ARNOLD DREYBLATT - FELLOWSHIP REQUEST (PROJECT PROPOSAL)

My early work in image and sound synthesis in the early seventies has led in the past five years to a concern for the ways in which a perceptual and acoustical approach to musical concepts has ramifications for music theory, composition, and instrument design. My interests have encompassed comparative tuning systems, instrument building and investigations into resonance and the harmonic series. Because the transverse vibration of a string (as opposed to longitudinal vibration of wind instruments, e.g.) presents a more controllable acoustic situation with observable variables, I have centered much of my recent activity in work with string instruments. The piece on the enclosed tape for Double Bass can be looked upon as a sketch for a more complex ensemble music. I have been concerned with presenting the "mirror-like" relation between the multiplicative tones naturally appearing in the harmonic series and the divisive systems of establishing scales and modal patterns. I have been actively studying certain ancient chinese and western medieval instruments which shed light on this ambiguity.

*I am asking for support to continue my historical and technical research, and to develop my ideas for an ensemble context. The project will result in documentation in recordings and performances.

The Project Includes:
Instrument Design and Development: I have been originating and adapting various instruments for precise generation of pitches and timbres required in my music. At this time the instruments include:
Double Bass Viol - unwound strings of steel and brass of various diameters supply greater resonance in the upper partials; fingerboard marked by nodal regions.
Pedal Steel Guitar- basically an oriental zither, related to the Vietnamese monochord with variable string tension and long sustain possible; being rebuilt and fingerboard designed for my compositions.
Midget Upright Pre-War Princess Piano - A small portable acoustic piano of three octaves has been rebuilt, the felt is has been removed from the hamm to emphasize the upper partials, brass strings at low tension account for less inharmonicity.
Harmonic Canon- A copy of a Partch instrument which I have been using to work out modal scale systems. Has 44 strings with movable bridges.
Amplified Zither with Nodal Locators - Has 20 strings of the thinnest wire. The strings are weighted to isolate a given harmonic.
I am also experimenting with bowed and plucked monochord of various sizes, and with metal tubes which generate the first 16 harmonics without fingerholes
Rehearsal and Training of Musicians: I plan to continue solo performances on the Bass and other instruments but also request the time and support to slowly develop an ensemble of musicians who have to be especially trained both aurally and in peculiar instrumental techniques. In addition to the instruments already outlined, I have begun working with a flute and a mandolin player.
Recordings and Performances: I would like to institute a rigorous performanc schedule to be documented on high quality recordings possibly resulting in a record pressing.

SCORE:

TO ACCOMPANY TAPE RECORDING OF

"NODAL EXITATION"

CALCULATIONS AND MAP OF INVESTIGATION

NODAL EXITATION

Bowed, Plucked, and Struck Music in Four Sections.

First Section: Explication of bowing and striking techniques; a kind of introduction (as a Taksim or Alap section in Eastern Musics) in which the nodal regions and their components are established aurally. Performed on one string; a second bass string is occationally struck at the end of each phrase.

Second, Third and Fourth Sections: I have developed a technique of rhythmic pulsing of the bow against the string to exite the selected vibrational patterns. The technique utilizes a combination of bowing and striking; the speed and arc of contact being critically important in the generation and sustenance of specific partial vibrations. As these sections begin the first 6 or 7 partials are isolated one at a time and gradually a complex waveform and texture is developed through the synchronizing of speed, attack, and nodal position on the string.

The Second and Third Sections utilize one string only; the Fourth Section no more than two strings at any time.
These recordings are not overdubbed; they are not electronically manipulated in any way. They represent solo, acoustic performances.

The Two Selections included on tape represent a live performance situation; one captures the acoustic reverberation of overtones in the space, while the other

The first selection on the tape was recorded in a studio and it emphasizes the acoustic situation at the source near the vibrating strings. The second selection is an excerpt of a live performance before an audience and it is miked to reveal the acoustic reverberation and distribution of overtones in a space created by the piece.

The following diagrams illuminate the acoustic research on which the music is based:

1- The Nodal Regions
2- The Harmonic Series and other Calculations taken into account.
3- Picture of the Adapted Double Bass used in the performance.
4- Program notes for a recent performance.

NODAL REGION IDENTIFICATION

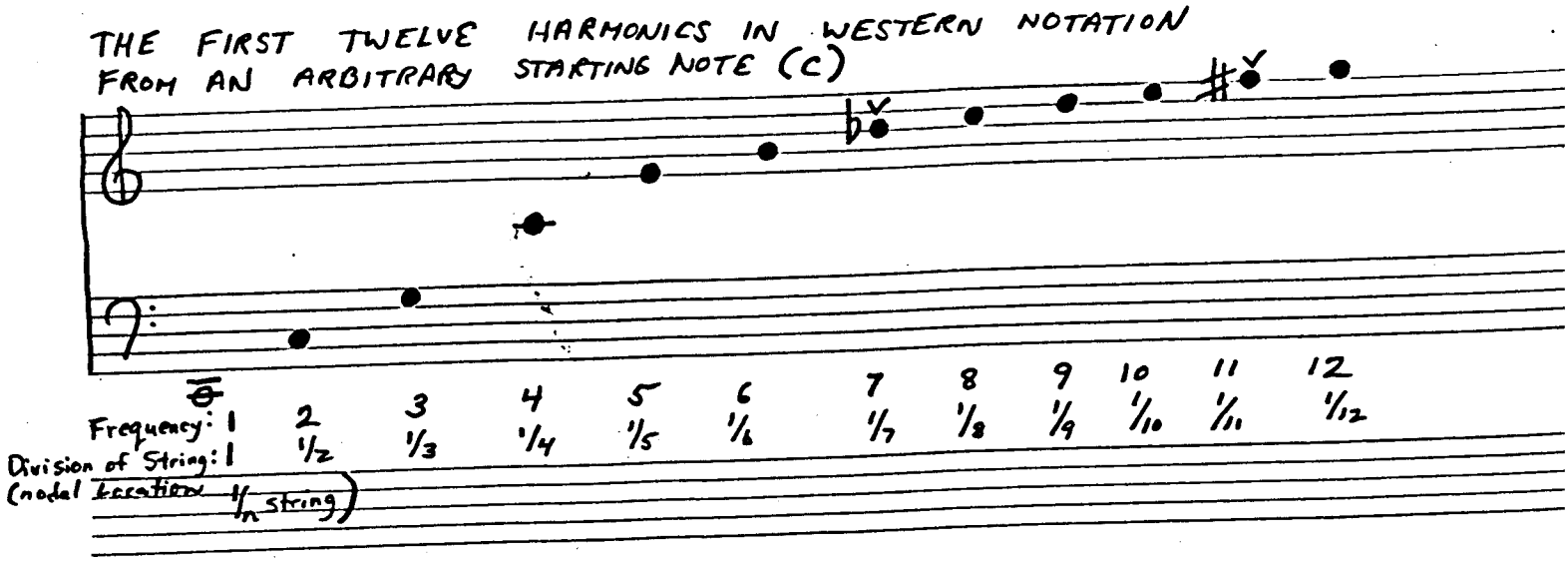
MONOCHORD
(total length of string = 1 .0 meter)

Vibrational mode # *	cm. from either end of string
1	0.0
2	50.0
3	33.3333333333
4	20.5
5	20.0
6	16.6666666667
7	14.26571429
8	12.5
9	11.111111111
10	10.0
11	9.090909091
12	8.333333333
13	7.692307692
14	7.142857143
15	6.6666666667
16	6.25
17	5.882352941
18	5.555555555
19	5.263157895
20	5.0

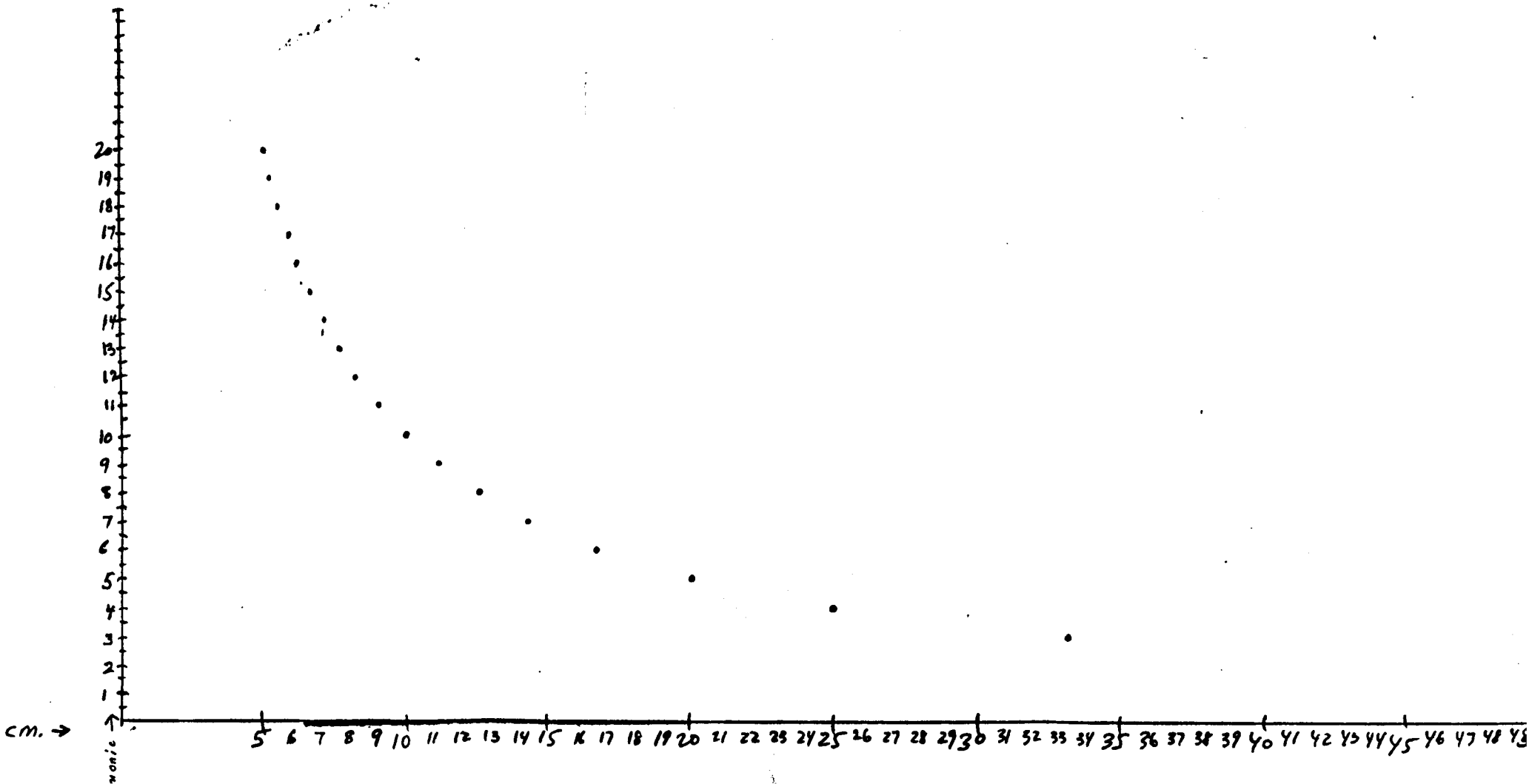
DOUBLE BASS VIOL NECK
(total length of string = 40.5 inch

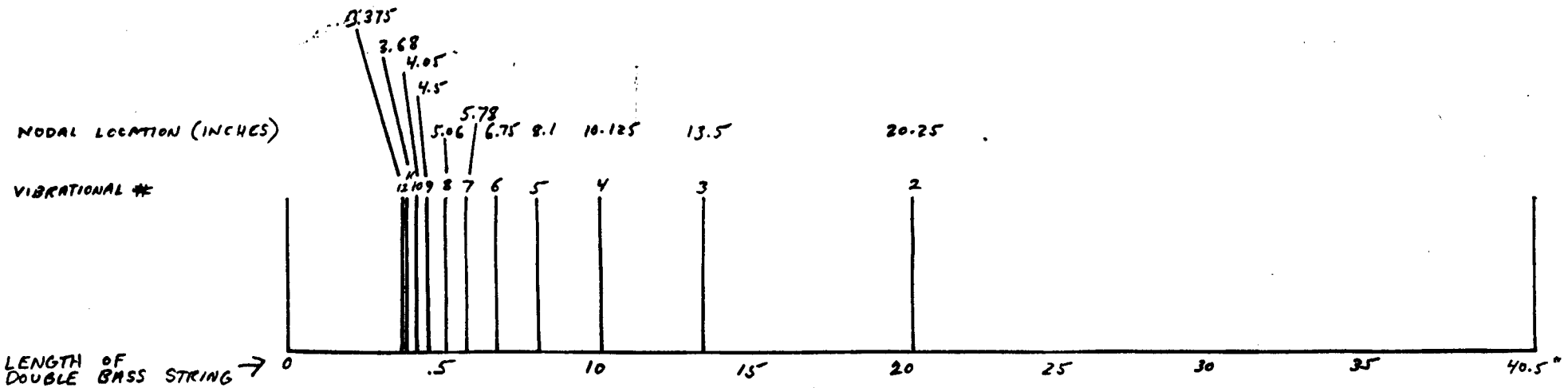
inches from either end of string *
0.0
20.25
13.5
10.125
8.1
6.75
5.78571426
5.0625
4.5
4.05
3.681813182
3.375
3.115384615
2.892857143
2.7
2.53125
2.382352941
2.25
2.131578947
2.025

*also indicates division of string and multiplication of fundamental vibration.



THE FIRST TWENTY HARMONICS EXPRESSED AS MONOCHORD DIVISIONS (ONE-METRE IN LENGTH)





NODAL REGION PATTERN
ON DOUBLE BASS VIOL
(40.5 INCHES IN LENGTH)