E	A9 DC EA	sound	LDA#DC
221	8D OB A8		STA ACR
224	A9 CO EA		LDA#CO
227	8D OC A8		STA PCR
22A	A9 7F EA		LDA#7F
22D	8D OE A8		STA IER
230	A9 84 EA		LDA#84
233	8D OE A8		STA IER
236	EA EA EA		NOP
239	A9 00 EA	sense	LDA#00
23C	8D OC AC		STA PCR
23F	A9 7F EA		LDA#7F
242	8D OE AC		STA IER
245	A9 92 EA		LDA#92
248	8D OE AC		STA IER
24B	EA EA EA		NOP
24E	8D 10 18	LISTEN	STA A/D
251	AD 20 18	status	LDA status reg.
254	10 FB EA		BPL status
257	A4 10 EA		LDY count
25A	A6 02 EA		LDX small change
25D	AD 10 18		LDA A/D
260	99 01 05		STA 501, y

Program (4)

```
263   85 14 38                     STA value, SEC
266   F9 00 05                     SBC 500, y
269   85 12 EA                     STA difference
26C   FO 2E EA                     BEQ equal
26F   90 16 EA                     BCC smaller
272   C5 01 EA    larger           CMP large change
275   BO 07 EA                     BCS much larger
278   A9 40 EA                     LDA#large
27B   10 22 EA                     BPL relays
27E   A6 03 EA    much larger      LDX large change
281   A9 80 EA                     LDA#much larger
284   30 19 EA                     BMI relays
287   65 01 EA    smaller          ADC large change
28A   90 07 EA                     BCC much smaller
28D   A9 10 EA                     LDA#small
290   10 OD EA                     BPL relays
293   A6 03 EA    much smaller     LDX large change
296   A9 20 EA                     LDA#much smaller
299   10 04 EA                     BPL relays
29C   A9 00 EA    equal            LDA#equal
29F   8D 00 AC    relays           STA relays
2A2   EA EA EA                     NOP
2A5   A5 14 EA    time on          LDA value
```

2A8	8D 1F A4		STA Timer
2AB	20 68 03	sense	JSR SENSE
2AE	2C 1F A4		Test Timer
2B1	10 F8 EA		BPL sense
2B4	CA DO EE		DEX, BNE time on
2B7	A9 OO EA	off	LDA#off
2BA	8D OO AC		STA relays
2BD	EA EA EA		NOP
2CO	A5 10 EA	STRING	LDA count
2C3	25 12 EA		AND difference
2C6	85 22 EA		STA string diff.
2C9	A5 10 EA		LDA count
2CC	25 14 EA		AND value
2CF	85 24 EA		STA string val.
2D2	C5 22 EA		CMP string diff.
2D5	BO OD EA		BCS v>d
2D8	85 30 EA	v<d	STA begin address
2DB	A5 22 EA		LPA string diff.
2DE	85 31 EA		STA end address
2E1	18 90 09		CLC, BCC increment
2E4	85 31 EA	v>d	STA end address
2E7	A5 22 EA		LDA string diff.
2EA	85 30 EA		STA begin address

2ED	E6 10 EA	increment	INC count
2F0	20 BO 03		JSR WAIT 1
2F3	EA EA EA		NOP
2F6	EA EA EA		NOP
2F9	EA EA EA		NOP
2FC	EA EA EA		NOP
2FF	EA EA EA		NOP
302	EA EA EA		NOP
305	EA EA EA		NOP
308	EA EA EA		NOP
30F	EA EA EA		NOP
311	EA EA EA		NOP
314	A6 30 CA	SOUND	LDX begin address, DEX
317	A5 14 EA	fc lo	LDA value
31A	8D 06 A8		STA TIL-L
31D	A5 12 EA	fc hi	LDA difference
320	25 06 EA		AND fc scaling
323	8D 07 A8		STA TIL-H
326	8D 05 A8		STA TIC-H
329	EA EA EA		NOP
32C	A5 06 38	time	LDA fc scaling, SEC
32F	ED 07 A8		SBC TIL-H
332	3D 06 05		AND 500, x

335	OA OA OA		ASL, ASL, ASL
338	EA EA EA		NOP
33B	A8 C8 EA		TAY, INY
33E	BD OO 05	sr	LDA 500, x
341	8D OA A8		STA SR
344	AD OD A8	poll	LDA IFR
347	8D OD A8		STA IFR
34A	10 F8 EA		BPL poll
34D	88 DO EE		DEY, BNE sr
350	E8 E4 31		INX, CPX end address
353	DO D4 EA		BNE time
356	A9 OO EA		LDA#silence
359	8D OA A8		STA SR
35C	20 B9 03		JSR WAIT 2
35F	4C 4E 02		JMP LISTEN
362	EA EA EA	end	NOP
365	EA EA EA		NOP

Subroutines

368	AD OD AC	SENSE	LDA IFR
36B	8D OD AC		STA IFR
36E	30 01 60		BMI irq, RTS
471	A4 05 EA	irq	LDY release time
374	6A 6A EA		ROR, ROR

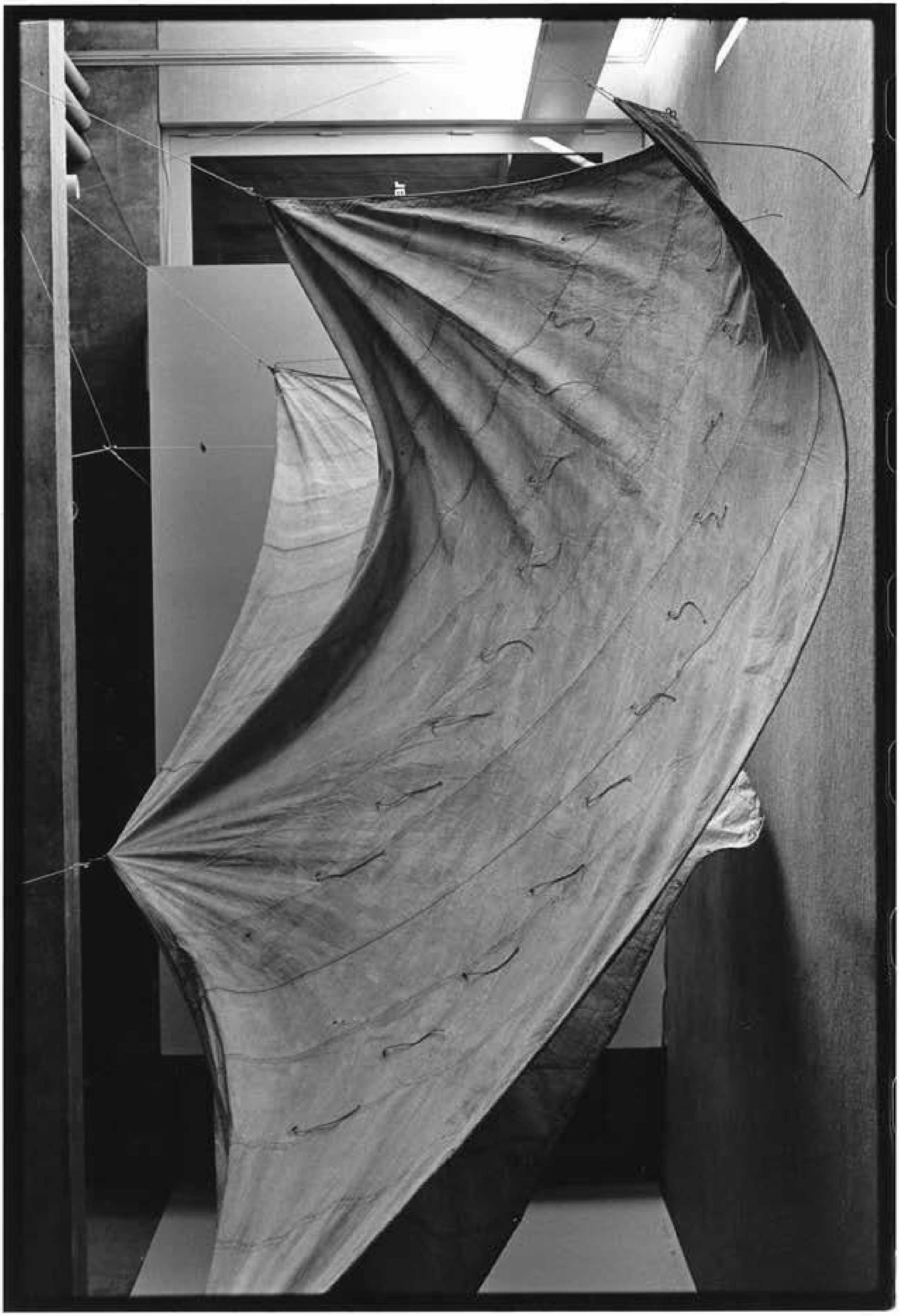
Program (8)

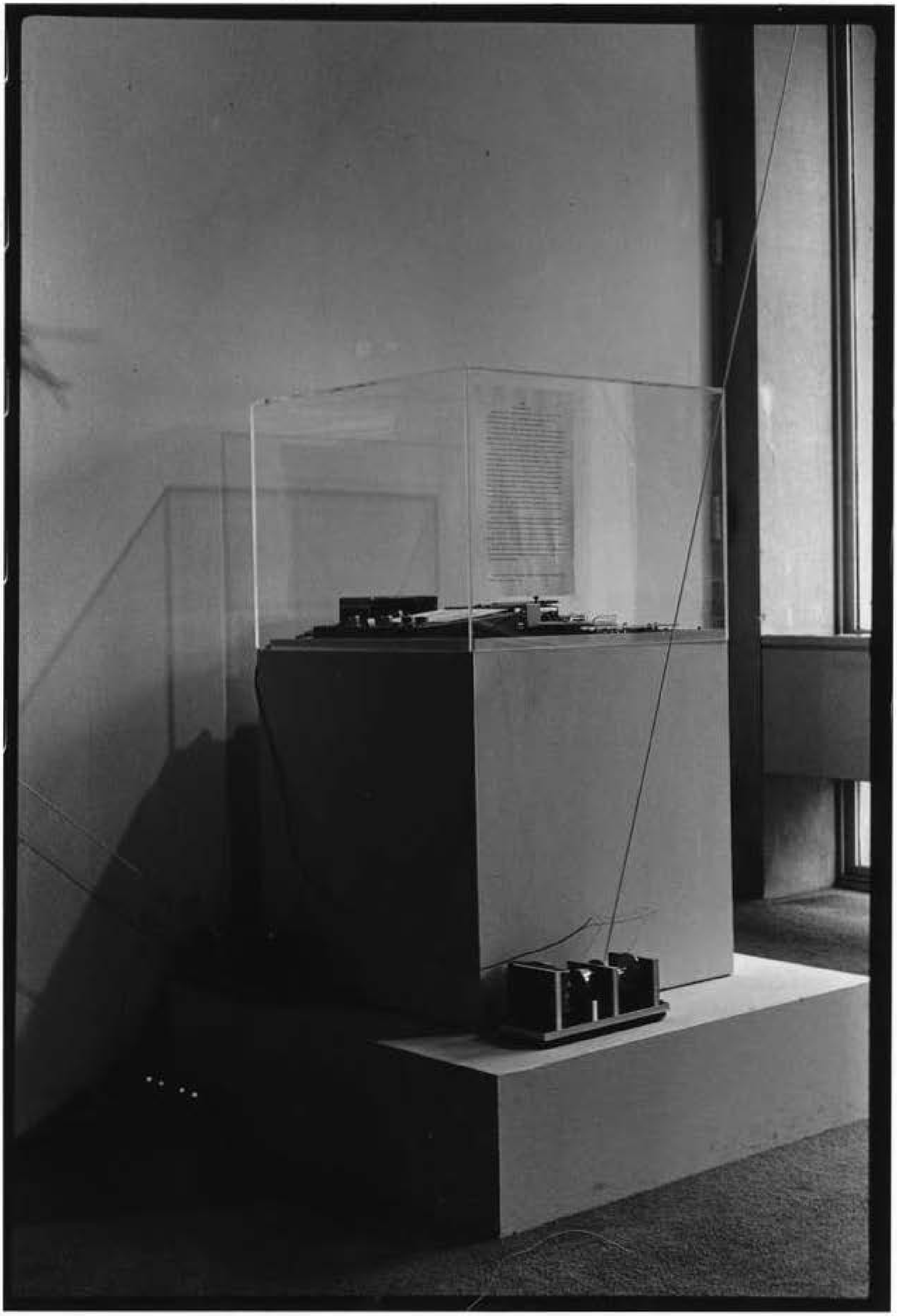
```
377    90 0A EA                BCC cb1
37A    AD 01 AC     ca1        LDA ORA
37D    A9 80 EA                LDA#release A
380    30 04 EA                BMI store
383    A9 20 EA     cb1        LDA#release B
386    8D 00 AC     store      STA relays
389    A9 40 EA     time       LDA#40
38C    8D IF A4                STA timer
38F    2C IF A4     test       Test timer
392    10 FB EA                BPL test
395    88 DO FI                DAY, BNE time
398    AD 01 AC                LDA ORA
39B    AD 00 AC                LOA ORB
39E    20 72 89                JSR BEEP
3A1    4C B7 02                JMP off
3A4    EA EA EA                NOP
3A7    EA EA EA                NOP
3AA    EA EA EA                NOP
3AD    EA EA EA                NOP
3B0    A6 10 EA     WAIT 1     LDX count
3B3    BD 00 05                LDA 500, x
3B6    20 FA 82                JSR OUTBYT
3B9    A5 12 EA     WAIT 2     LDA difference
3BC    85 15 EA                STA wait register
```

3BF	A5 04 EA	wait	LDA wait scaling
362	80 IF A4		STA Timer
3C5.	EA EA EA		NOP
3C8	EA EA EA		NOP
3CB	20 06 89	loop	JSR SCANDS
3CE	20 6A 89		JSR KEYSTAT
3D1	90 OA EA		BCC test
3D4	20 FF 80		JSR GETCOM
3D7	20 4A 81		JSR DISPAT
3DA	20 71 81		JSR ERMSG
3DD	2C IF A4	test	Test Timer
3EO	10 E9 EA		BPL loop
3E3	E6 15 EA		INC wait register
3E6	DO D7 EA		BNE wait
3E9	60 EA EA		RTS
3EC	EA EA EA	end	NOP

Photographs by Nicolas Collins and Meredith Gang of an installation of <u>NICHE</u> in the South Gallery, Wesleyan University, March 1979


→0A →1 →1A →2 →2A →3 →3A →4 →4A →5
KODAK SAFETY FILM 5063
→5A →6 →6A →7 →7A →8 →8A →9 →9A →10
KODAK SAFETY FILM 5063
→10A →11 →11A →12 →12A →13 →13A →14 →14A →15
KODAK SAFETY FILM 5063
→15A →16 →16A →17 →17A →18 →18A →19 →19A →20
KODAK SAFETY FILM 5063
→20A →21A →22 →22A →23 →23A →24 →24A →25
KODAK SAFETY FILM 5063
→25A →26 →26A →27 →27A →28 →28A →29 →29A →30
KODAK SAFETY FILM 5063
→30A →31 →31A →32 →32A →33 →33A →34 →34A →35





Photographs of an installation of

NICHE at Media Study/Buffalo,

October 1978

ANDS

for two pairs of players

with coincidence-detecting circuitry

ANDS combines basic concepts of musical instrument, structure, and form into one set of circuits. The structure of any particular performance is determined by coordinations between the players and the circuit. The form of the piece results from relationships that develop among the players in performance. The primary score is the circuit itself.

Awareness of the form is necessary for performance. This awareness can best be attained through some direct experience with the instrument and the structure. Someone who understands the circuit-as-score should design rehearsal instructions that will expose the players to the factors that shape the piece.

The instructions for the first rehearsals can be task-like and relatively mechanical, so that the players may develop a feeling for their instrument and its controls. Later rehearsals should shift the players' attention to the circuit's structuring of time and to their possible roles within that structure. (An example of an instruction set for such a rehearsal is included in this notation.) Finally, the performers' understanding of their ability to play with each other through the circuitry signals their readiness to perform ANDS. At this point they begin to use the circuit as a score for a kind of ensemble activity in which no single player "leads," "follows," or otherwise dominates any moment of the piece. The current rehearsal instructions may now be treated as a general format, or supplementary guidelines, for performance.

Most of the ANDS circuitry is housed in a 3"x5"x8" aluminum box. Four control devices are attached to this central unity with five-foot long sections of ribbon cable. Two of the controls are small keyboards, which are used by the players in Pair 1; each contains four momentary switches, a miniature condenser microphone, and two potentiometers. The other controls are two strips of four potentiometers each, which are played by Pair 2. The outputs from the central circuitry are connected to seven channels of amplification. The speakers are distributed throughout the available space.

Coincidences between the keyboards in Pair 1 change the output channel assignment of two Phase-Locked-Loop Oscillators. The rate of radical change in the sound texture of the oscillators reflects the density of the performers' activity.

Coincidences between rhythmic patterns controlled by the players in Pair 2 change the tuning of a digital oscillator. Non-coincident patterns alter its timbre. The transformations in the oscillator's sound reflect trends in the rhythmic interplay within the pair.

An additional circuit controls the final output of ANDS in response to coincidences between the two pairs of players.

Pair 1

Each player can depress any combination of the four momentary switches (A, B, C, D) on his/her keyboard. Coincidence between Player 1 and Player 2 occurs when they press A1 and A2, or/and B1 and B2, or/and C1 and C2, or/and D1 and D2. A coincidence assigns each performer's Phase-Locked-Loop Oscillator (PLLO) to output channels corresponding to the switches depressed at that moment. For example: Player 1 presses A, B, and C; Player 2 presses B and D; coincidence is detected between B1 and B2; PLLO-1 is sent to channels A, B, and C; PLLO-2 is sent to B and D. The channel assignment is held until the next coincidence.

Each PLLO alternates between two modes of operation after every eight pressings of the switches on its keyboard. In the "tracking" mode it attempts to lock in frequency and phase with any sounds it detects through the microphone mounted in the keyboard. It creates complex patterns as it tries to track the output of the other PLLO, the other sounds of ANDS, ambient sounds, and its own square-wave output. These patterns vary with the PLLO's channel assignment, and are also affected by the room acoustics. When the PLLO changes to the "holding" mode, it initially locks on the pitch it is producing at the moment of the change and then slowly drifts upward in frequency.

When the outputs of the two PLLOs are sent to the same channel they are mixed digitally, so that they are not heard as two separate sounds but rather as a single complex one. Each of the four output channels employs a different mixing circuit, and so sounds different from the others.

Each keyboard has controls to adjust the sensitivity of the microphone and the tracking speed of the PLLO.

Pair 2

Each performer manipulates four potentiometers connected to a circuit that generates pulse sequences in complex periodic patterns. Three of the pots influence the rhythmic pattern and tempo; the fourth primarily affects the timbre of the pulses. The two circuits are completely independent, each being controlled by one player, and each having its own channel of output.

When both circuits coincide by producing a pulse at the same time, they shift the frequency of a digital oscillator to the next pitch in a sequence of pre-set tunings. After every eight non-coincident pulses, the oscillator is similarly shifted to the next in a sequence of different timbres (which includes silence).

Additional counting circuitry divides the performance into four major sections. During the first section the digital oscillator operates in a low frequency range. In the second it produces high frequencies only. Its waveform becomes extremely complex in the third section, and in the last the oscillator is silent. A transition from one section to the next occurs every time a predetermined number of pulses has been counted.

The sequences of pitches and timbres, and the pulse-count and tunings for the sections are all programmed with trimpots and a matrix on the circuit board.

Output Circuitry

Every time coincidences occur simultaneously in Pair 1 and Pair 2, a circuit randomly selects one of four possible output modes: 1) only Pair 1 is audible (four channels on); 2) only Pair 2 (three channels); 3) both pairs (seven channels); 4) neither pair (all channels off). The output mode is held until the next double coincidence.

A switch, mounted on the box containing the central circuitry, overrides the random control. It directly selects either pair's output for the purpose of practicing or "tuning" either circuit. It is also used to initialize the circuitry at the beginning of a performance by selecting Pair 2's output and resetting all counters and sequences.

Sample Rehearsal Instructions

Prior to the rehearsal, the rehearsal director programs the matrix, selects tunings for the sensitivity and slew controls of the PLLOs, and sets Pair 2's pulses to a slow rate. The performers are told that the piece is divided into four sections, which are marked by changes in the range of Pair 2's digital oscillator. The circuitry is initialized.

Section 1. Only Pair 2 is audible. Only Pair 2 plays. The oscillator is in the low frequency range. The players evolve a sequence of rhythmic patterns. The pause between any changes in the rhythm should be long enough to allow the pattern of the oscillator's tunings and timbres to establish the character of the current rhythmic interplay. The two players should seek cross-rhythms that produce significant changes in the oscillator's behaviour. They should gradually increase the speed of the pulses to an average rate of one pulse per second by the end of this section.

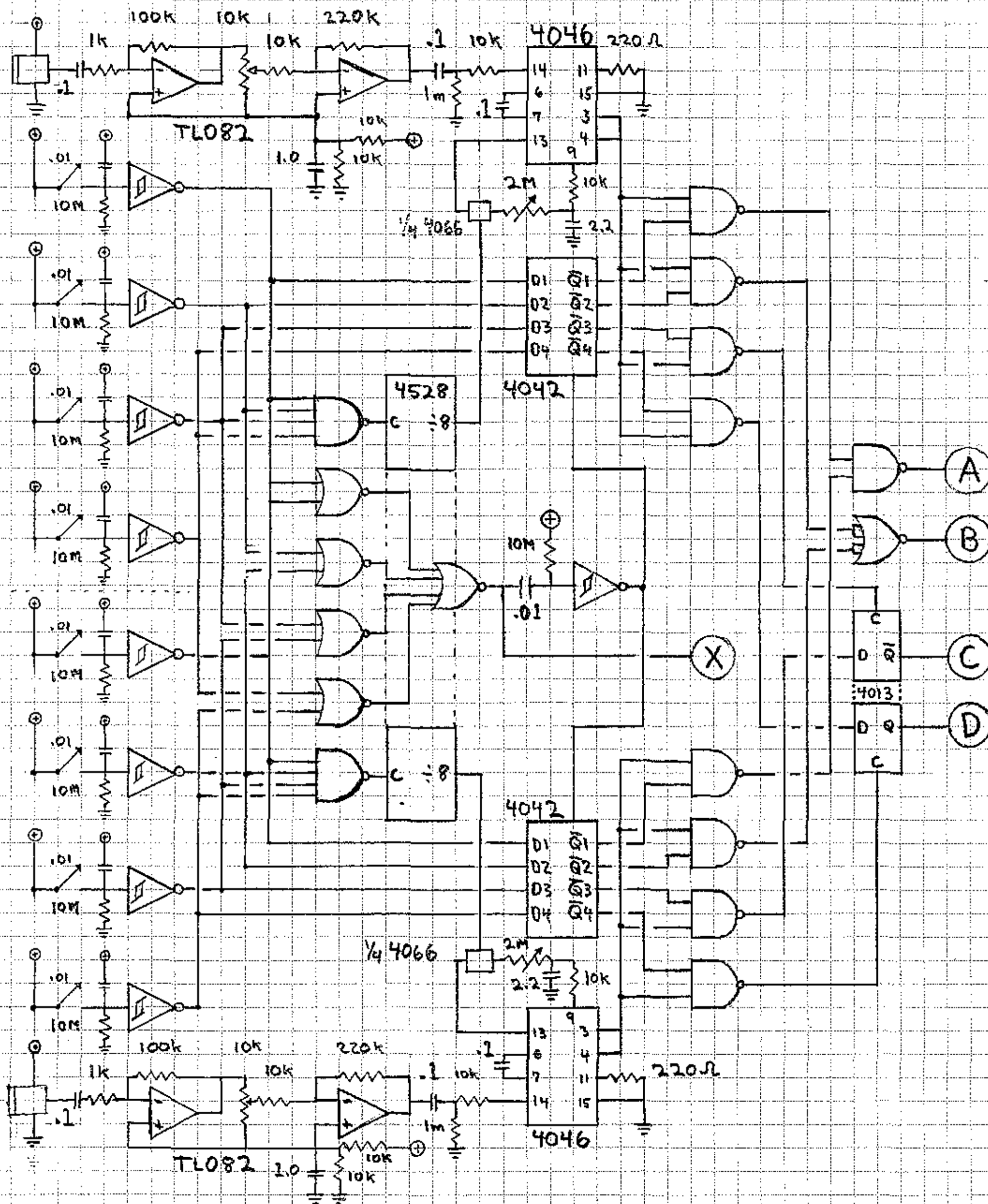
Section 2. The oscillator's shifting to the high frequency range signals Pair 2 to stop playing and Pair 1 to begin. Each full coincidence between the pulses and the keyboards will randomly select any one of the four output modes. Whenever Pair 2's pulses are audible, the players in Pair 1 should play "in time" with them --they need not attempt to synchronize exactly with the pulses, but should scale their tempo accordingly. When the pulses are inaudible, the players are free to explore the effects of other gestural styles. They should attempt to allow several occurrences of each output mode within this section.

Section 3. This section begins as soon as Pair 2's oscillator is heard producing the complex timbres of its third tuning stage. Both Pair 1 and Pair 2 play. Pair 1 should mark the transition by tuning the sensitivity and slew controls of the PLLOs to new settings, and by adopting gestural styles that are significantly different from those of the preceding section. Pair 2 should play the rhythm and speed of the pulses with the intent of varying the rate of the changes among the various output modes.

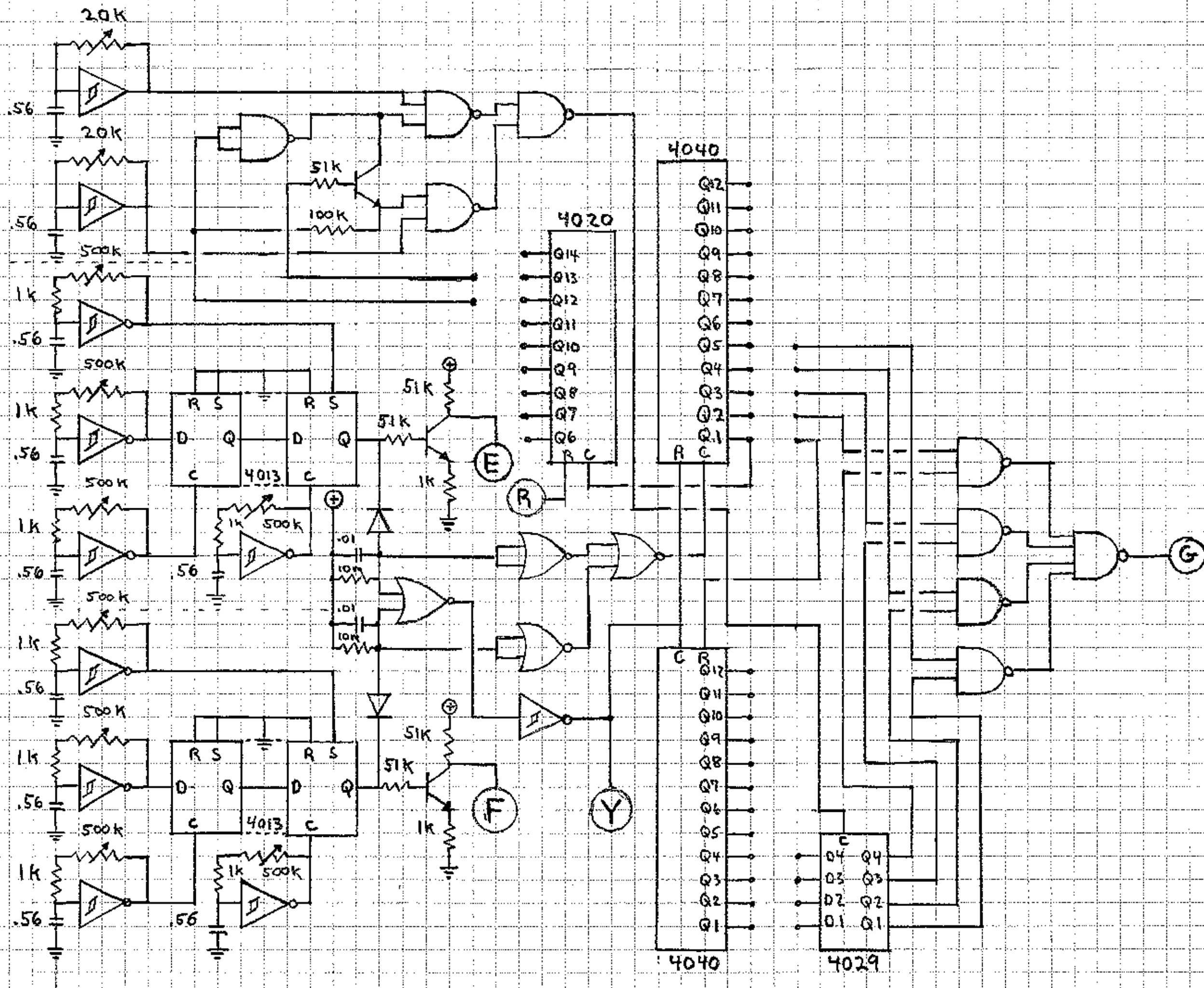
Section 4. As soon as it is clear that Pair 2's oscillator is in its last, silent stage, the players should perform whatever actions are necessary to achieve the "Pair 2 only" output mode. After waiting in this state for several minutes, the players should try to effect the silent mode. The piece ends once silence has been established.

The players and director should discuss the piece after it has ended. They should address themselves to the following questions in particular: Did the players perceive any causal relationships within the piece? Did they have any sense of control over the sounds and shape of the piece? Did they adopt particular performance roles? Did any player or either pair tend to dominate the piece? How would the players describe the ensemble of the piece? How might they try to change another runthrough based on the same set of instructions? How might they change the instructions for another rehearsal? Are they ready to perform the piece?

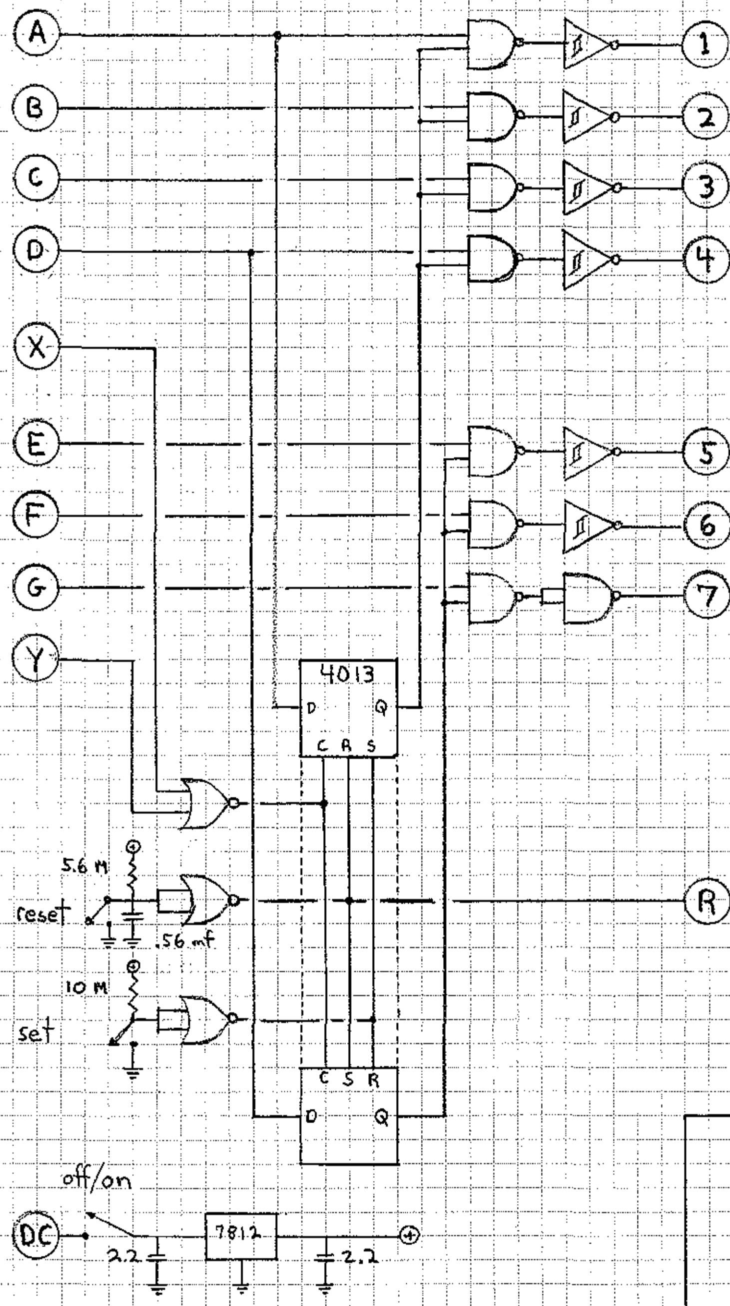
Circuit Board 1

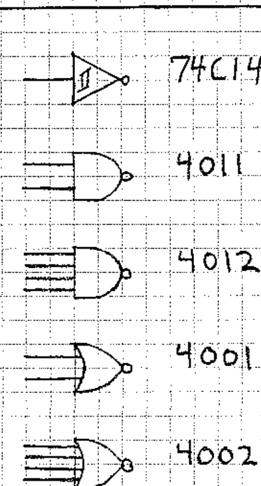


Circuit Board 2

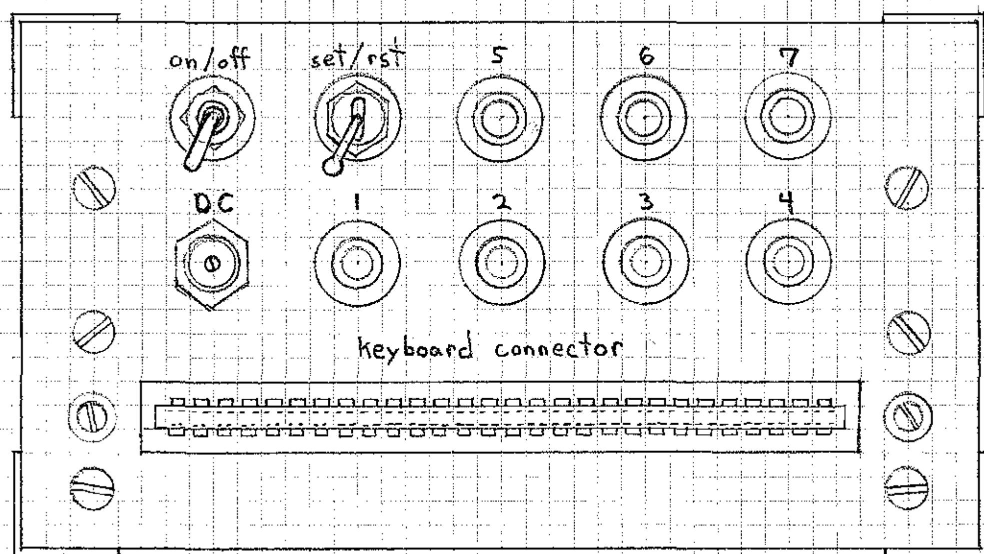


Circuit Board 3

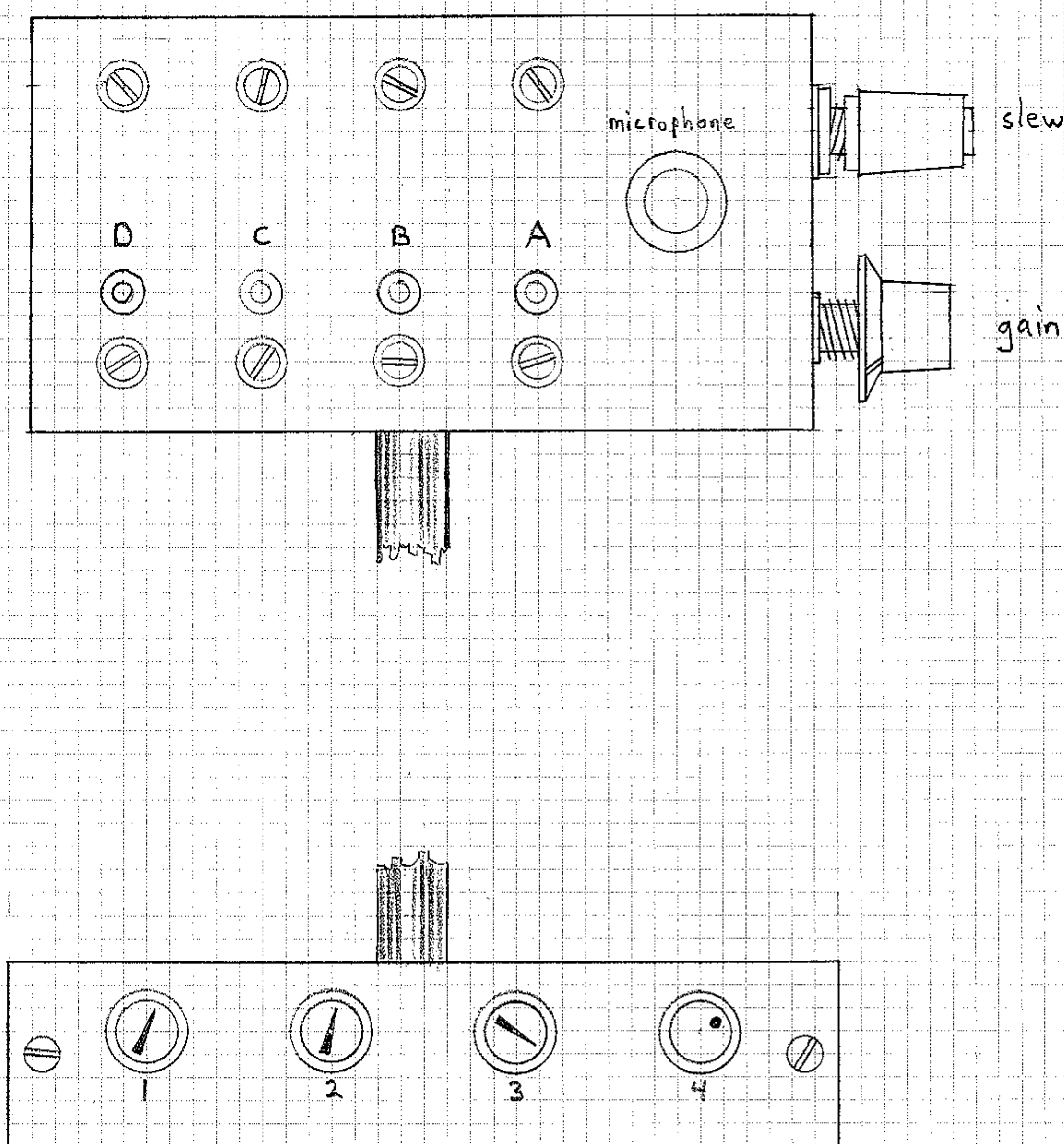




Access Panel



Keyboards



Pair 1

Pair 2

NOTES ON THE THESIS

In October 1976 in Berlin I read in "Bauwelt" (a German architectural magazine) an article by Peter Lehrecke and Ralf Kurer which described the use of acoustic "tents" in churches. Loosely-woven fabric absorbed mid-range and high frequency sound; tightly-woven material reflected it. When hung low over the knave, canopies of either material reduced the effective volume of the church and cut down the reverberation time sufficiently to make the space suitable for conferences. The following spring in Florence I saw such tents in use in the church of St. Lorenzo.

Having previously composed some pieces involving the acoustics of static architectural space, I became interested in using similar tents to construct a flexible architecture whose acoustics would vary as it moved. On Cape Cod over the summer of 1977 I collected old canvas and dacron sails. For me the curves of the hung sails evoked images of the vaulting of Antonio Gaudi and the tensile structures of Frei Otto. I settled on using a feedback system to reveal acoustical changes, and by January 1978 worked out the performance version of <u>NICHE</u> included in this thesis.

I began working with a microcomputer in May 1978, and soon began to apply it to the task of manipulating the sails. I wanted to design an architecture that was physically responsive to people within it. The focus of early versions of the installation project was still on illustrating the acoustical changes inside the moving tent, which were closely monitored by feedback networks similar to that of the performance version. Recently I have been more concerned with emphasising the ability of the computer and sails to reflect sound activity already taking place; I prefer to let the acoustical variation either be experienced directly through attentive listening, or be revealed by its influence on a separate, acoustically sensitive work performed within the tent (such as ANDS).

ANDS grew out of an interest in the early pieces of Christian Wolff and the realization that his basic concept of "coordinations" was implicit in certain types of logic circuitry. Initially I tried using "coordinating circuitry" in conjunction with traditional acoustic and electronic instruments, but I was dissatisfied with the lack of coherence between the two. Later I decided to combine a structure for group coordination and some sound producing devices into one electronic instrument, which would not be controlled directly by any single performer, but instead would bring out an image of the group as a whole. I built one such duet in April 1978 and another the following December. In January 1979 I added a third circuit board to combine the two duets into ANDS, for four players.

I have performed NICHE (1978) at the Merce Cunningham Dance Studio, The Kitchen Center for Music and Video, Media

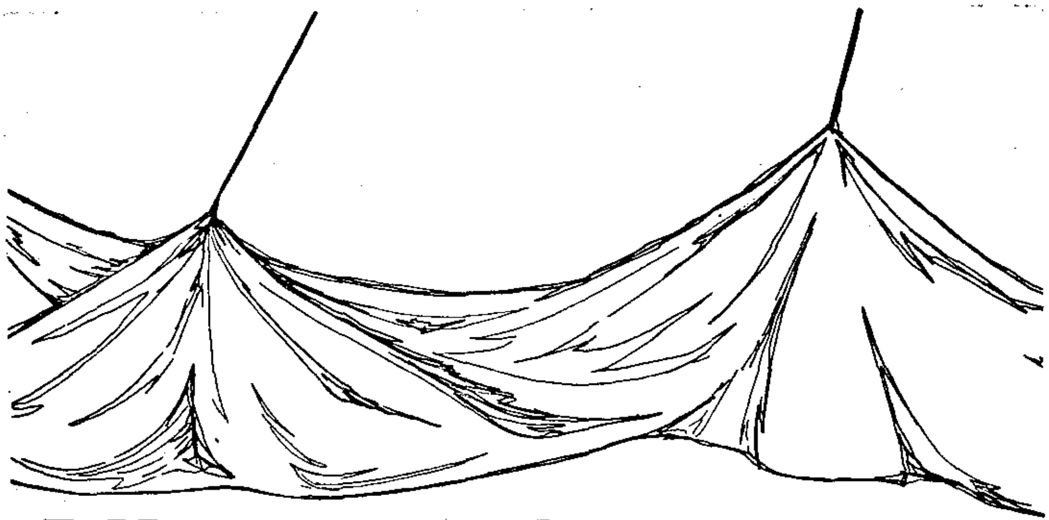
Study/Buffalo, and Wesleyan University. Various realizations of the installation of NICHE, some done in conjunction with Ron Kuivila, have been presented at Media Study/Buffalo, Millennium Film Workshop (NYC), and the South Gallery of Wesleyan University. Versions of ANDS have been performed at The Blind Lemon (Berkeley), The Concord Hotel (Kiamesha Lake, N.Y.), 80 Langton Street (San Francisco), Experimental Intermedia Foundation (NYC), Footprints (Manchester, CT.), Media Study/Buffalo, and Wesleyan. Jon Barlow and Joseph Reed have recorded the Pair 1 duet from ANDS.

My thesis show consisted of an installation of NICHE in the South Gallery from March 26 to April 1, and a performance of ANDS under NICHE in the gallery on March 29. The performers were Jon Barlow, George Barth, Joseph Reed, and Roger Solie.

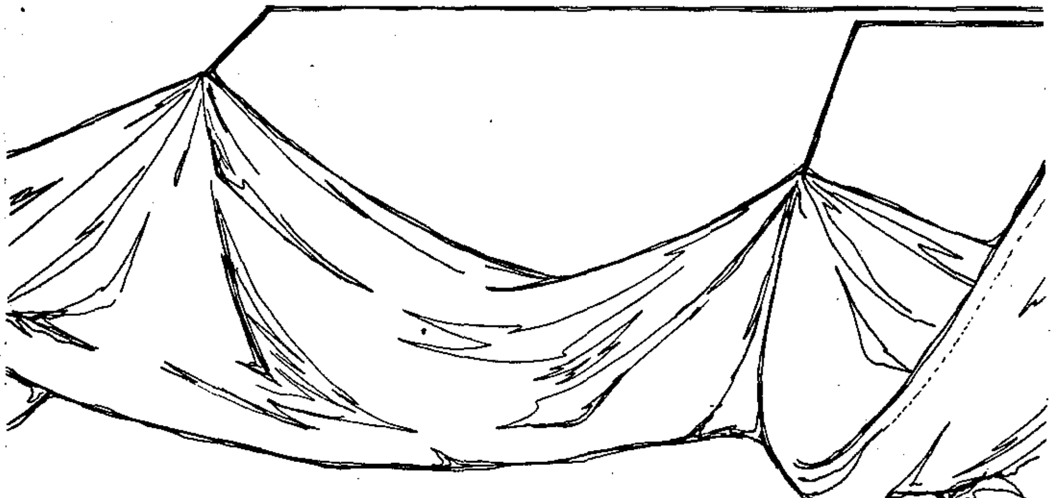
The photography in this thesis is by Meredith Gang, Mary Lucier, and myself. Linda VanMeter printed my photographs.

I would like to thank several people for their help on this thesis: K. Lea Crawley of Falmouth, Mass., and Thomas Hale of the Martha's Vineyard Shipyard, for contributing sails; Richard Young of the Wesleyan Machine Shop, for aid in making the winches used in NICHE; Meredith Gang, Mary Lucier, and Linda VanMeter, for photographic work; Rich Gold and Paul DeMarinis, who introduced me to the microcomputer; Susan Tallman, designer and editor; Jon Barlow, George Barth, Joseph Reed, and Roger Solie, who performed, advised me on notation, and edited; Ron Kuivila and, especially, Alvin Lucier, who gave needed compositional criticism.

N. C., April 1979



Nicolas Collins



New Pieces

with sails, microcomputer, and players

installation / March 26 - 31
performance / thursday March 29 8:00

South Gallery / Center for the Arts