Wesleyan University * The Honors College

EXPERIMENTAL MUSIC

by

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Faculty of Wesleyan University
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Contents

Introduction

In composing I make use of materials, tools, concepts, and images from a wide variety of fields: music, dance, theater, visual arts, geology, physics, calculus, electronics, phenomenology, linguistics, psychology, alchemy. I am particularly interested in exploring acoustical and psychoacoustical properties of sound and in designing tasks that generate unusual social situations among performers. Most of my compositions can accommodate musicians of almost any level of proficiency and several can be performed by so-called "non-musicians." Many pieces employ electronic devices, but often only the technician who sets up and tunes the system need have a more detailed understanding of it than as a "black box": it usually suffices for the other performers to be familiar with the system's basic theory and its perceptible behavior. The success of any of my pieces depends on each performer's focusing attention and actions exclusively on the given task.

Graphic "patch diagrams" are usually the most effective way of communicating the information needed to set up an electronic system, but instructions for the tuning of such a system and for the performance of almost any of my compositions can be given orally. Only when working with a large group of performers have I found oral instructions to be impractical and written ones to be necessary. Rehearsals and performances provide opportunities to

refine performance instructions, so whenever possible I prefer to delay the final, formal notation of a composition until after at least one performance.

I began my two-semester thesis tutorial with Professor Alvin Lucier in January 1975. I have included in this thesis scores of what I feel are the most important compositions of my last two years at Wesleyan and a set of compositional exercises that I have been accumulating since May 1974. The dates on each score indicate when I was actively composing the piece. The form and language of most of the earlier scores were greatly reworked between January and March, 1976.

Q, Second Sibilation, Word of Hand, and Pea Soup were performed at my Thesis Concert on March 8, 1976. The Wesleyan Orchestra presented wanna know? on November 9, 1975. The Wesleyan Singers have performed All the News That's Left in Print in several concerts on- and off-campus. With the exceptions of The Kuivila Uncertainty Principle, The Lesser Coverts of the Bend of a Bird's Wing When Distinctively Colored, and As I Said Before, all the other compositions have been performed publicly at least once by members of the Wesleyan Experimental Music Studio.

I would like to express my gratitude to several people who helped make this thesis both possible and pleasurable: Geordie Arnold, Neely Bruce, Marc Grafe, Gregg Howard, Isaac Hurwitz, and Eric Ranvig, who made performances

possible; Ron Kuivila, for hours of ideas exchanged; my parents and Lisa Siegman, for encouragement and editing; and especially Alvin Lucier, for four years of amazing learning.

March 28, 1976

THE NUMBERS

a continuing series of self-imposed

compositional exercises

1. At chosen intervals over an extended period of time record moments of an environment whose sonic quality changes in time as a result of environmental processes (weather, erosion, flood, drought, animal activity, tides, seismic activity, fires).

May 1974

2. In an environment that changes through time perform activities that articulate some aspect of the change. Use sounds occuring naturally within the environment, processes utilizing those sounds, or sounds brought in from outside the environment.

May 1974

3. Use sound to map an environment. At each of several different locations within it record identifying sound or perform activities that articulate some distinguishing characteristic.

May 1974

4. Improve access to sonic environments that are either:

a) static, or changing at an imperceptible rate; or

b) extremely dense, too large to hear all at once.

Use any practical, non-destructive means: realtime listening; transformation in realtime or of pre-recorded

tape by electronic, acoustic, or mechanical devices.

May 1974

5. Find an environment whose daily or seasonal transformations are reflected in perceptible changes in some aspect of its sonic character. In realtime or using pre-recorded tape perform synthetic temporal alterations on the sounds of that environment: use ears or electronic, acoustic, or mechanical devices to modify one moment's sounds to resemble those of another time. Perform gradual or instantaneous transformations.

May 1974

6. Find an environment in which the sonic character changes from one location to another. In realtime or using pre-recorded tape perform synthetic geographical alterations on sounds of that environment: using ears or electronic, acoustic or mechanical devices modify the sounds of one location to resemble those of another. Perform gradual or instantaneous transformations.

May 1974

7. Carry the sounds of one environment through others. Distribute the sounds of one environment within another. Use electromagnetic, electronic, mechanical, or biologic recording and playback devices, or any other practical means.

May 1974

8. Explore the interface--the boundary between environments: listen to, perform in, or otherwise articulate border regions; move continuously or by discrete units of time and space across interfaces.

August 1974

9. Find and explore a sequence of environments that share a common audible, visual, or conceptual element. Perform several times within the same region; each time follow a different common element. Consider any form of output (tape, photographs, drawings, notes) as a map to be used by other persons.

September 1974

10. Complete the loop: rather than taking material out of the environment, enter it as fully as possible and perform within it; maintain as an objective minimal disturbance of the system that you have entered; using any means recycle energy within the system--take no more than is necessary and return no more than the balance plus the energy needed for the unification of performer and environment.

September 1974

11. Find or create a sonic situation. Construct a multi-perspective, multi-dimensional representation of that situation by assembling: audio and visual recordings made through the different elements and objects in contact

with it; descriptions of and reactions to the situation by people who have perceived it in some way. Record the unrecordable: assemble an image of a situation that cannot be recorded and reproduced by ordinary means.

September 1974

12. A piece whose performance begins as soon as you consider it.

November 1974

13. When sound production in a performance generates very little visual material, incorporate actions that relate visually, sonically, and conceptually to the original piece. Design a set of actions that serves both to focus and to give an additional dimension of thickness to the piece.

November 1974

14. From Lisa Siegman. A piece that initially is very direct and highly accessible, but in performance moves from here through regions of progressively increasing subtlety or complexity, by transitions so gradual that access by the audience is never lost.

January 1975

15. A piece that consists of an event of finite duration repeated several times, as exactly as possible, with the repetitions separated by performances of other pieces.

The repetitions should serve to:

a) erode the event, expose different aspects each time;

b) imply a piece that is something more than the sum of the repetitions.

February 1975

16. A simple action or set of actions performed sequentially, simultaneously, and/or repeatedly by a large number of people.

February 1975

17. From Laura Pawel. One initial concept realized in several ways; each realization should stress a different fundamental concern: sound, movement, verbal information, visual design, etc. An exploration of the distinctions and overlapping between different performance frameworks.

February 1975

18. In any piece of technilogical music consider substituting performers for any or all electronic devices. How do you change the piece in order to accommodate the substitutions? How does this consideration change the ways that you approach music for electronics, for performers, and for both together?

May 1975

19. When designing an electronic module or network consider two cases for its use:

a) within a self-stabilizing feedback system;

b) within a system that responds to performance activities.

How do these considerations affect your design?

May 1975

20. Replace an electronic connection with an electro-acoustic one. Make a chain: amplifier-speaker-air space-microphone-preamp. Use it instead of a patchcord between any two electronic modules or as a feedback path between the output and input of one module. Explore the effects on the modules of performance activities within the air space.

May 1975

21. A piece that cannot be understood but only enjoyed.

May 1975

22. Instead of designing a performance "task," consider a "pleasure."

October 1975

23. From Marty Plotkin. A piece for a group of people who, unknowingly, have something unusual in common. The piece should be designed to bring out that common thing, in any such group.

November 1975

24. From Ron Kuivila. A piece in which the performers are not allowed to do anything interesting, but what results is interesting.

February 1976

25. From Lisa Siegman. Find a way of making someone listen to something he or she does not want to hear.

February 1976

LITTORAL MIX

for tape and performers

I recorded the surfbreak on a Cape Cod beach through each of the three elements that meet to form the littoral line: air, water, and earth (sand). Using Sony ECM-220 Condenser Microphones in the air, Clevite Model CH-17 Hydrophones in the water, and Shure Model 61B Vibration Pickups in the sand, I recorded simultaneously with three Sony TC-152SD Stereo Dolby Cassette Recorders onto TDK SD-C90 Cassettes. I mixed the cassettes sequentially into a $\frac{1}{4}$-inch four-channel tape in such a way as to create the effect of slow movement from one element to another across the littoral line and through the playback space.

Using this tape as a core prepare and present materials and perform activities that relate in different ways (sonically, visually, conceptually, emotionally) to both the littoral environment and the particular performance environment. Create a field of imagery in which members of the audience can participate by associating personal images, memories, and fantasies.

September 1974
March 1976

COGINCHAUG

for tape and performers

I recorded the Coginchaug River, in Middlefield, Connecticut, at nine locations along its course, from the headwaters of a tributary to a set of falls. I made each recording through an element or object that touches or is part of the river: air, water, rock, tree root, bridge foundation. Using Sony ECM-220 Condenser Microphones in the air, Clevite Model CH-17 Hydrophones in the water, and Shure Model 61B Vibration Pickups on the rocks, roots, and bridge, I recorded with a Sony TC-152SD Stereo Dolby Cassette Recorder onto Maxell UD-C46 Cassettes. I mixed the nine cassettes sequentially into a $\frac{1}{4}$-inch four-channel tape in such a way that each location appears, in stereo, between a pair of speakers, and the sequence cross-fades and flows clockwise around the playback space.

Using this tape as a core prepare and present materials and perform activities that relate in different ways (sonically, visually, conceptually, emotionally) to both the environment of a river and the particular performance environment. Create a field of imagery in which members of the audience can participate by associating personal images, memories, and fantasies.

October 1974
April 1975

ALL THE NEWS THAT'S LEFT IN PRINT

for any number of performers

The performance space provides for each performer a chair or seating area and one full sheet from that day's local newspaper. The seating should be distributed throughout the available space and oriented in different directions in relation to the audience. The newspaper sheets should be assembled into a single copy and placed on a small table somewhere in the space.

Enter the space and walk to the table. Remove one sheet from the newspaper. Move to an unoccupied seating area. Visibly make yourself comfortable and prepare to read.

Read one sentence out loud as though reading to someone five feet behind you: not very loudly and without looking up. Tear the sheet in half and allow one half to fall to the floor while you retain the other. Read one sentence (it can be the old one or a new one) out loud from the remaining portion; then tear it in half as before. Repeat this process until there is no legible print left. When the sheet becomes so small that you can no longer read a full sentence, read the contents of one line of type or a column of letters or syllables.

When you have finished the paper gather and noisily crumple up all your pieces into a ball, and carry it out of the performance area in the manner of your entrance.

Optional ending: if this piece is used to terminate a concert each performer should enter equipped with his or her favorite portable beverage, food, or smoke, which he/she consumes after reading and before cleaning up and exiting.

February 1975

THE KUIVILA UNCERTAINTY PRINCIPLE

for two performers and tape recorder

Cast

The Speaker should be an individual known for great eloquence, lucidity, or verbosity, a keen and unshakable sense of logic, strong scientific or mathematical methodology, or some similar virtue.

The Spoker should be very familiar with the Speaker and his qualifying attributes.

The performers may be of either sex, but for the sake of clarity in the use of personal pronouns in this score, the Speaker will be assumed male and the Spoker, female.

Set

A cassette or reel-to-reel tape recorder rests on a small table to one side of a podium. A chair is placed behind the table. A microphone is mounted on top of the podium and connected to the tape recorder. If external speakers are used they should be located on either side of the stage or performance area in the manner of a P.A. system, or else immediately in front of the podium. If the tape recorder's internal speaker is used the machine should be positioned so that the speaker projects to the audience as efficiently as possible. The connections in the microphone-tape recorder-amplifier system should be set up in such a way that the microphone signal is heard through the speakers unless the tape is being played back.

A sheet of paper lies on top of the podium. Prior to the performance the Spoker has written one sentence on this sheet: it begins "The Kuivila Uncertainty Principle states that. . ." and concludes with a declaration, of her invention, designed to provoke the Speaker in some way. The Speaker should not be allowed to see the paper before the performance begins.

An optional pitcher of liquid and a glass may be placed on the podium.

Performance

The two performers enter the space together. The Spoker sits in the chair. The Speaker stands at the podium and reads the paper to himself as though reviewing lecture notes. He begins speaking by explaining, elaborating, and providing proof for the Kuivila Uncertainty Principle as he found it stated. The Spoker records him on the machine in front of her. She can, at any time, stop the recording, rewind the tape a few yards, and play back a statement or series of statements by the Speaker.

While the tape is being played the Speaker listens; when it ends the Spoker resumes recording, and the Speaker must argue <u>against</u> what was just heard, contradict what he said earlier (he may allude to the methodology of "reductio ad absurdum"), and offer an alternative explanation, proof, or approach to the material in question. Again, at her discretion, the Spoker can stop, rewind,

play back, and force the Speaker to argue with himself while she resumes recording; if she plays back the response to her previous interruption, he must find a new approach rather than returning to the reasoning that he was following prior to that interruption.

This process continues until the Speaker has nothing left to say, at which point he attempts to exit gracefully. The Spoker rewinds and plays back the last section of the tape and exits during the playback.

March 1975

NOTE

for any number of performers

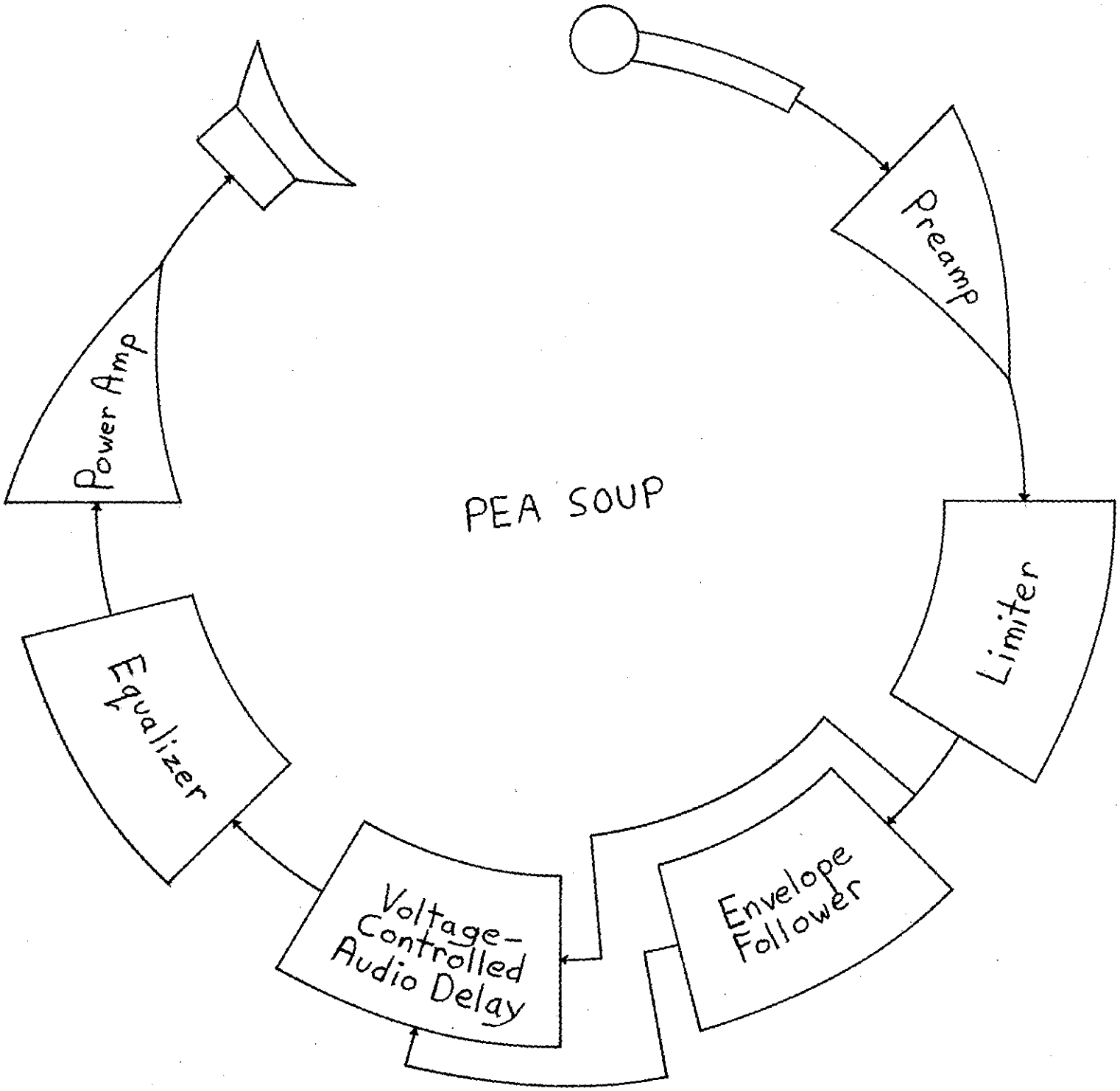
Any environment can be used as a performance space, but the piece was conceived with large spaces in mind: open country, a canyon, a forest, a desert, a campus, a spread of city rooftops, a stadium, a cathedral, a cave. Each performer should position himself at as great a distance as possible from the others. Where practical, the audience should be encouraged to move through the space.

Before the performance select the "Note," which should be a pitch common to all the instruments and, if possible, a resonant frequency of the performance space. Unpitched instruments should all be within the same general range.

The Note should be played as a short pulse of sound. You may attempt to play the Note synchronously (according to your perception) with any other performer by sounding it as soon as you hear another Note begin, and at the same dynamic level as that Note; you may sound the Note, at a dynamic level of your choice, when no other Note can be heard; you may remain silent whenever and for as long as you wish. Play no other note but the Note. Consider any echo as a performer. You may move through the space if the space allows movement.

The performance begins with the first Note, which can be played by any performer, and ends when no one has played for a long time.

February 1973
April 1975


PEA SOUP
Preamp
Limiter
Envelope Follower
Voltage-Controlled Audio Delay
Equalizer
Power Amp

Pea Soup is a self-stabilizing feedback network that generates a sonic image of its immediate environment in response to certain basic acoustical properties of the space: the set of resonant frequencies (normal modes), the reverberation time, the level and pitch of ambient sound, the speed and paths of sound transmission, and the standing-wave patterns. Within a static architectural space some of these properties are constant, some vary according to meteorological conditions, and some can be influenced by human activity. Pea Soup can exist as a participatory public or private installation, or it can be presented in concert by performers who use instruments to manipulate the variable properties and thereby change the character of the image.

The Patch

Pea Soup uses a configuration of electronic components to shift the pitch of an audio feedback signal among various resonant frequencies of the air space in which it is operating. In a simple microphone-amplifier-loudspeaker loop feedback can occur at any frequency whose wavelength is integral both to the distance separating the microphone from the speaker and to at least one of the dimensions of the space. When a short (<30 ms), variable time delay is introduced into the feedback loop, it effectively changes the speaker-microphone distance

and therefore can be used to reinforce or cancel frequencies of different wavelengths.

In Pea Soup an electronic delay is produced by a Voltage-Controlled Phase-Shifter. The amount of delay is determined by an Envelope-Follower, which generates a control voltage that is, at any moment, directly proportional to the level of sound at the microphone. As the system begins to feed back at a particular frequency, the increasing amplitude of the signal causes a change in the delay time. This cancels feedback at the initial frequency and enables it to begin again at one that is resonant within the conditions established by the new delay time. The increasing amplitude of this signal causes another delay change, which cancels the second feedback frequency and enables another to begin. Once the system has been properly tuned this process of self-stabilization can continue indefinitely.

The acoustical properties mentioned earlier are the principle determinants of the characters of this process and the sonic "soup" that it generates. Feedback occurs at frequencies that are resonant to the air space; the speed with which it shifts is dependent on the reverberation time. Any sound, ambient or performed, picked up by the microphone increases the delay; in addition, the feedback tends to "follow" the frequency of pitched sound performed in the space. Any object or condition that

influences the transmission of sound from the speaker to the microphone alters the standing-wave patterns and consequently changes the sound level at the microphone. The speaker and microphone together define a "responsive field," within which the sounds, location, texture, and movement of objects and beings, and the density and motion of the air all affect the soup.

A Limiter is inserted into the loop in order to prevent high-level feedback signals from distorting or overloading the other devices. An Equalizer or the tone controls of an audio preamp can be used to balance the system for wide and uniform frequency response or to tune it to a specific operating range. The response pattern of the microphone (unidirectional, cardioid, omnidirectional, etc.) determinesthe shape of the field.

Set-up and Learning

Assemble any number of electronically independent channels of the Pea Soup patch within the chosen space. Position the speakers facing inwards from the periphery of the performance area. Distribute the microphones within the area; they may be mounted on stands, suspended, or fastened in any other appropriate way.

The location of the microphones and speakers in relation to each other and to the boundaries of the space delimits the full Pea Soup field and influences which of the resonant frequencies will be heard. Separate each

microphone from the speaker associated with it by a distance at least as great as the wavelength of the lowest frequency of feedback that you wish the loop to generate. When more than one channel is used, this distance should be different for each microphone-speaker pair in order to increase the number of possible frequencies in the soup.

The density of the soup is a function of the number of channels used and the total sound level. The power amplifier and microphone preamplifier level controls, the Envelope-Follower and Limiter slew times, and the control sensitivity of the delay all affect the speed and phrasing characteristics of the soup. The delay range and the Equalizer settings can be adjusted to maximize the frequency range of the feedback.

Tune the system so that it is stable enough to require no subsequent adjustment. For each such tuning find instruments that you can use to change the character of the soup: your body; other bulky, moveable objects; any acoustic or electronic sound producing device; any mechanism or material that can alter the density or motion of air within the space, such as sources of heat or coldness, compressed gases, or fans. Begin every performance with a careful tuning process prior to any other activities.

When you are still and silent the soup flows around you through the space. When you move, make a sound, or change the air, you displace some and disturb its flow.

When you stop, it returns, filling the place you previously occupied, following the sounds you made, and adopting a new pattern of circulation. Each pattern contributes a different perspective to the Pea Soup image.

Treat Pea Soup as an alien intelligent being who is attempting to gather information about her environment and its residents. The soup is both the tool with which she examines the space and the language by which she processes information and expresses her image of the space. Approach performance as an attempt to 1) facilitate her acquisition of information about the environment and you by inducing a variety of circulation patterns, and 2) learn her language and therefore begin to perceive the space through the soup.

Develop instrumental technique that is appropriate to the task of directing the flow of the soup. Derive performance realizations from your experiences.

Performance Suggestions

Movement

Set up several channels of Pea Soup in a performance space. Mount the microphones three to four feet above the floor. Tune the system so that it responds to movement in the field.

Walk slowly through the field. Pause after each step for the soup to react and settle fully. Perform slow,

simple, exploratory movements of your body while standing in place: turn your head or torso, raise an arm, lean, bend, crouch, etc. Do not perform any compound motions (i.e. turning while stepping or raising an arm) or any superfluous actions.

Pea Soup is sensitive to the size of movement and objects. Small movements or the motions of a small or narrow object (such as a hand, an arm, or the head) have the strongest effect on high frequencies. Movement of the torso affects both mid-range and high frequencies. A step forward usually affects the entire range of the soup.

Adopt Pea Soup's phrasing characteristics. Let your movement grow not from visual considerations but from a sensitivity to Pea Soup's manner of perceiving you.

The duration of the performance is determined by the length of time you take to move across the entire field.

Voice

Set up several channels of Pea Soup in a performance space. Mount the microphones four to five feet above the floor. Tune the systems so that it shifts through a wide range of frequencies and is responsive to pitched vocal sound.

You may begin and end a vocal performance in one

of two ways:

1) Tune the system. Enter and leave the field by following the suggestions for the performance of movement.

2) Walk to the center of the field. Have an assistant turn on and tune the system. Leave the field only after he has turned it off.

Stand in the center of the field. Listen: learn the pitch vocabulary and phrasing of the soup.

Perform the following tasks several times, in any order:

1) Begin a note in unison with a pitch that grows out of a silence or lull in the activity of the soup. Attack the note softly on a round "oo," (as in "soup"), "n," or "m" sound and increase to a loud "e" (as in "pea"). Sustain the "e" and detune it slightly until the soup cancels that pitch and shifts to a different one; then sharply release the note.

2) Begin a note out of a silence or lull; it should have a pitch that you have heard before, but one that is different from the one growing out of the lull at that moment. Attack the note softly on an "oo," "n," or "m" and increase to a loud "e." Sustain the "e" until the soup shifts to your pitch or to a harmonically related one; then sharply release the note.

3) Choose a soup-pitch that is not sounding at the

moment. Sing it as a short, loud "e" with a sharp attack and release. Pause for two or three seconds. Repeat the pitch but sustain it a little longer than before. Pause. Repeat it again but sustain it even longer. Continue this process until you have coaxed the soup onto this pitch or onto a related one.

4) Choose a soup-pitch that is not sounding at the moment. Sing it with a slow attack and sharp release ("oo"-"e"), a sharp attack and slow release ("e"-"oo"), or a slow attack and slow release ("oo"-"e"-"oo"). Repeat the note, with pauses, until you have coaxed the soup onto this pitch or onto a related one.

5) Learn a two or three note sequence from the soup. Mimic it as accurately as you can. Will the soup repeat it after you?

If, at any time, the soup locks on one pitch, sing a loud "e" an octave or two above and detune slightly until the soup cancels the pitch.

Make your performance very sparse. Sing no louder or longer than is necessary to coax the soup onto each new pitch. Pause after each event for the soup to react and settle fully. Follow Pea Soup's sense of time and phrasing. You may sing from different locations in the field, but do not sing while you are moving or while the soup is settling from your movement.

Changes of Temperature

1) Set up and tune several channels of the Pea Soup patch. Use any available heaters and air conditioners to change the temperature of the entire space as rapidly as possible between its greatest extremes.

2) Set up several channels of the Pea Soup patch in a space with a flat, smooth floor. Place the speakers on the floor, and mount the microphones on short stands or in mic-mice. Tune the system so that it is responsive to the movement of the heat sources used in the performance.

Provide each performer with a candle in a wide-based holder with a long string attached. Place the lit candles around the perimeter of the Pea Soup field. Lay the strings across the field, each leading to a point opposite its candle.

Pull the candles very slowly across the field.

Other small sources of heat, such as kerosene lanterns, Coleman lamps, oil lamps, butane lighters, blowtorches, or cans of Sterno, may be substituted for the candles.

August 1974--
March 1976

FEETBACK

for any number of performers with
with brass or woodwind instruments,
simple electronics, and one assistant

Preparation

A dry space with a large performance area is preferred for this piece. Prepare each instrument by installing a miniature microphone (such as a Sony ECM-16) inside its mouthpiece or in the bore as near to the mouthpiece or embouchure as possible. For each instrument set up one channel of amplification consisting of a microphone preamp, an audio limiter, a power amplifier, and a speaker. Place the speakers anywhere along the perimeter of the performance area where they can be seen by the audience. Run long microphone cables from the center of the area to the preamps; coil the excess neatly in the center and leave the ends unmarked, so that none of the performers can tell which cable leads to which speaker.

When the gain of any channel is raised high enough, the performer can use the instrument as a variable acoustical filter in order to reinforce or cancel different frequencies of the resultant feedback.

Performance

Walk into the center of the performance area. Pick up the end of any cable and tie it around your waist.

Connect your instrument's microphone to the cable. Once the entire group is attached, the assistant raises the gain of each channel to the threshold of feedback. After he has done so click the keys or thunk a valve or the slide a few times until you have determined to which speaker you are connected.

Walk towards that speaker. At each step along the path try to prevent your channel from feeding back by finding fingerings or spatial orientations of the instruments (aimed away from the speaker, blocked by your body, etc.) that cancel feedback, or by clicking or thunking, which usually drive the limiter to decrease the gain. You may only take a step when no one in the group is feeding back.

Continue moving in this fashion until you can no longer sustain any silence, and therefore neither you nor anyone else in the group can progress any farther; disconnect yourself and leave the area. The performance ends when the last person has left.

An FM wireless microphone system can be used in place of the cables. If a short version of the piece is desired the assistant can hasten the end of the performance by raising the gain of the amplifiers high enough to make silence impossible, thereby forcing all the performers to disconnect.

October 1975

THE LESSER COVERTS OF THE BEND OF A BIRD'S WING WHEN DISTINCTIVELY COLORED

for any number of performers
with bowed stringed instruments

Tune one string of your instrument to a strong resonant frequency of the performance space. (When several persons perform they should tune to not more than three different frequencies). Position yourself anywhere within the space.

Play all the harmonics of that one open string. Rest one finger of your left hand very lightly on the string at the nut. Move the finger as slowly as possible from the nut to the bridge. Bow continuously, but vary the bowing quality (weight, amount of hair, point of contact, etc.) to bring out as many different harmonics as possible at each position of the finger. You may stop the movement of the left hand to hold and explore a position, but you may never move back towards the nut. Do not use tremolo or vibrato.

The process of moving from nut to bridge should take at least thirty minutes and should never sound like a glissando. When you reach the bridge, stop playing. Wait for the other performers to finish, then leave the space.

October 1975

wanna know?

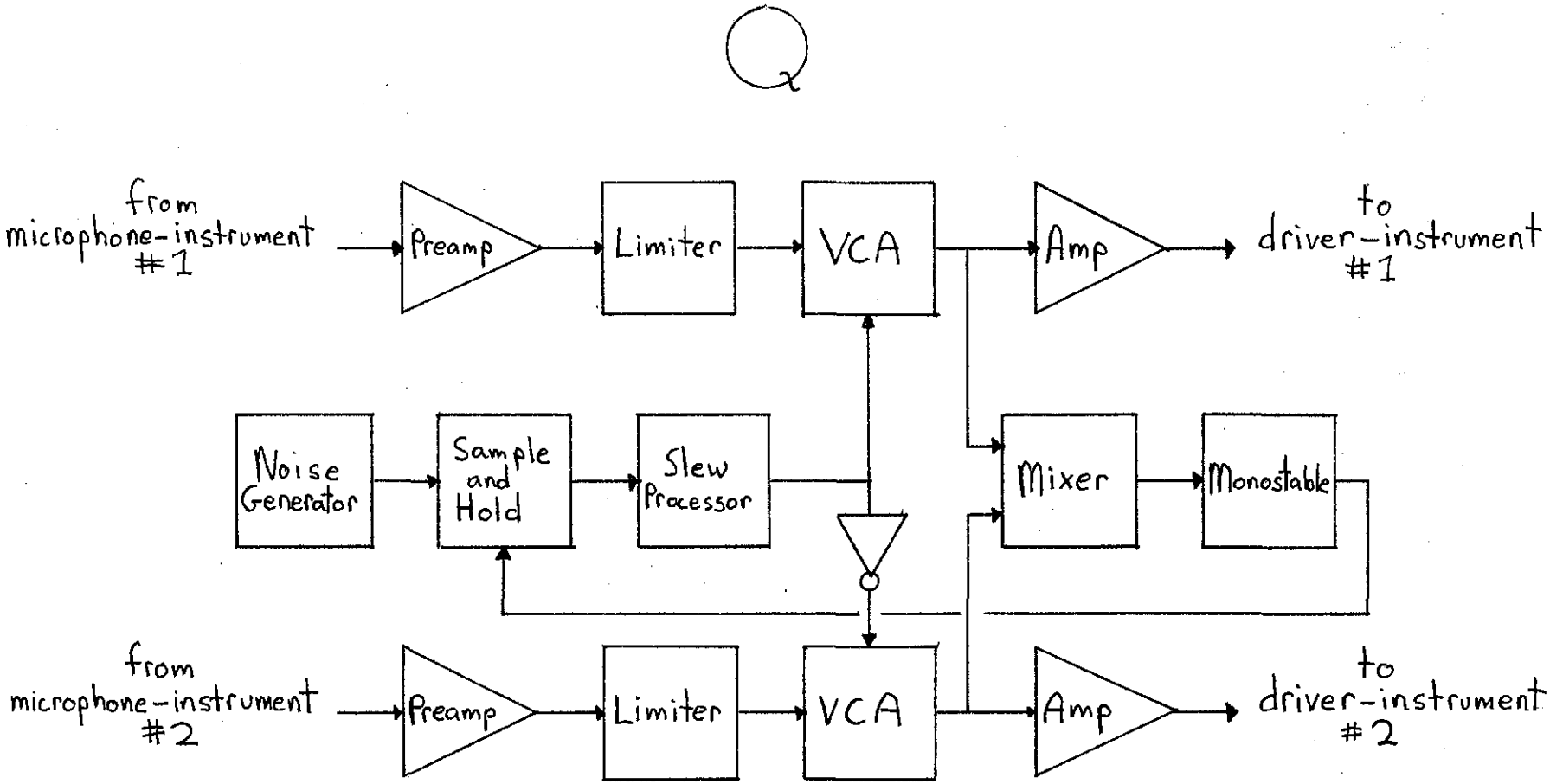
for orchestra

Set up Feetback and The Lesser Coverts of the Bend of a Bird's Wing When Distinctively Colored in two halves of a large performance space. Place several tympani and snare drums near the speakers used for Feetback. Set the pedal of each tympanum for its lowest tuning. Put the snare levers in the "on" position but unscrew the tension knobs until the snares no longer resonate. Place a contact microphone on the head of each drum and connect it through a preamp, limiter, and power amplifier to a speaker. Locate the speakers as far away from the drums as possible within the area used for The Lesser Coverts. Adjust the microphone gains so that each channel is just below the threshold of feedback.

Each tympanist uses the pedal to raise the drum's tuning slowly from its lowest to highest pitch over the duration of the performance. Similarly, each snare-drummer slowly tightens his snares. The drums will be heard resonating different pitches of the Feetback in the speakers across the space.

Perform Feetback, The Lesser Coverts, and the drum part simultaneously. The string players can either stop when Feetback ends or continue playing until they finish naturally.

November 1975


from microphone-instrument #1
Preamp
Limiter
VCA
Amp
to driver-instrument #1
Noise Generator
Sample and Hold
Slew Processor
Mixer
Monostable
from microphone-instrument #2
Preamp
Limiter
VCA
Amp
to driver-instrument #2

for four performers with brass or woodwind instruments, electronics, and one assistant

Preparation

Pair instruments with similar or overlapping ranges: flute and soprano saxophone, trombone and french horn, clarinet and trumpet, etc. Install a miniature microphone (such as a Sony ECM-16) inside the mouthpiece or bore of one instrument of each pair. Attach a wide-range P.A. horn driver to the mouthpiece end of each of the others. Connect each microphone-instrument to its driver-instrument through the configuration of electronic modules shown in the patch diagram.

Seat the instrumentalists in chairs that are separated by as much distance as is practical, either on stage or in four corners of the area occupied by the audience. Bias the Voltage-Controlled Amplifiers (VCAs) half-open. Fully attenuate the output of the Noise Generator. Raise the preamp and power amp gains until both channels are just below the threshold of feedback.

When either of the microphone-instrumentalists slaps a key or thunks a valve, the signal at the output of the VCA triggers the Monostable. The Monostable in turn triggers the Sample and Hold. When the Noise Generator is fully attenuated, the output of the Sample and Hold always remains at ground level (0 volts). As the level of the Noise Generator is raised, the Sample and Hold

produces a widening range of positive and negative random voltages.

Transitions in the Sample and Hold output are smoothed by the Slew Processor. The slewed signal controls one VCA directly and is inverted to control the other; thus, whenever the gain of one VCA increases, that of the other decreases. When one VCA is attenuated enough that its output signal is below the threshold level of the Monostable, only the signal from the other VCA can trigger the Sample and Hold.

Each instrument pair, with its electronics, acts as a complex filter whose frequency characteristics are determined by the fingerings of the instruments and by the distance separating the two performers. The amount of resonance (Q) is a function of the gain of the channel. Initially each filter has a fixed, medium Q, and slaps or thunks simply "ring" the filter. When in the course of the performance the Sample and Hold begins to affect the level of the VCAs, these slaps also trigger changes in the gain and therefore in the Q. By the end of the performance the Q varies between zero (when the VCA is fully attenuated) and a large positive value (when the channel is oscillating with feedback).

Performance

The task of the assistant is to raise the level of the Noise Generator from zero to its maximum. The amount

of time that he takes to do so determines the length of the performance. Fifteen minutes is the minimum length.

The performers in each instrument pair work together to produce short, articulated pulses of sound. The microphone-instrumentalist initiates each event by changing her fingering with a loud slap or thunk; the driver-instrumentalist changes his fingering as soon as he hears or feels his partner's slap in his instrument.

At the beginning of the performance the sounds should be very short and sparse: each microphone-instrumentalist should wait at least ten seconds between slaps, and the driver-instrumentalists should act only in direct response to the slaps. Once the Sample and Hold has begun to change the gains, feedback can occur; when it does, the affected pair should try to eliminate it in one of two ways:

1) They may quietly and independently change fingerings until they have re-tuned their filter to cancel that frequency of feedback.

2) The microphone-instrumentalist may slap repeatedly until the Sample and Hold produces a voltage that lowers the gain of their VCA below feedback level.

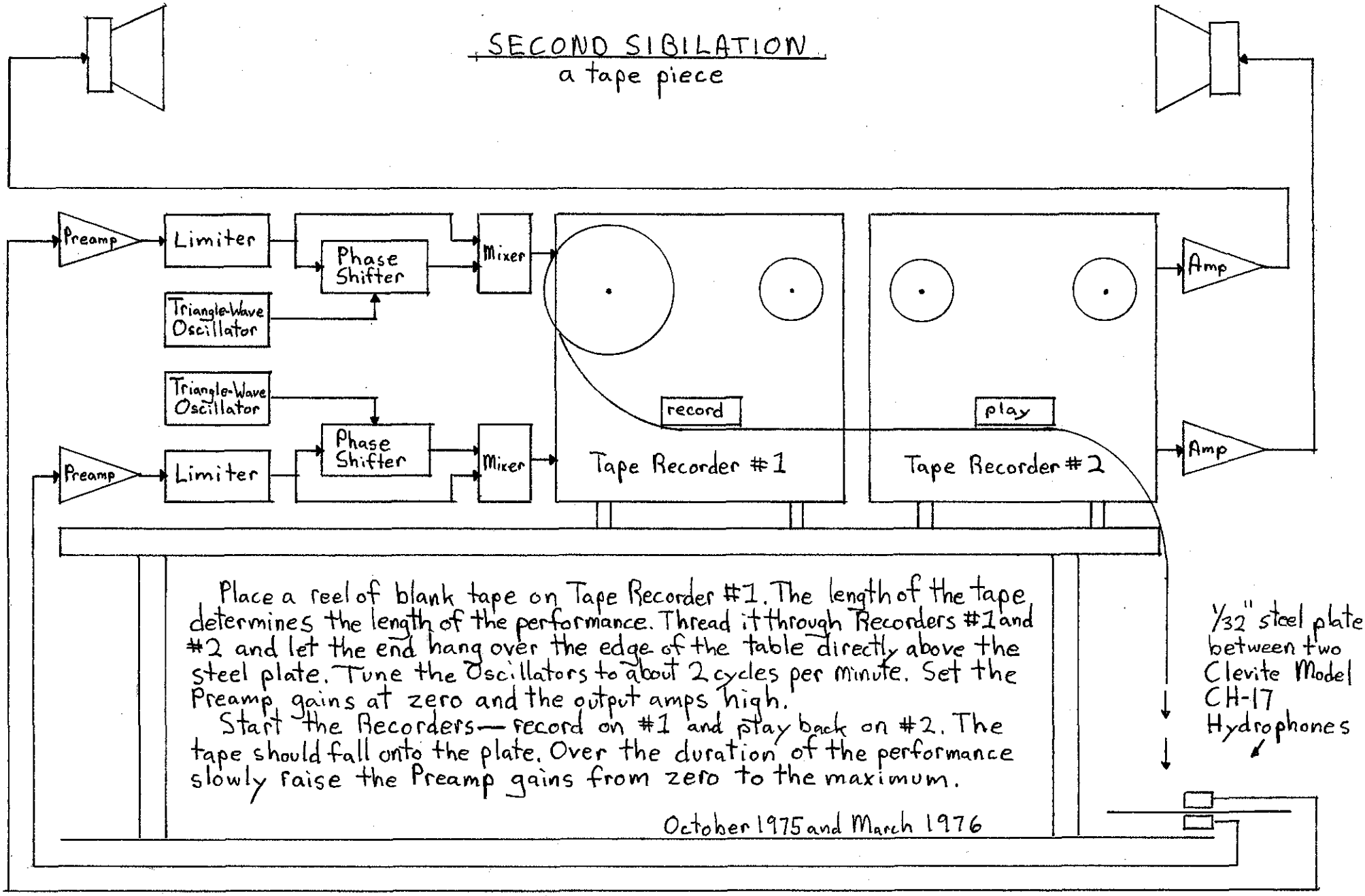
Because of the complementary nature of the control voltages, whenever one pair of performers has managed to cancel feedback by the second method they have probably initiated it for the other pair. As the range of the control voltages increases, a considerable amount of

activity may be needed to produce states in which neither pair is feeding back. During these later, more chaotic parts of the performance the instrumentalists should take advantage of these stable states and rest without slapping for as long as possible.

The assistant may end the performance by shutting off the amplifiers any time after he has raised the level of the Noise Generator to its maximum.

December 1975--
February 1976

SECOND SIBILATION
a tape piece



Place a reel of blank tape on Tape Recorder #1. The length of the tape determines the length of the performance. Thread it through Recorders #1 and #2 and let the end hang over the edge of the table directly above the steel plate. Tune the Oscillators to about 2 cycles per minute. Set the Preamp gains at zero and the output amps high.

Start the Recorders — record on #1 and play back on #2. The tape should fall onto the plate. Over the duration of the performance slowly raise the Preamp gains from zero to the maximum.

October 1975 and March 1976

AS I SAID BEFORE

for any number of performers
with instruments of similar loudness

If you are using loud instruments, such as saxophones or brasses, perform outdoors. If you are using softer instruments, such as strings or voices, you may perform either outside or in an enclosed space.

Gather together in the midst of the space. Designate one performer as the "Center." The Center selects a pitch from the middle range of her instrument and plays it as a short, loud pulse every ten to twenty seconds. One person leaves the group and walks out in any direction until he can just barely hear the Center. He then begins pulsing loudly a different pitch from the middle range of his instrument.

When performers around the Center hear the new note, a second person leaves and walks out until she either 1) can just barely hear the Center and just barely hear the other performer, or 2) can just barely hear one and cannot hear the other at all. She then begins pulsing loudly a third mid-range pitch. When the remaining performers hear this note, another leaves, walks out until he can just barely hear one or more of the other performers, and begins pulsing a fourth pitch.

Continue this process until all the performers are separated by distances defined by thresholds of audibility. When the last performer reaches threshold-distance, she

plays one very long tone instead of pulsing. Anyone who hears it stops pulsing and plays his pitch as one long tone. Anyone who hears one of these "secondary" long tones plays her pitch similarly.

After you have played your long tone, wait about (thirty seconds) X (The number of performers). At the end of this time, if you have not already heard someone else do so, you may play a short, simple melodic phrase; if you do hear someone else's phrase, repeat what you hear loudly and as accurately as you can. In this way one or more phrases are initiated.

Continue to return what you hear. Begin a response only when you can hear no other performer. If someone else begins after you have, stop, listen, and then repeat whatever you can of the phrase that interrupted you. When you hear two or more performers together or in close sequence, you may repeat either the entire resultant phrase or a portion of it. If a pitch you hear is beyond the range of your instrument, omit it from your response.

As the performance continues the original phrases are modified by their repeated perception at the threshold of hearing after transmission over long distances and by the performers' options described above.

If you do not hear anyone for a long time you can assume that the physical conditions that determine

threshold-distance have changed or that the nearest performers have moved. You may walk until you can just barely hear another performer and then resume playing, or you may leave the performance. The performance ends when the last person stops playing.

February 1976

WORD OF HAND

for one performer with Gloves

and associated electronics

The Gloves consist of eight mercury switches and a circuit board mounted on a pair of white cotton gloves, a ninth mercury switch attached to an eyeglass frame near one's ear, and a battery pack. Each of the eight switches is glued to a fingertip and is connected to a resistor on the circuit board. When all the fingers are pointed up towards the ceiling, the eight resistors form a continuous chain; pointing any finger down shorts out its resistor and therefore decreases the total resistance of the chain.

The resistor values are scaled in such a way that each finger represents one bit in a digital word: the left index finger controls the smallest resistor, and therefore the least significant bit (2^0); the right little finger controls the largest resistor and most significant bit (2^7). Each of the 256 possible permutations of the vertical orientation of eight fingers produces a different resistance value for the chain as a whole.

When triggered, the circuitry generates a voltage that sweeps from -3 volts to +9 volts. The sweep time is inversely proportional to the value of the resistor chain, and varies between 0.05 seconds (all fingers down) and ten seconds (all fingers up). The sweep is initiated when the performer tilts the ninth mercury switch upward;

it is interrupted and returns quickly to -3 volts when the switch is lowered. Moving the fingers during the sweep complicates its contour.

Connect the output of the sweep generator to the control input of a wide-range Voltage-Controlled Sine Wave Oscillator, such as is found on a synthesizer. Connect the Oscillator to an amplifier and speaker. Tune it so that when the sweep is at -3 volts the frequency is just below the range of hearing, and when the sweep is at +9 volts the frequency is just above the range of hearing.

By moving only your hands and head, try to construct and use a language that is simultaneously visual and audible.

In Progress

March 1976