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

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

377	90 OA 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 OO 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 OO 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
3BO	A6 10 EA	WAIT 1	LDX count
3B3	BD OO 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

NICHE in the South Gallery, Wesleyan

University, March 1979

→0A →1 →1A →2 →2A →3 →3A →4 →4A →5

TY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063

→5A →6 →6A →7 →7A →8 →8A →9 →9A →10

ODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063

→10A →11 →11A →12 →12A →13 →13A →14 →14A →15

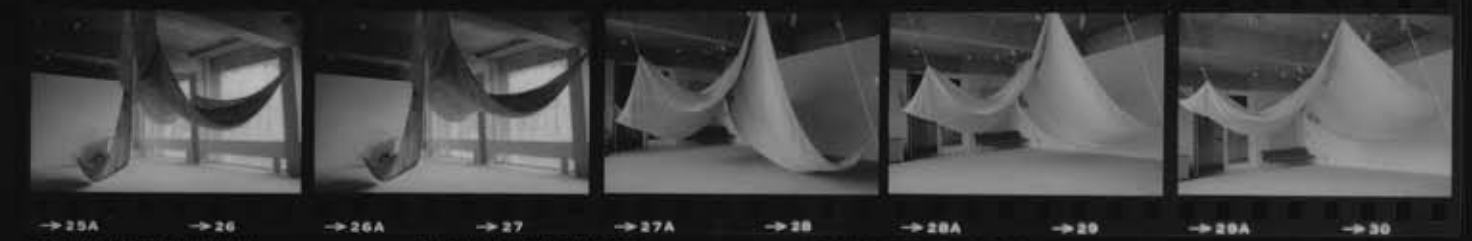
KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM S

→15A →16 →16A →17 →17A →18 →18A →19 →19A →20

063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAF

→20A →21A →22 →22A →23 →23A →24 →24A →25

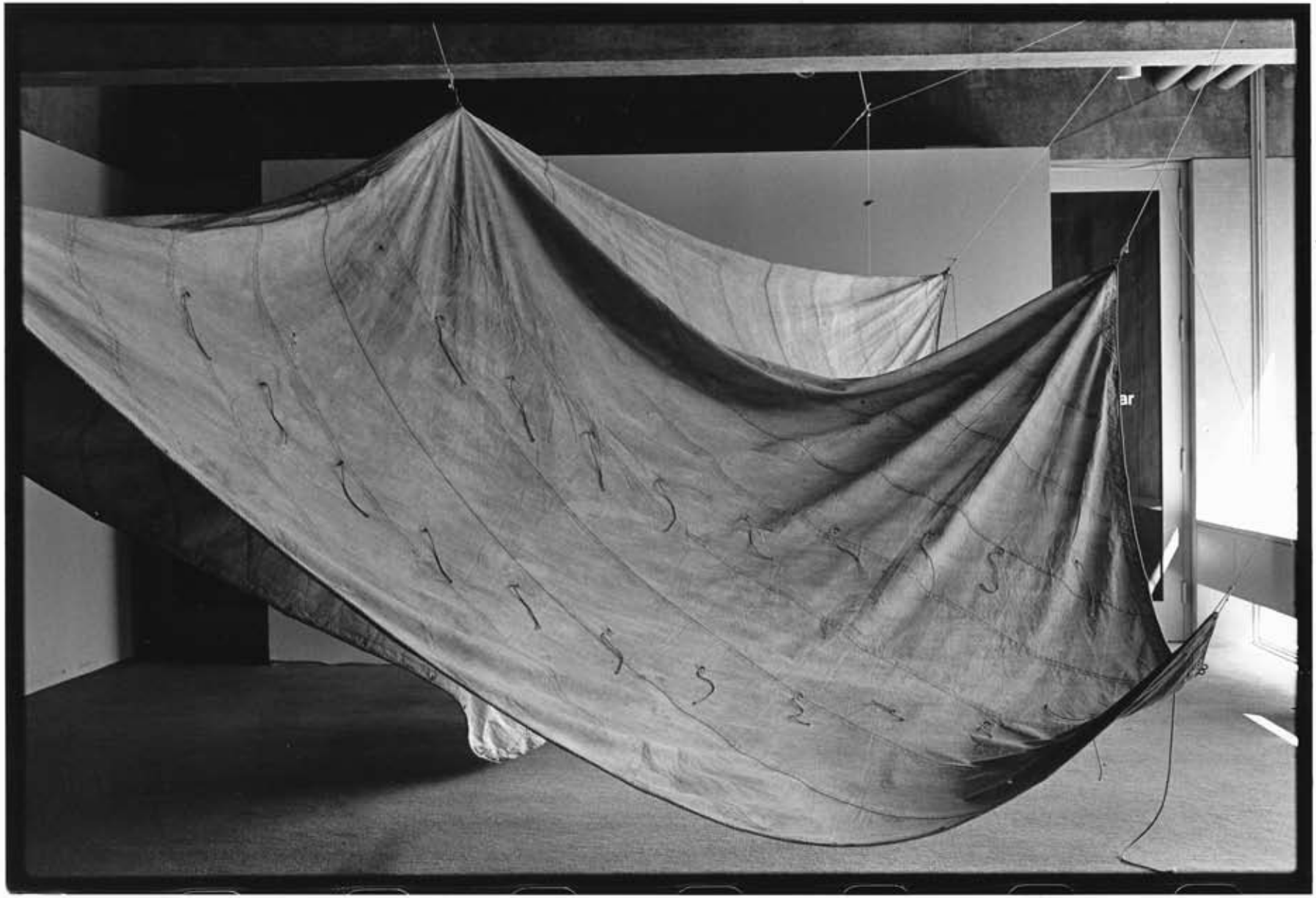
ETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063

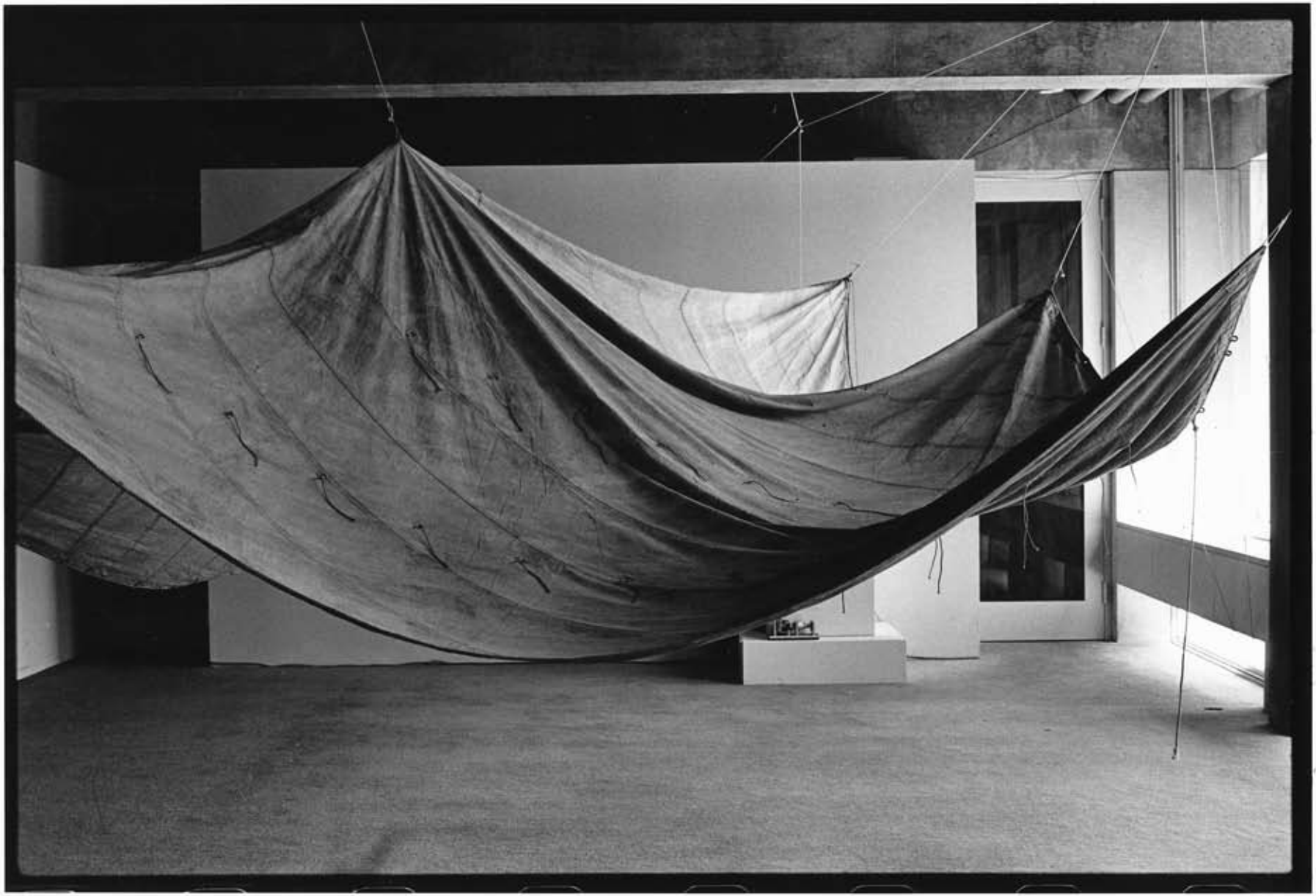


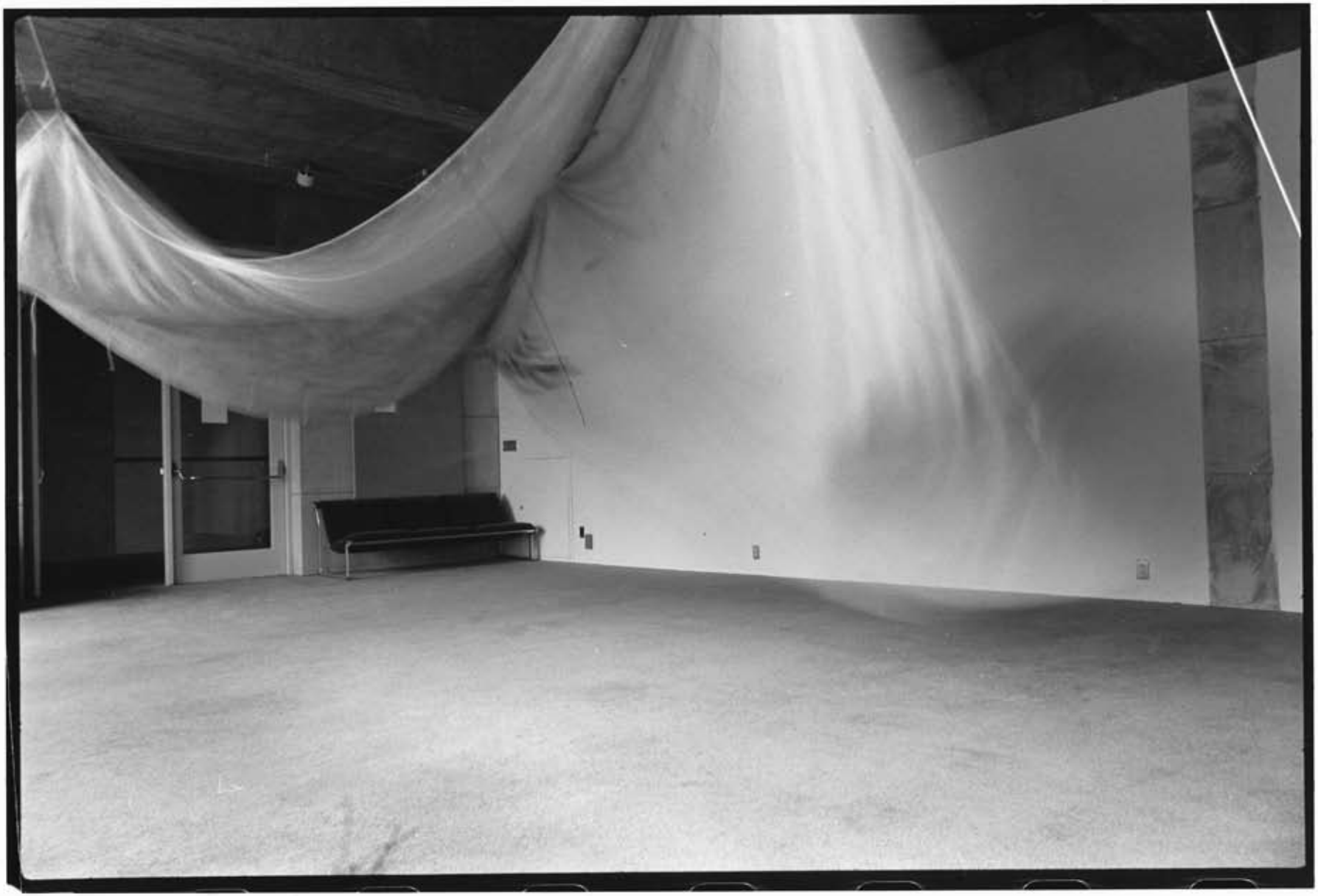
→25A →26 →26A →27 →27A →28 →28A →29 →29A →30

KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 KODAK SAFETY FILM 5063 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