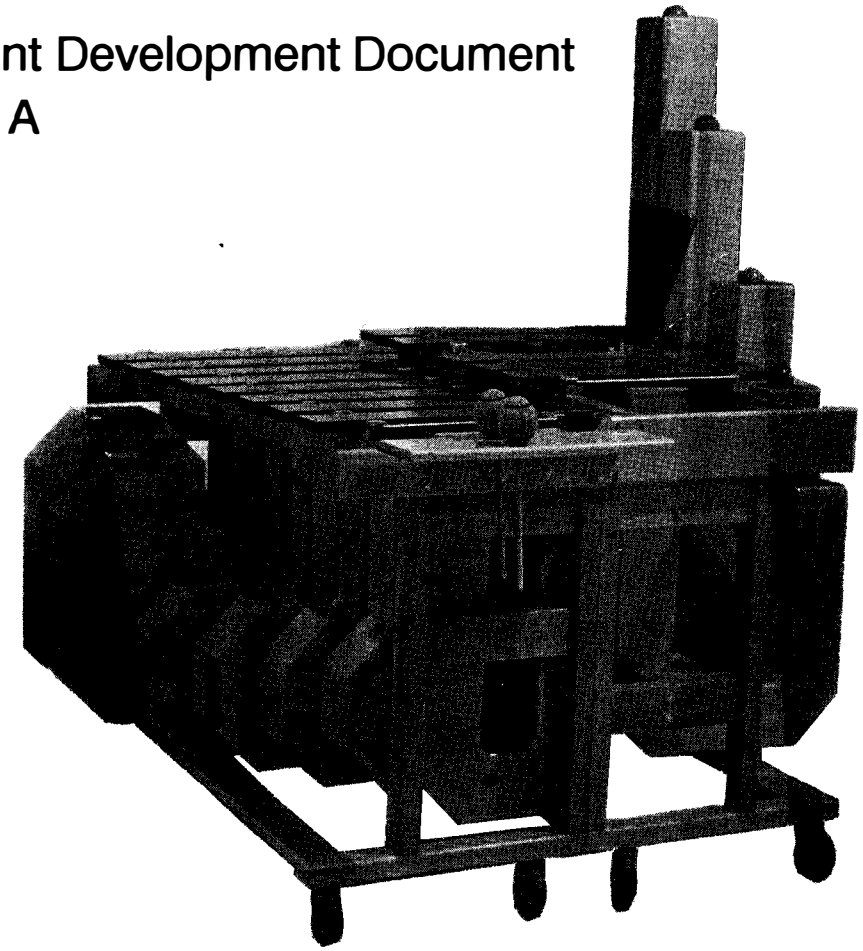
Mallet Percussion Science

CONTRA BASS MARIMBA (1980)

Instrument Development Document
Revision A



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Doc. No. CCB-1012

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INTRODUCTION

I developed this document to describe the issues surrounding the design, development, and fabrication of a second generation class of [CCBANTA] instruments known as the "Contra Bass Marimba". I felt it was important to document my bass marimba projects, and to make them available to anyone interested in low-frequency mallet percussion instruments.

I apologize for the sketches contained herein if they are unclear, incomplete, and messy. They were included to show the reader my thought processes in the instrument's development prior to fabrication. The information was not intended to be adequate to build a bass marimba. Instead, it was included so that it might be entertaining or helpful to those who are involved in their own bass marimba projects.

Christopher C. Banta

DESIGN CONCEPT AND DESCRIPTION

INSTRUMENT'S PREDECESSOR

Contra Bass Marimba (1974)

EVENTS LEADING UP TO THE CONTRA BASS MARIMBA'S DESIGN

Since the 1974 Contra Bass Marimba only had five notes, there were times when other contra bass pitches were desired while playing. Therefore, a full one-octave chromatic instrument was becoming necessary. This *second generation* Contra-Bass Marimba was the next evolutionary step of the 1974 Contra bass Marimba, and represents a continuation of the Extended Bass Marimba [1980] technology with the emphasis on lower notes.

ENGINEERING DESCRIPTION OF THE CCBANTA CONTRA BASS MARIMBA

The Contra-Bass Marimba shall be a one octave, 13 note, diatonic scale, bar percussion musical instrument starting on the pitch of C [32.7Hz]. The top note shall be the pitch of C [65.4 Hz]. Each bar shall have its own correspondiing quarter-wavelength resonator with an adjustable stopper at the closed end. Resonators, on the naturals side of the instrument, shall be mitered as required to meet the 35 1/2" playing height and shall fit within the confines of the frame. Resonators, on the accidentals side, shall use limited mitering that allows them to project upward - similar to organ pipes. Both bars and resonators shall be held in precise alignment with each other using a support frame that is capable of separation into two halves. One half shall contain the naturals. The other half shall contain the accidentals. The whole instrument shall be made mobile through the use of rubbers casters.

PRE-FABRICATION INFORMATION

SIGNIFICANT EVENTS IN THE INSTRUMENT'S DESIGN

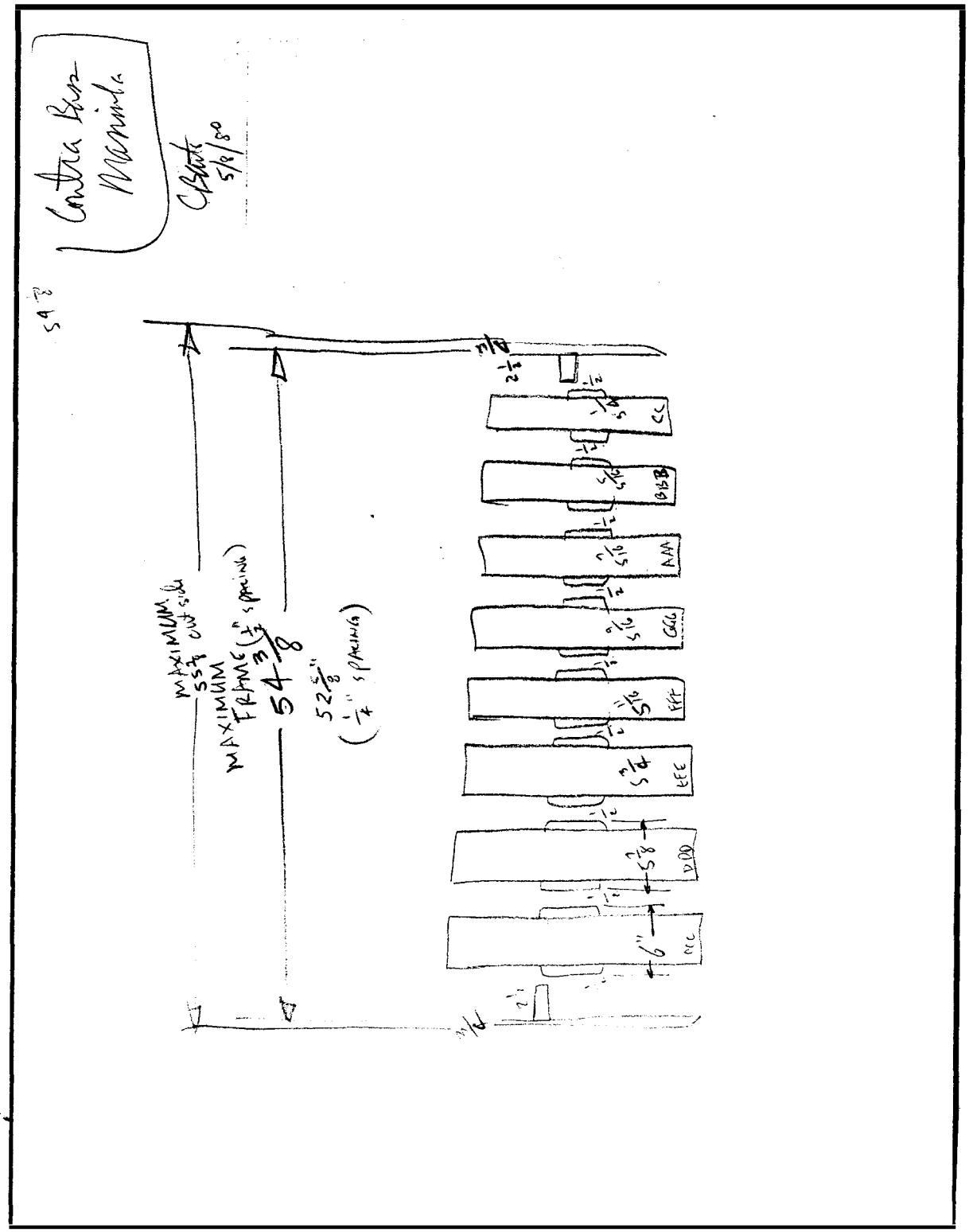
- Bar sizes [both length and width] were reduced to accommodate a *more notes per given space* philosophy. This would allow the performer to reach all 13 notes with a fair amount of ease. I understood that the smaller bar dimensions and smaller resonator scale would not move as much air as the larger 1974 instrument design. The compromise I made was simply to provide *more notes at the expense of loudness.*

- I paid much attention to the *naturals* resonators since they all had to fit within the frame assembly. Their designs required extremes in mitering - all while maintaining the *progressive step* look when set-up next to each other.

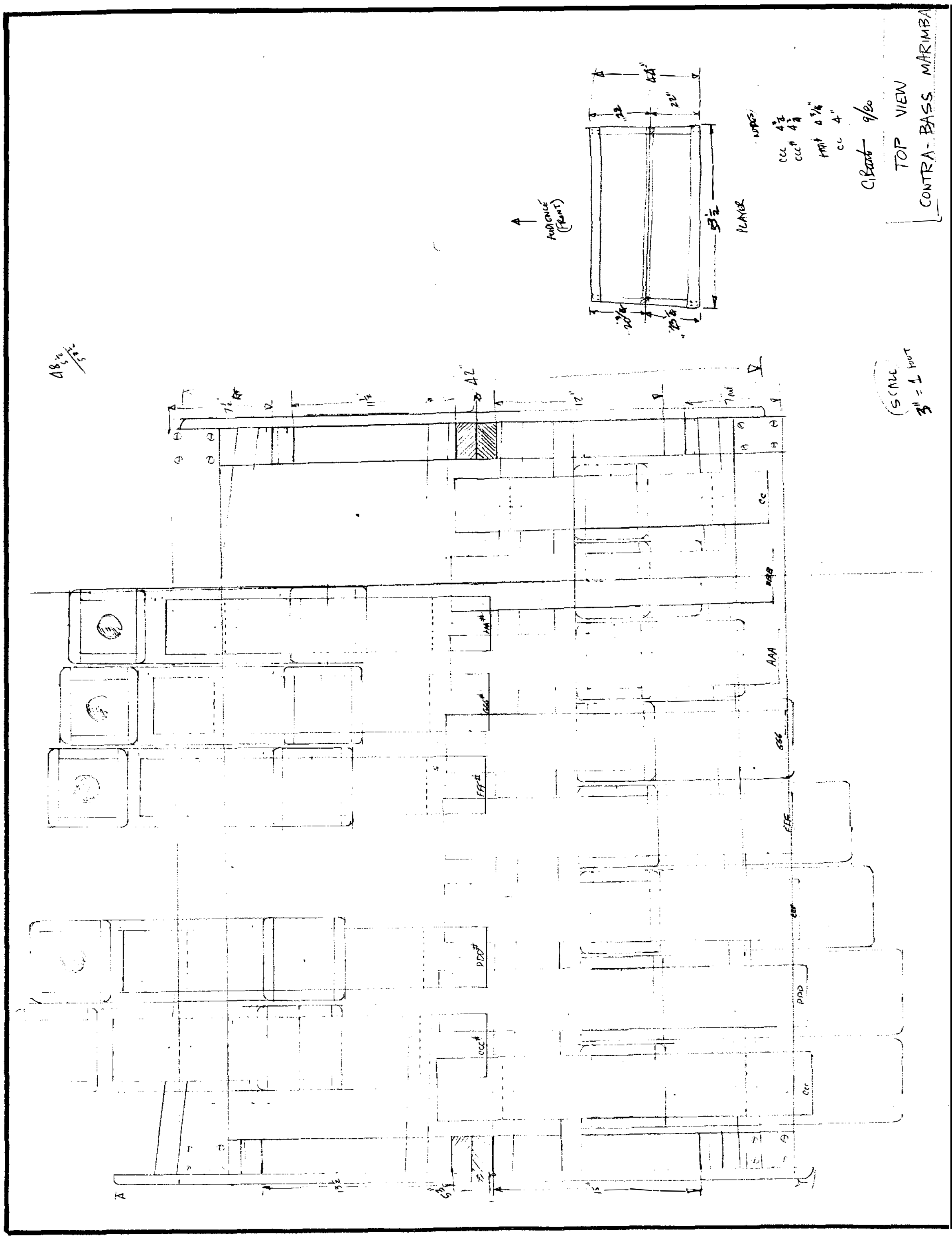
- I decided that the *accidentals* resonators did not need to be extensively mitered as the *naturals.* Since these resonators were opposite the performer, they could just project straight-up. Visually this would give the audience some indication of their lengths as they associated them with low frequencies.

PRE-FABRICATION SKETCHES

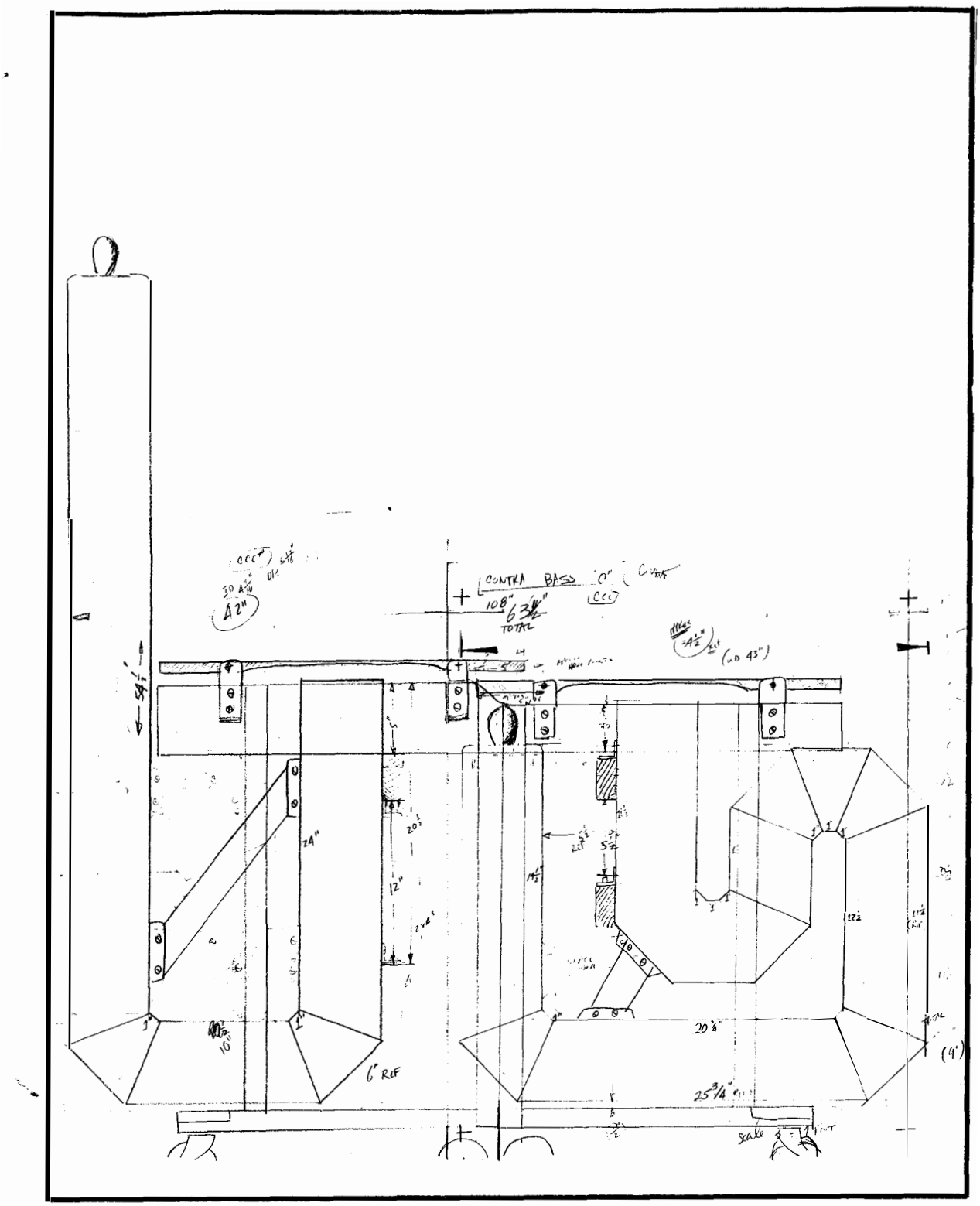
Pages 6 through 9 show my early design sketches of the Contra Bass Marimba.


Contra Bass Marimba
C Blatt
5/9/80
MAXIMUM OUTSIDE
MAXIMUM FRAME
54 3/8
52 5/8"
CC
BBB
AAA
GGG
FFF
EEE
DDD
CCC

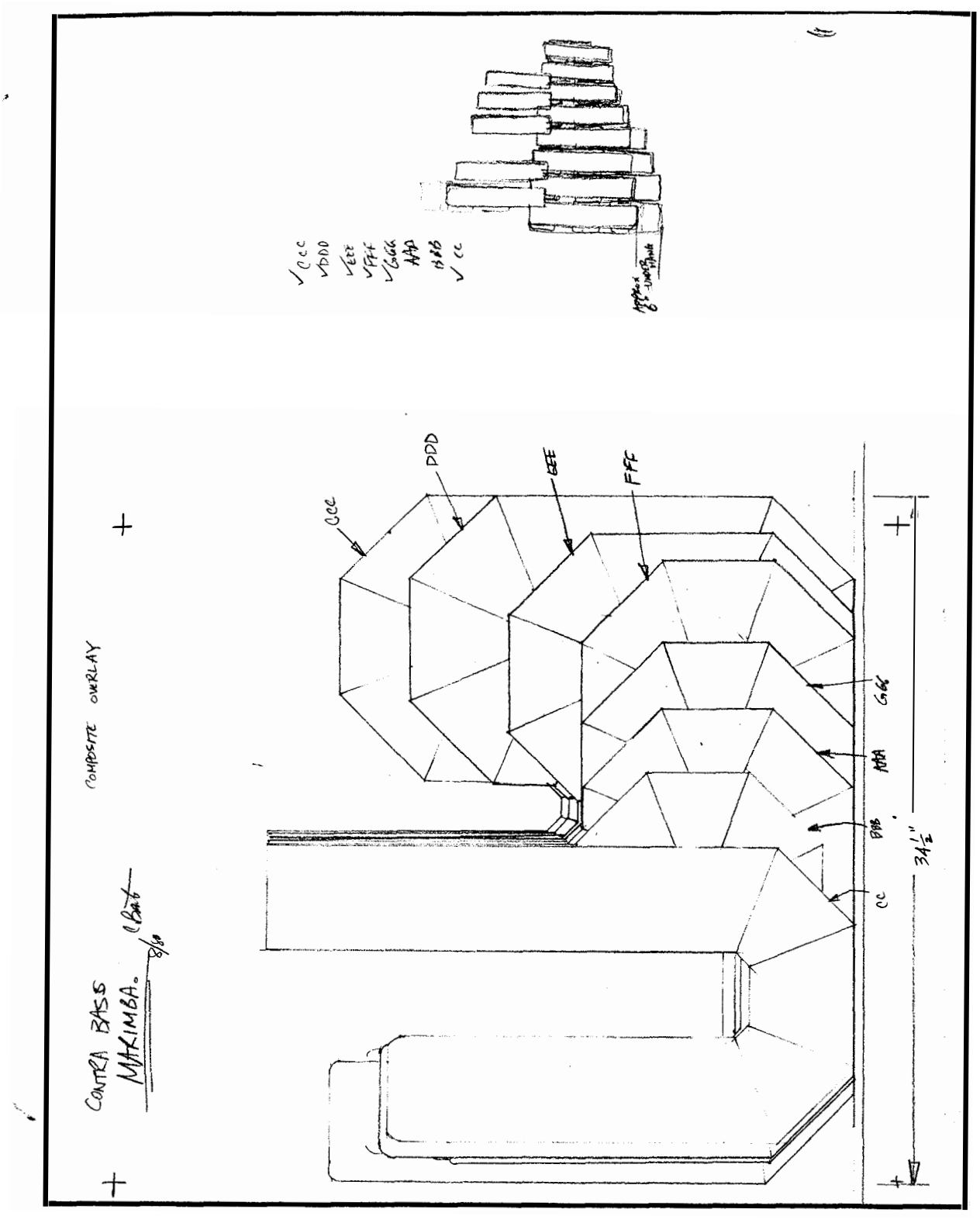
Sketch No. 1



Sketch No. 2



Sketch No. 3


CONTRA BASS MARIMBA.
COMPOSITE OVERLAY
CCC
DDD
EEE
FFF
GGG
AAA
BBB
CC
34½"

Sketch No. 4

POST-FABRICATION INFORMATION

CONSTRUCTION COMPLETION DATE

Sep 1980

LOCATION OF CONSTRUCTION

Pasadena, CA - My garage, after having been converted to a workshop from previous bass marimba projects.

SIGNIFICANT EVENTS IN THE INSTRUMENT'S CONSTRUCTION AND FUNCTION

- The low note resonators were nearly unmanageable during fabrication. These *longer* resonators were quite cumbersome and heavy when it came to band-sawing them into sections for mitering. Even in the mitered configuration, their weight makes them cumbersome.

- The center of balance on the *accidentals* half of the instrument was considerably off. This condition made this part of the instrument extremely prone to tipping, and required propping against a solid items whenever it was by itself. However, when fastened together with the *naturals* half, the off-center balance problem was eliminated.

- During initial construction, the low C# and D# bars would "bottom-out" on the bar support rail even when mildly struck. The bar mounting supports were replaced with supports that created additional clearance from the rails. Both C# and D# resonators were re-adjusted to maintain the correct spacing from the resonator's opening.

DESIGN IMPROVEMENTS LACKING IN THE 1974 CONTRA BASS MARIMBA

- Column resonators, using square tubular construction and made from white pine, were used in lieu of the plywood "piggyback" style.

- The *accidental* resonators were allowed to rise (in pipe-organ fashion) without "back-and-forth" mitering.

- Since the "accidentals" were added, the split-frame design was required.
- Large diameter casters were incorporated which would allow the instrument to roll over uneven surfaces with ease.
- One attribute was *not improved* by the new design. Unfortunately, low frequency *loudness* was reduced when small bar and resonator scale dimensions were used.

POST-FABRICATION PHOTOGRAPHS

Pages 12 through 15 show the complete build of the Contra Bass Marimba.

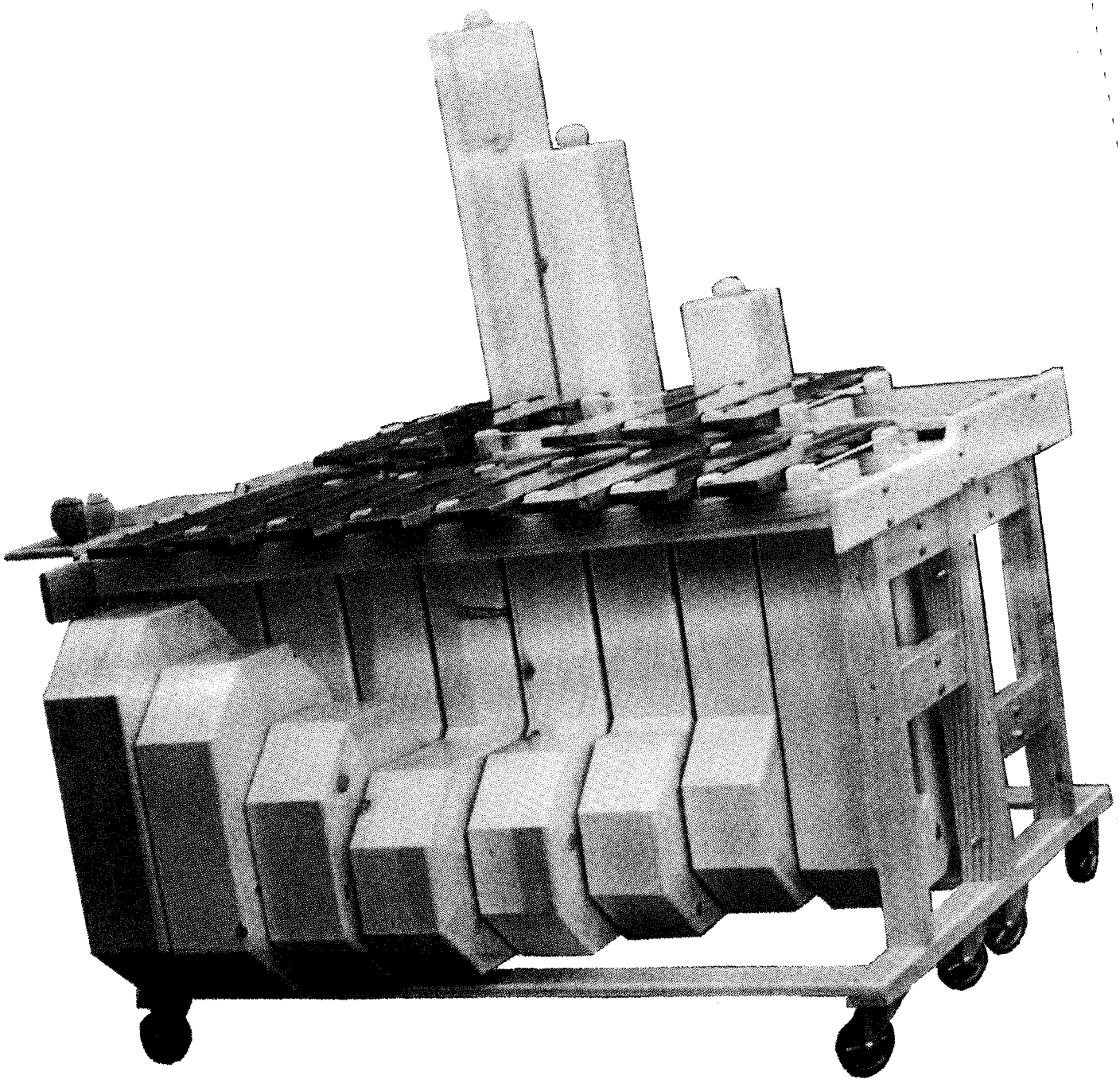


Photo No. 1

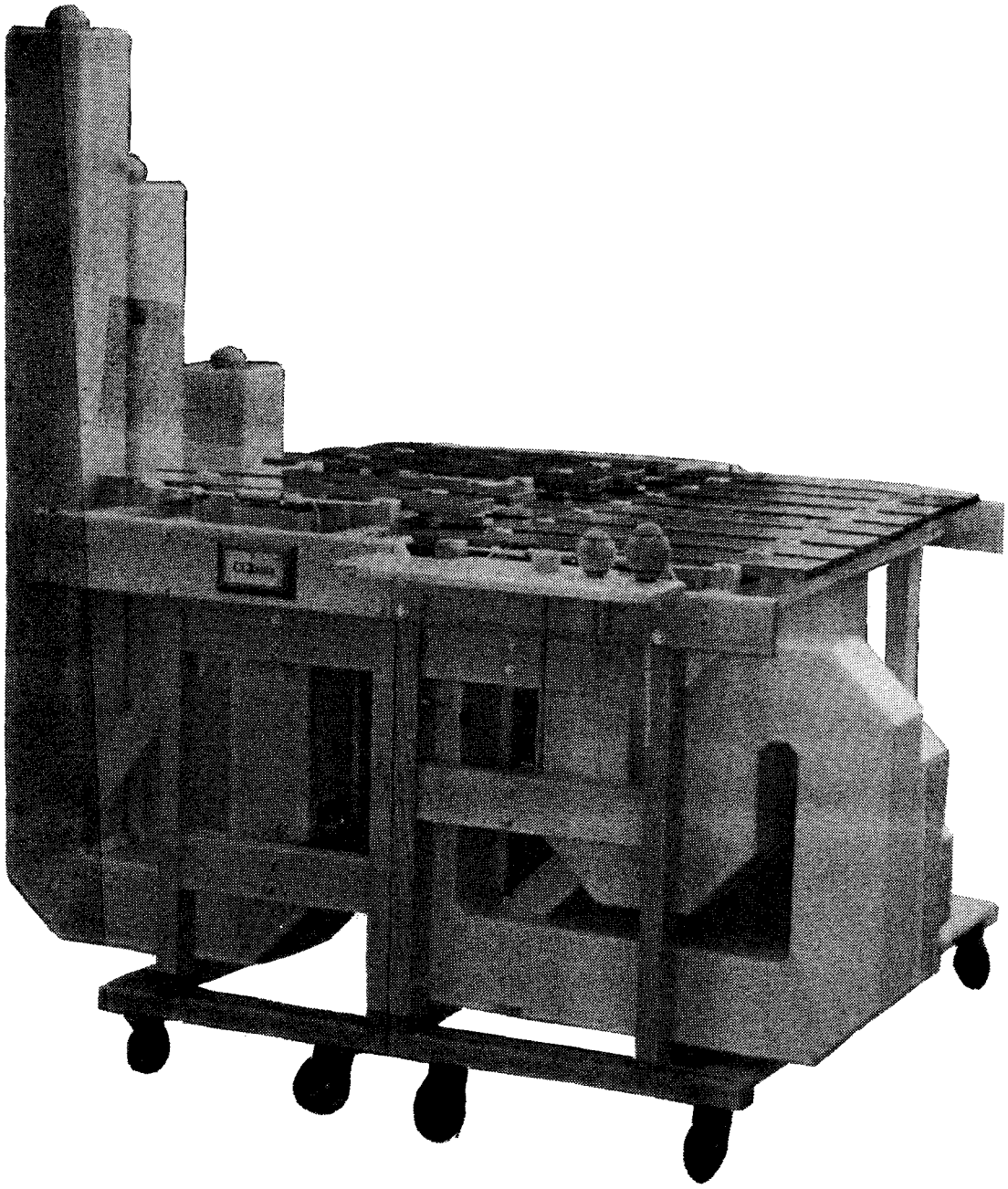


Photo No. 2

Photo No. 3

San Bernardino, CA - Sonic Art exhibit (1983)

Photo No. 4

Pasadena, CA - My residence (1984)

INSTRUMENT SPECIFICATIONS

INSTRUMENT

Type:	Contra Bass Marimba
Designed and Built By:	Christopher C. Banta
Year:	1980

PHYSICAL CHARACTERISTICS

Height:	35 1/2" (Naturals)
	37 1/2" (Accidentals)
	70" (Top of C# Resonator)
Depth:	63 1/2" .
Width:	56"
Weight:	Approximately 250 lbs.

MATERIALS

Bars:	Macacauba
Resonators:	White Pine
Frame:	White Fir and Clear Fir

MUSICAL CHARACTERISTICS

Number of Notes:	13
Tuning:	Equal Tempered
Pitch Standard:	A-440 Hz
Pitch Range:	C1 to C2 (CCC to CC)
Frequency Range:	32.7 Hz to 65.4 Hz
Musical Range:	

INSTRUMENT EXHIBIT/DISPLAY SUMMARY AND STATUS

INSTRUMENT EXHIBIT/DISPLAY SUMMARY

Nov 1980 - The Contra Bass Marimba was first exhibited at the Percussive Arts Society (PAS) convention in San Jose, California.

13 Feb to 14 Mar 1982 - Due to its unique shape and that *art follows form*, the Contra-Bass Marimba was chosen for display at the "Sonic Art" exhibit at California State University, San Bernardino.

INSTRUMENT STATUS

The Contra Bass Marimba remained at my residence in Pasadena California until October 14, 1985 when it was donated to California Institute of the Arts (Cal-Arts), in Valencia, California. The instrument is under the direction of John Bergamo, who leads the Cal-Arts Percussion Ensemble.