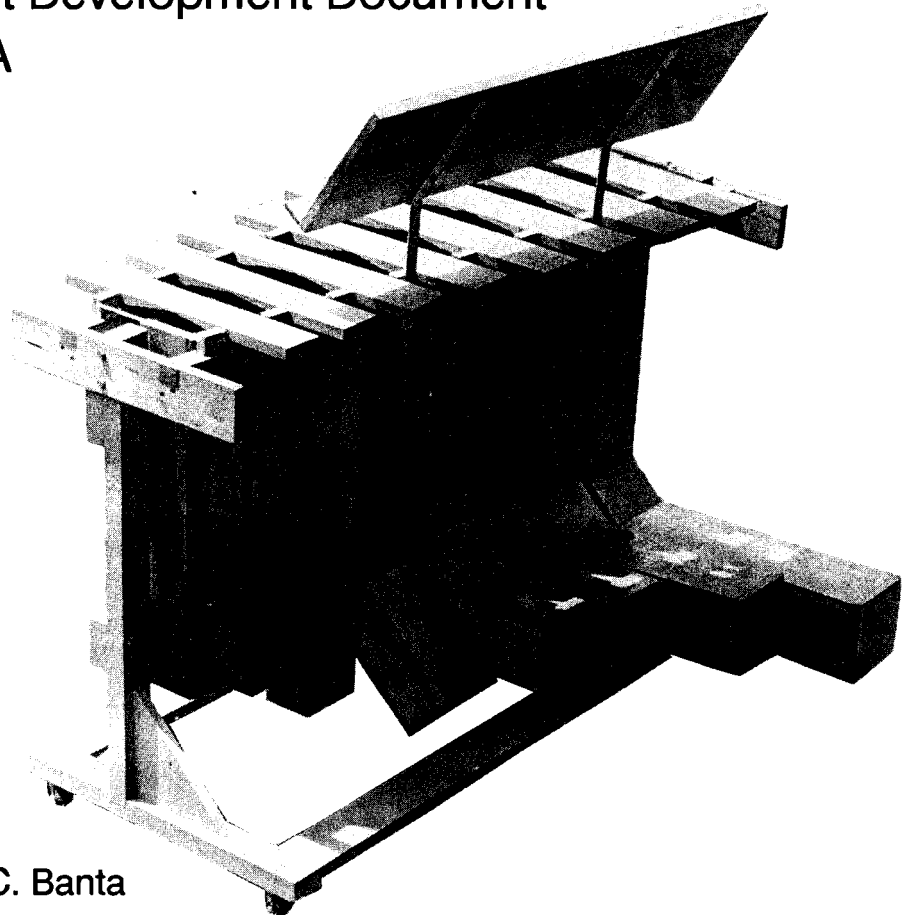


Mallet Percussion Science

BASS MARIMBA (1973)

Instrument Development Document
Revision A



Christopher C. Banta

Doc. No. CCB-1001

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INTRODUCTION

I developed this document to describe the issues surrounding the design, development, and fabrication of my first "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.

A handwritten signature in black ink, appearing to read "CC Banta". The signature is stylized and cursive, with a long horizontal stroke extending from the end of the name.

Christopher C. Banta

DESIGN CONCEPT AND INSTRUMENT DESCRIPTION

EVENTS LEADING UP TO THE INSTRUMENT'S DESIGN

Design and construction of this bass marimba resulted from an exhilarating listening experience I had while listening to a composition by one Harry Partch. Harry Partch designed and built all instruments that were being used in the composition including a *bass marimba*. The sound of his bass marimba was simply described as amazing!

The purpose for this [CCBANTA] instrument's existence was driven by my attempting to recreate the recording's sound of the Harry Partch Bass Marimba. In fairness, I graciously cite Harry Partch as the inspiration for my instruments and give him complete credit for the CCBANTA Bass Marimbas of today. (The particular Partch composition that inspired me is titled "Daphne of the Dunes" from the album "The World of Harry Partch", Columbia Masterworks, No. 7207.) In addition, a small photograph of his bass marimba was included on the backside of the album jacket which became a source of intrigue and further inspiration.

PHOTOGRAPHS OF THE HARRY PARTCH BASS MARIMBA

Photographs and a brief description the Harry Partch Bass Marimba are provided in Figures 1, 2, 3, and 4.

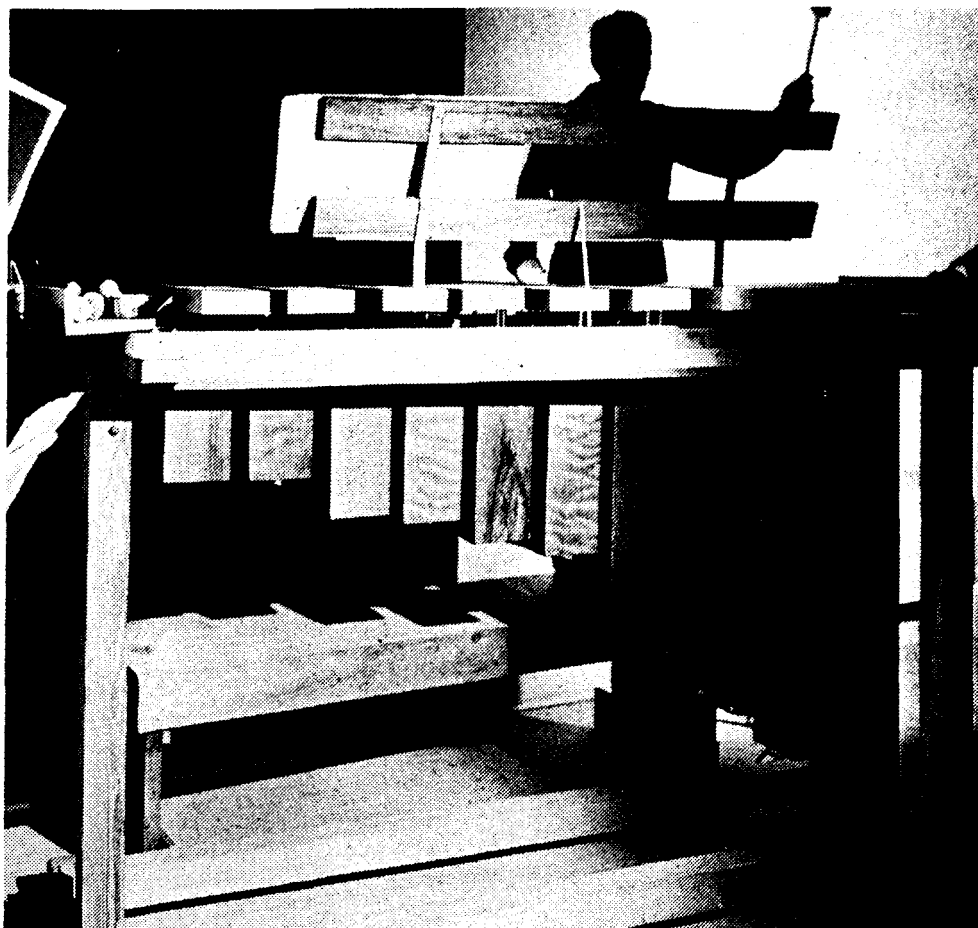
ABOUT HARRY PARTCH

[Quoted from the book covers of *Genesis of a Music*, by Harry Partch]

"Harry Partch is the most controversial of all contemporary composers. He has rejected not only the form and tonality of the 300 year-old symphonic tradition, but its theory, notation, and instrumentation as well. The only composer to write for instruments of his own design and construction, Partch has created a battery of stringed and percussive instruments which, in lesser hands, would function as mere gadgetry. Harry Partch was exposed in his early years to the nonconventional. Born in California to missionary parents who had spent many years in China, he was fascinated by Oriental culture. With an eye always to the exotic, he cites among his strongest musical influences Greek mythology, Christian hymns, Chinese lullabies, Taqui Indian ritual, and Hebrew chants. As a boy of 14, he began writing dramatic music and by the time he was in his twenties, had already formulated his revolutionary theory and philosophy of music. At the age of 28, Partch abandoned his earlier musical output to a pot-bellied stove and a year later, wrote his first composition in the new method. A multifaceted artist, he composed for voice and one instrument the exciting trans-continental freight-train trip composition, *U.S. Highball* and shortly after the musical adaptation of W.B Yeats' *Oedipus*, which he showed the poet in 1934. Because his music and instruments are unique, Harry Partch actively functions today as performer, tuner, repairman, adviser, and vocal and dramatic coach for his recordings and performances. Partch is quoted for saying, "I am not an instrument builder, but a philosophic music man seduced into carpentry."

ENGINEERING DESCRIPTION OF THE CCBANTA BASS MARIMBA

The Bass Marimba shall be a one-octave, eight-note, diatonic scale, bar percussion musical instrument starting with the bottom pitch of C (65.4 Hz). The top note shall be the pitch of C (130.8 Hz). [These eight notes shall represent the "naturals" or white keys portion of the piano keyboard.] Each bar shall have its own corresponding resonator. Resonators shall be quarter-wavelength which requires them to be stopped at the opposite end. Each resonator shall be tuned to match the frequency of the bar. Both bars and resonators shall be attached to a support frame in precise alignment with each other. The whole instrument shall be made mobile by using rubber casters.



FRED LYON

BASS MARIMBA. Built 1950, near Gualala, California. 5 feet high (to the block level — not including the music rack); 7½ feet long. The longest block is 52 inches; the shortest 27 inches. The player stands on a riser 22 inches high.

Resonators are organ pipes with tuning plungers. The blocks are of vertical-grain Sitka spruce, mounted on foam rubber.

Eleven blocks produce tones ranging from the low cello C to the B-flat below middle C (approximately). Played with a variety of heavy and light mallets, bare hands (as in bongo drumming), felted sticks on the edges of the ends, and wire cream whippers.

Figure 1

Description and photo of the Harry Partch Bass Marimba

[Ref: Album liner notes "From the Music of Harry Partch", Composers Recordings, Inc., No. CRI 193]

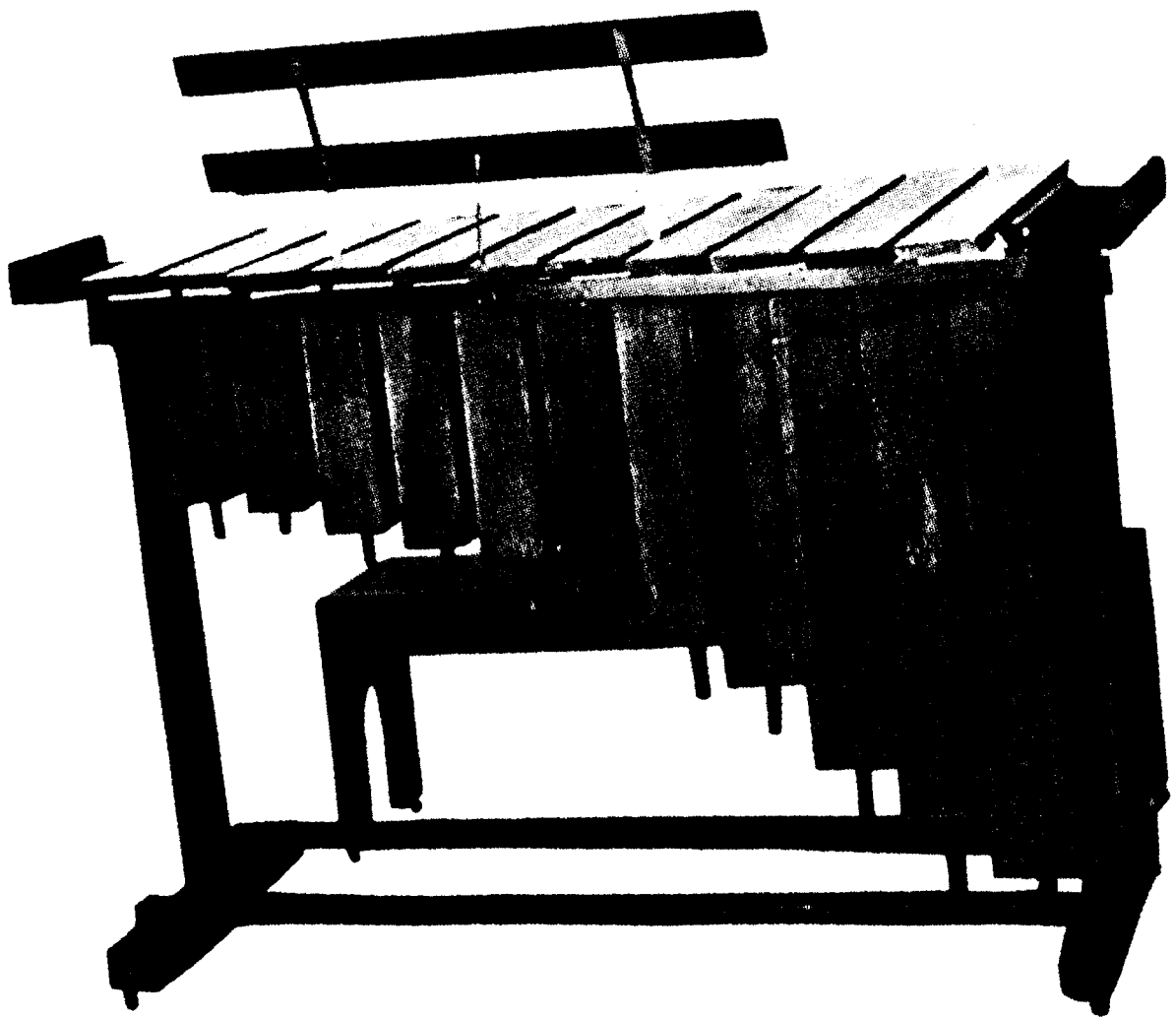


Figure 2
Photo of the Harry Partch Bass Marimba
[Ref: Album liner notes "Harry Partch/Delusion of the Fury", Columbia Masterworks, No. M2 30576]

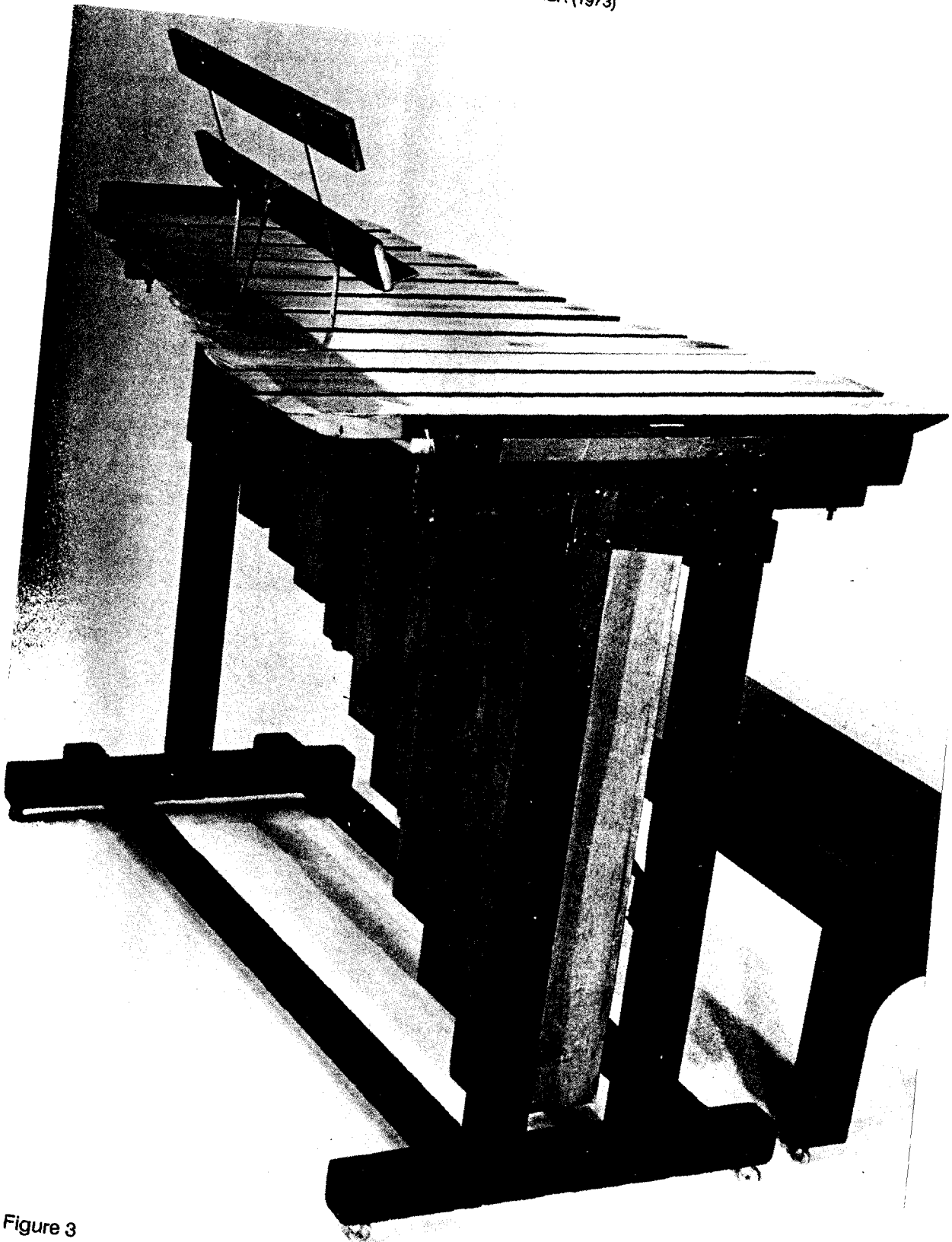


Figure 3
Photo of the Harry Partch Bass Marimba
[Ref: Book "Genesis of a Music", by Harry Partch, 2nd Ed, 1974, Da Capo Press, N.Y.]

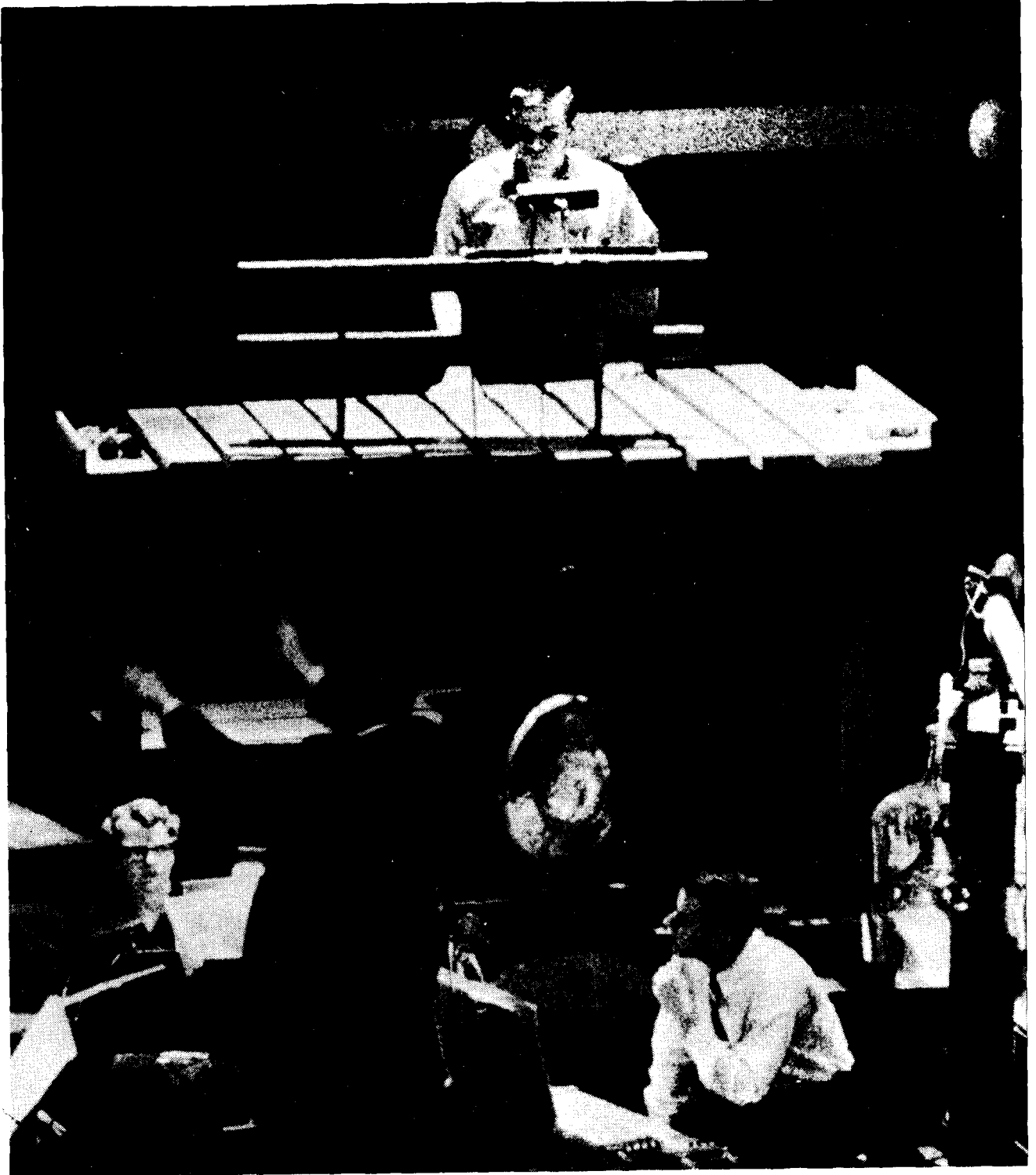


Figure 4

Photo of the Harry Partch Bass Marimba in Concert

[Ref: Album jacket "From the Music of Harry Partch", Composers Recordings, Inc., No. CRI 193]

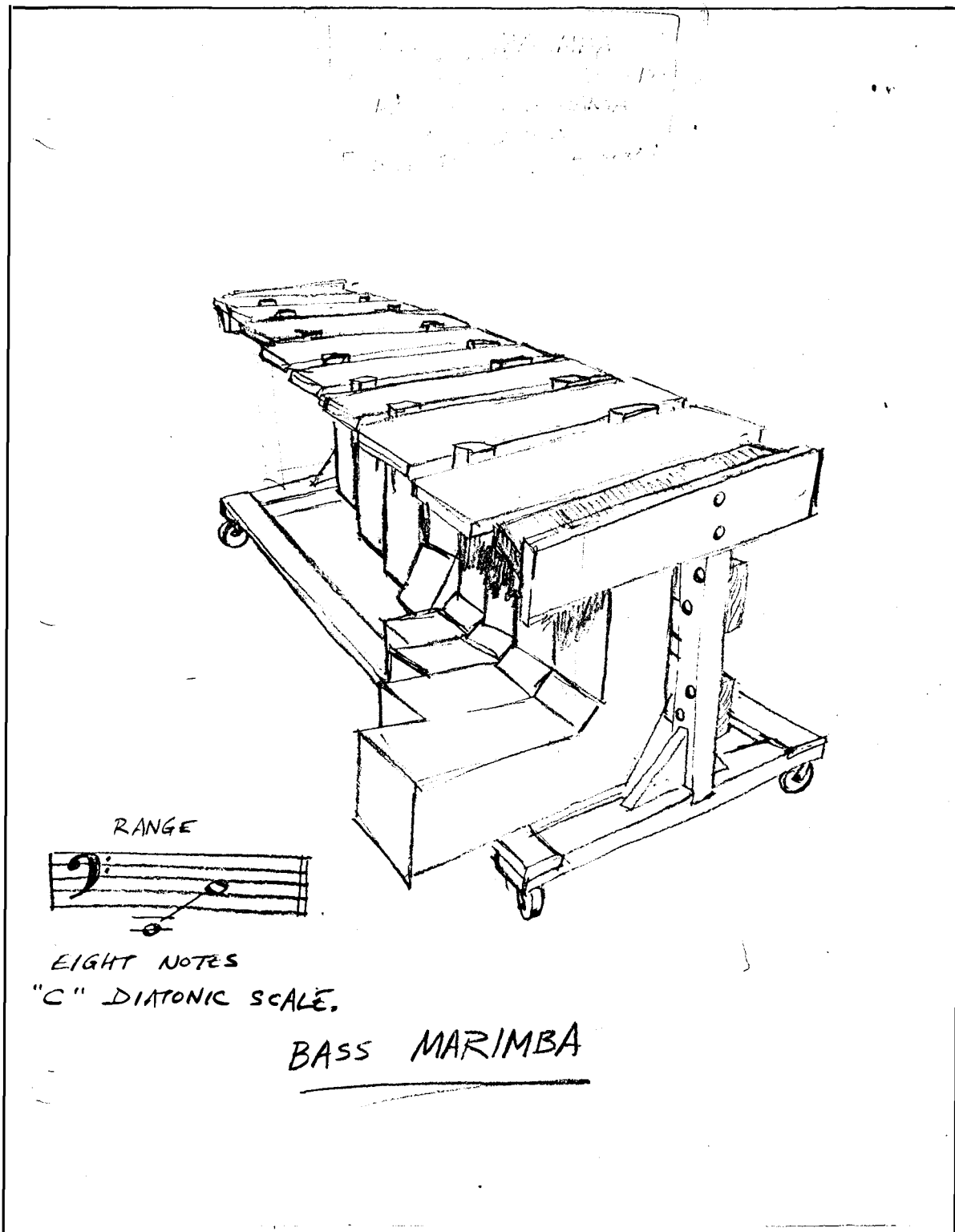
PRE-FABRICATION INFORMATION

SIGNIFICANT EVENTS IN THE INSTRUMENT'S DESIGN

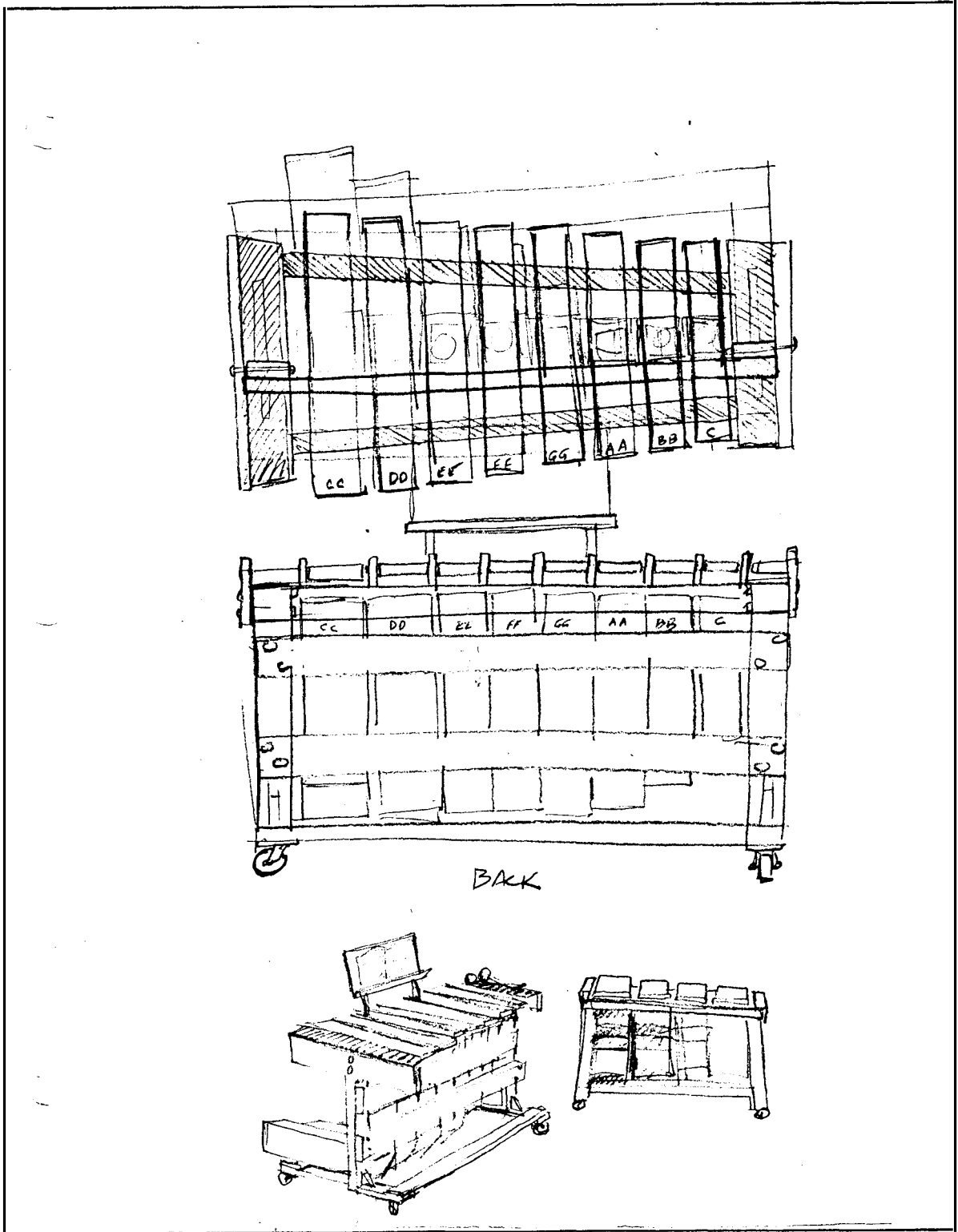
- At the time of design, I had no comparative standard to gauge the size of the Harry Partch bass marimba in the photograph on the album jacket. This presented me with problems in determining the length of the bars and the column width of the resonators. I didn't discover the Harry Partch bass marimba dimensional attributes [Figure 1] until years later.
- As seen in the photographs, the Harry Partch bass marimba used straight resonator columns which required the performer to stand on a riser. It was my desire to eliminate the need for a performer's riser, and to create a playing surface height [of approximately 36"] that would allow an average person to play the instrument while standing directly on the ground. I also knew that resonators whose length exceeded the established playing height would require mitering.
- At first I was uncertain of how to arrive at the correct length for each resonator. However, I applied two known facts to solving the problem. The first fact I knew went something like this: *An open-end organ pipe at middle "C" was 2 feet long.* The second fact I knew went something like this: *To halve an organ pipe's frequency [without affecting existing length] the open-end would have to be capped-off.* I used these facts as a basis for determining the length of each resonator.
- The length determination of the bars was less precise. I started with the length of 24" for the bottom note [65.4 Hz], and felt the top note [130.8 Hz] should be 18". 18" is approximately the length of the bottom C note [also 130.8 Hz] of a standard marimba. I divided the difference between the two lengths by twelve [to represent the chromatic scale] and ended up with the length dimensions of the in-between notes.
- I had to figure out a way of attaching the resonators to the frame and still have them be removable for doorways.

PRE-FABRICATION SKETCHES

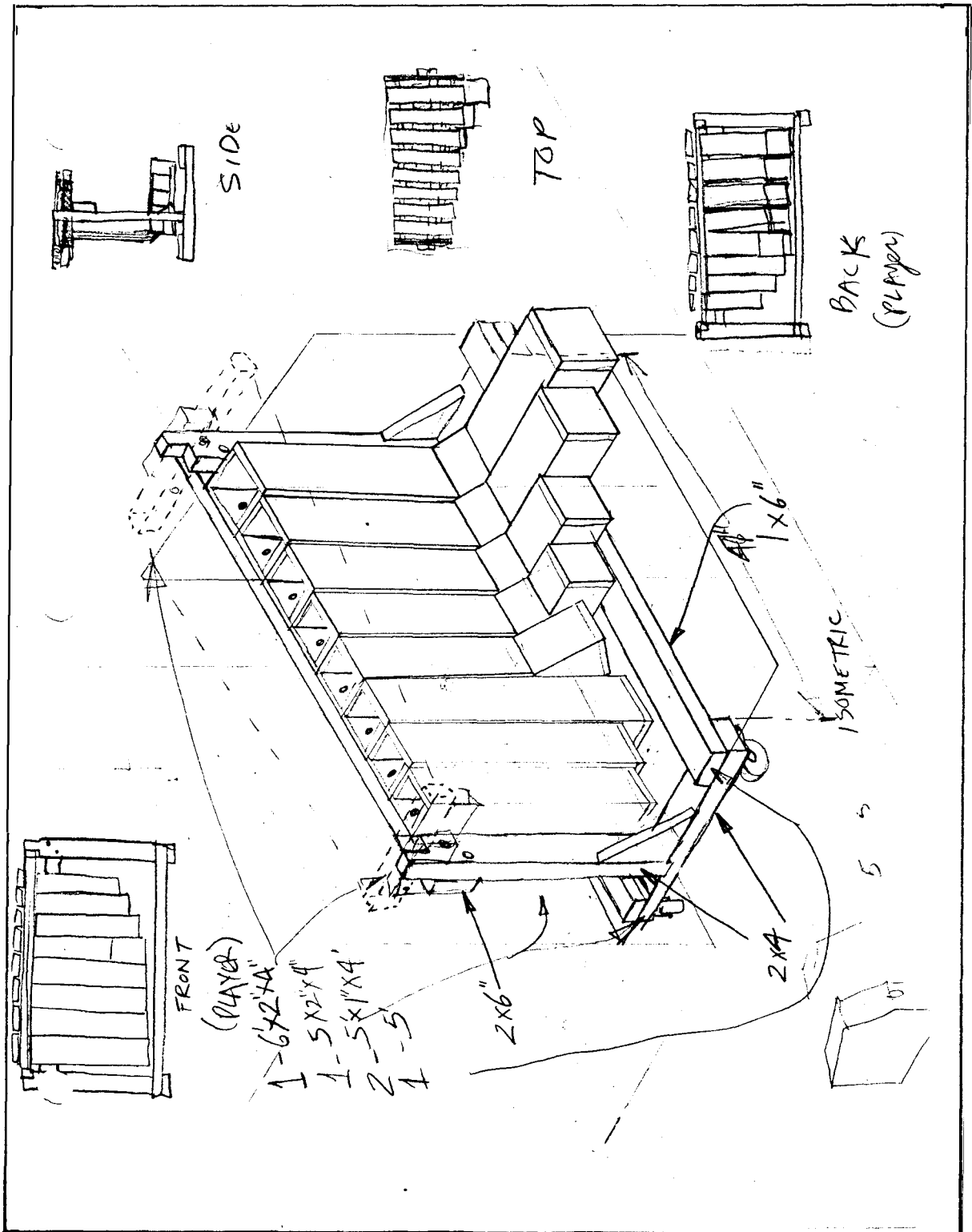
Pages 11 through 16 show my pre-fabrication design sketches.



Sketch No. 1

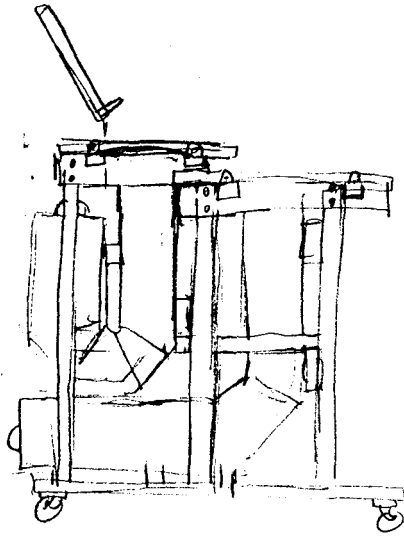


Sketch No. 2



Sketch No. 3

	LENGTH	WIDTH
C	18	3
BB	$18\frac{1}{2}$	$3\frac{1}{8}$
AA	$19\frac{1}{2}$	$3\frac{3}{8}$
GG	$20\frac{1}{2}$	$3\frac{5}{8}$
FF	$21\frac{1}{2}$	$3\frac{7}{8}$
EE	22	4
DD	23	$4\frac{1}{4}$
CC	24	$4\frac{1}{2}$

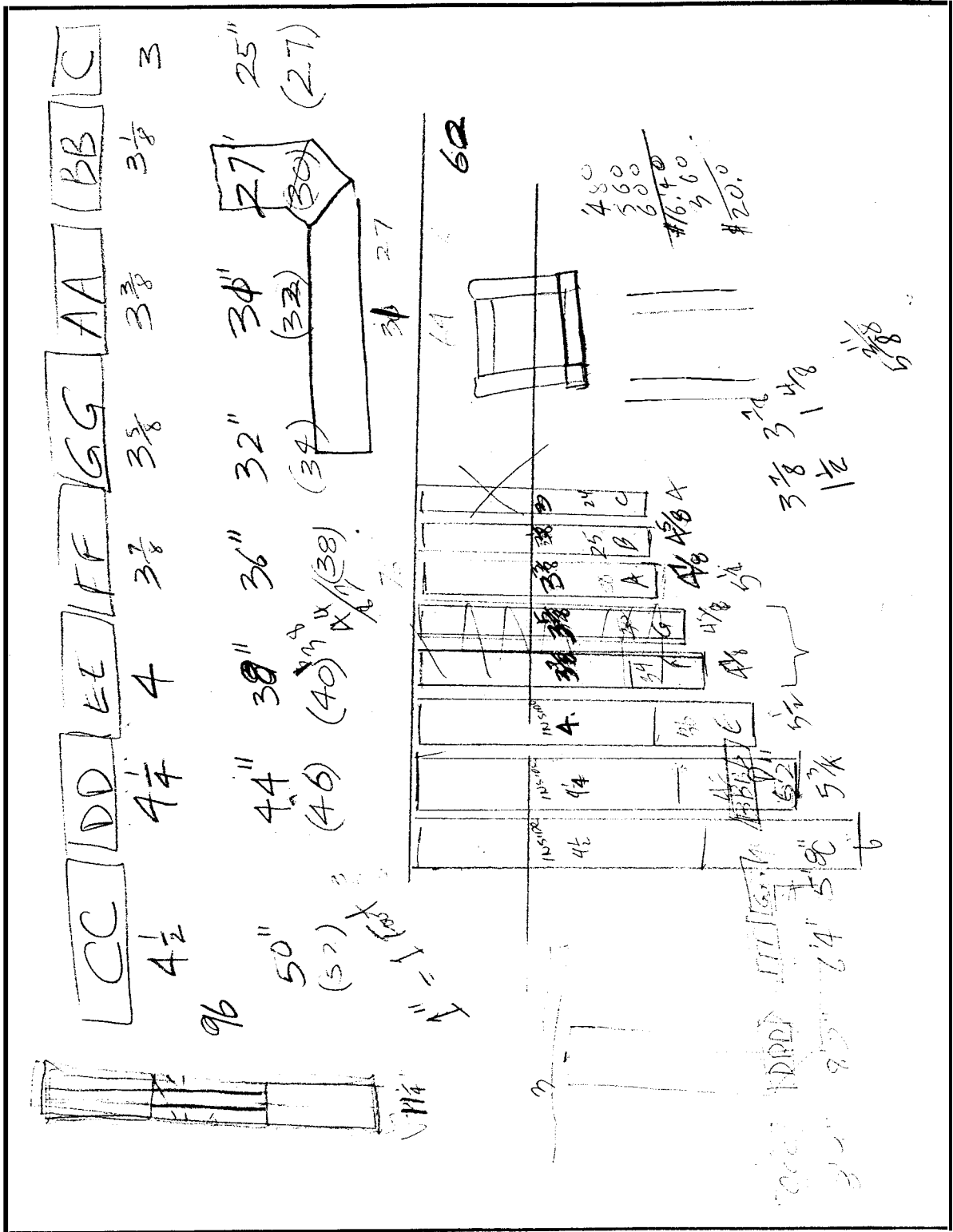


Sketch No. 4

BASS MARIMBA
— BLOCK DIMENSIONS —

NOTE	WIDTH	LENGTH	5TH ^s /4TH ^s	NODE POINT	RESONATOR INTERNAT.
✓ CC	6 4½"	24"	4.8"/6.0"	5.4"	48"
✓ CC#	5⅞/4¾"	23½"	4.7"/5.875"	5.285"	46"
✓ DD	5¾/4¼"	23"	4.6"/5.75"	5.175"	44"
✓ DD#	5⅝/4⅛"	22½"	4.5"/5.625"	5.0625"	42"
✓ EE	5½/4"	22"	4.4"/5.5"	4.95"	40" 12
FF	5⅜/3⅞"	21½"	4.3"/5.375"	4.8375"	38" 40
FF#	5¼/3¾"	21"	4.2"/5.25"	4.725"	36" 28
GG	4⅝/3⅝"	20½"	4.1"/5.125"	4.6125"	34" 16
GG#	5 3½"	20"	4.0"/5.0"	4.5"	32" 34
AA	4⅞/3⅞"	19½"	3.9"/4.875"	4.3875"	30" 22
AA#	4⅞/3¼"	19"	3.8"/4.75"	4.275"	28" 31
BB	4⅝/3⅛"	18½"	3.7"/4.625"	4.1625"	26" 24 SA
C	4¼/3"	18"	3.6"/4.5"	4.05"	24" 16 SA

Sketch No. 5



Sketch No. 6

POST-FABRICATION INFORMATION

CONSTRUCTION COMPLETION DATE

circa 1973

LOCATION OF CONSTRUCTION

The garage area at my parents house in Pasadena, California.

SIGNIFICANT EVENTS IN THE INSTRUMENT'S CONSTRUCTION AND FUNCTION

- This was the first marimba I ever built.
- Due to a high level of motivational energy, I had the marimba built within 10 days after hearing the Harry Partch composition.
- Bar undercut arches were created using a radial arm saw. The technique required several back-and-forth passes of the saw blade along with gradual increasing of the cut depth over the length of the arch contour. There was no harmonic tuning.
- The longer resonator miter angles were established at 90° using a two- 45° angle segments.
- Resonator mitered angles were held together with "hot-melt glue".
- Without the benefit of large *surface* sanding power tools, it was not possible for me to create smooth joints after sawing the resonators [from a column configuration] into segments. Excessive hot-melt was used to fill in the gaps to maintain air-tight integrity.
- Resonator "end caps" [held in place with the hot glue] were used in lieu of stoppers.
- All bars and resonators were tuned using my parent's piano as the pitch reference.
- Resonators were held in place with "flush mounts" hanging hardware, which relied on the weight of the resonators to create a *gravity* hold.

- Having been constructed too short, the G resonator was sharp of it's corresponding bar's pitch. As a result, coupling [between bar and resonator] was extremely poor. To correct the poor coupling, the resonator was lengthened with a short piece of post-fabricated column.
- During the finishing process, a whole can of "bar-top" resin was purposely dumped into the largest resonator. The resin was swished around to coat the inside surfaces, then poured into the next resonator until the insides of all resonators were sufficiently coated. Unfortunately through seepage, the resin caused the hot glue to lose its stickiness and each miter joint separated. Resonators could not be re-glued until the resin had completely cured.

POST-FABRICATION PHOTOGRAPHS

Pages 19 and 20 show different views of the Bass Marimba.

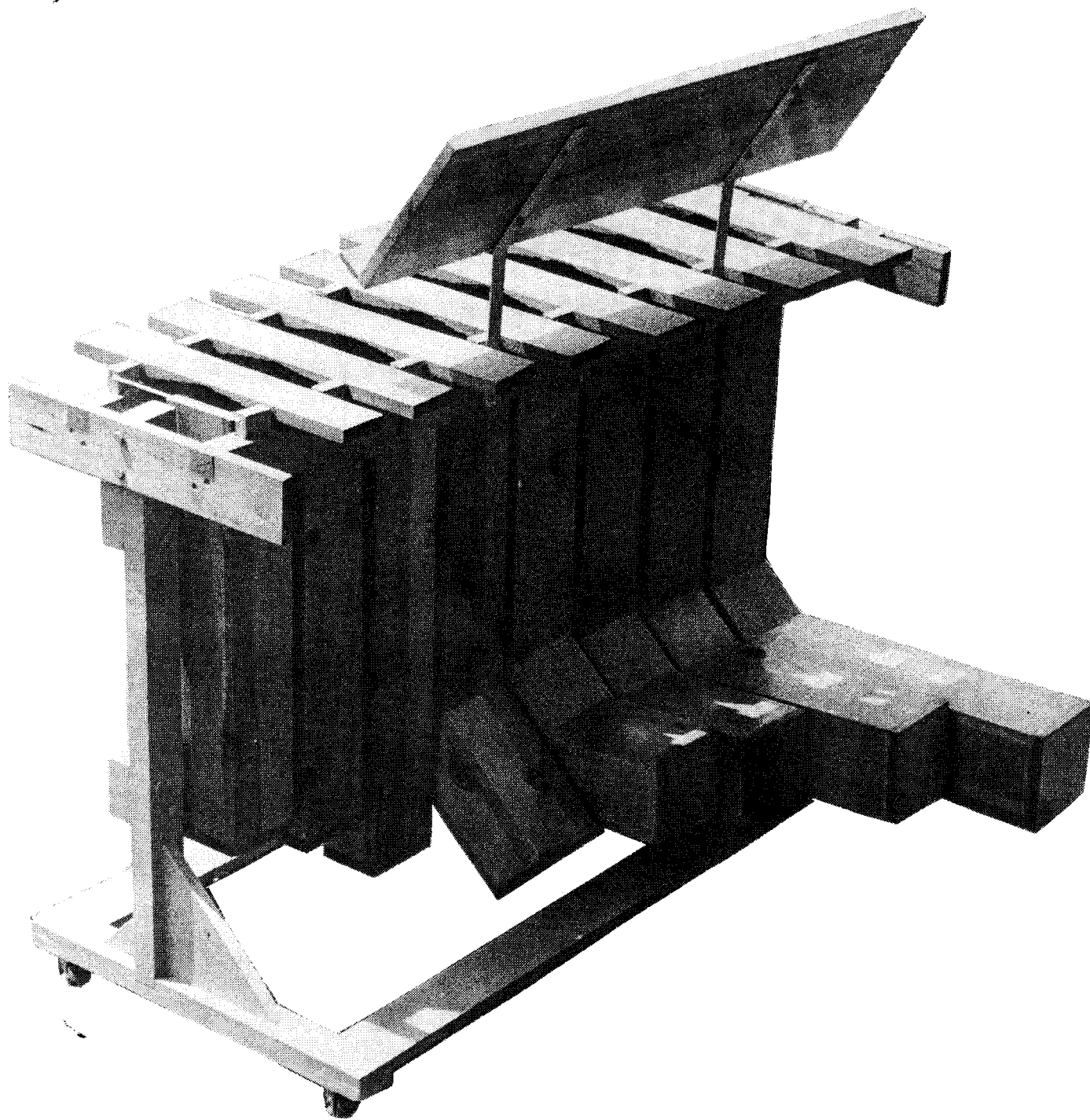


Photo No. 1

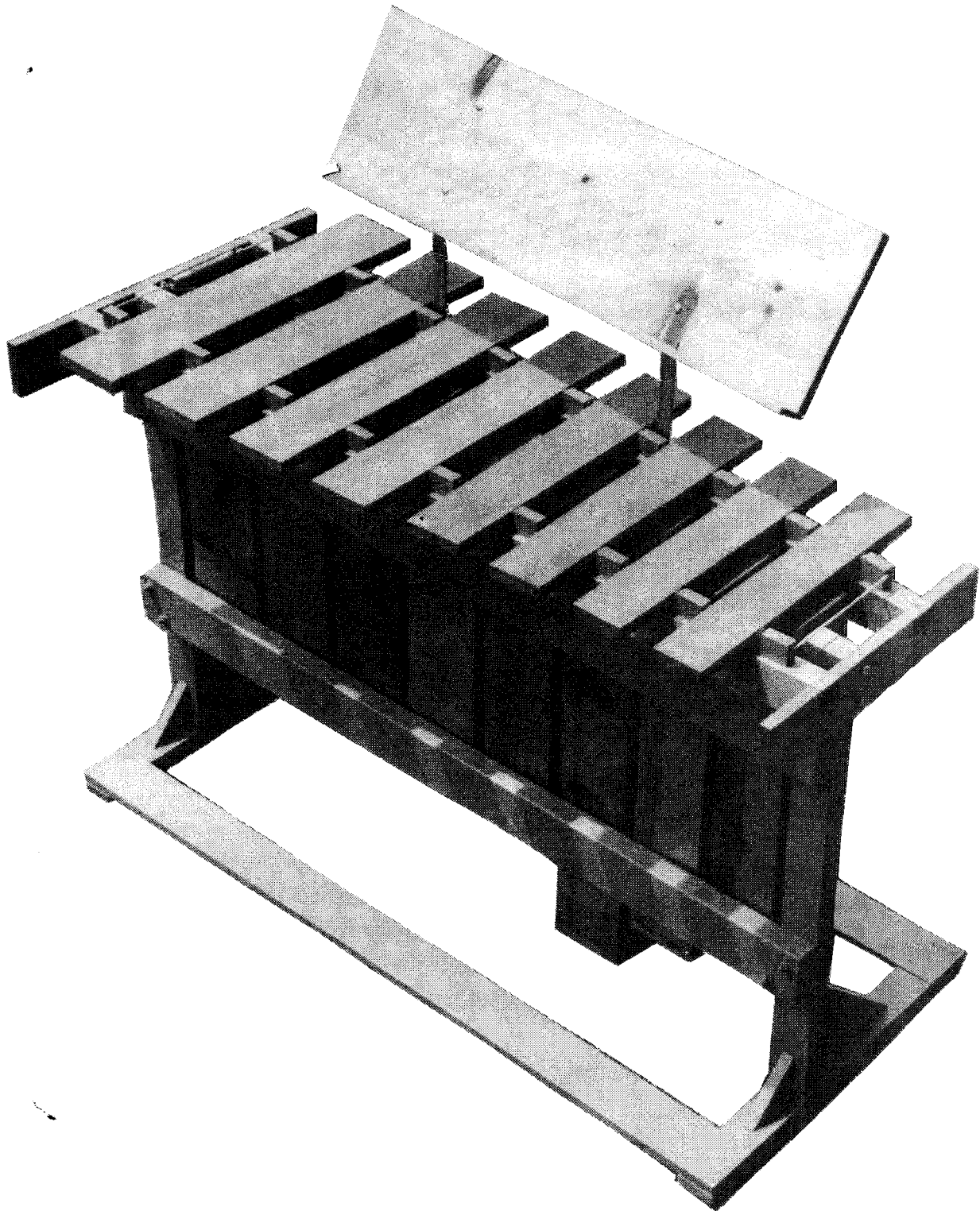


Photo No. 2

INSTRUMENT SPECIFICATIONS

INSTRUMENT

Type: Bass Marimba
Designed and Built By: Christopher C. Banta
Year: 1973

PHYSICAL CHARACTERISTICS

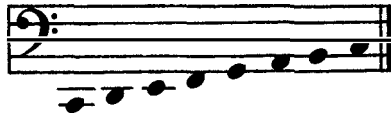
Height: 36"
Depth: 40"
Width: 52 3/4"
Weight: Approx 110 lbs.

MATERIALS

Bars: Mahogany
Resonators: White Pine
Frame: White Fir

MUSICAL CHARACTERISTICS

Number of Notes: 8
Tuning: Equal Tempered
Pitch Standard: Piano (Approximately A-440 Hz)
Pitch Range: C2 to C3 (CC to C)
Frequency Range: 65.4 Hz to 130.8 Hz
Musical Range:



INSTRUMENT EXHIBIT/DISPLAY SUMMARY AND STATUS

INSTRUMENT EXHIBIT/DISPLAY SUMMARY

Dec 1974 - The Bass Marimba was displayed during an open-house at California Institute of the Arts (Cal Arts).

INSTRUMENT STATUS

After having been dis-assembled and stored in my garage for a number of years, the Bass Marimba was re-assembled and taken to the San Francisco area for use by Mr. David Ahlstrom. As of this writing, the instrument is still in his possession and possibly still in performance with the Bay Area Youth Opera (BAYO).