

Warren Burt

In December 1984 I arrived back in Australia after an extended period overseas, looked at what funding schemes were available, and decided that the only one that had any relevance whatever to what I was interested in was the CSIRO/Artists and New Technologies Program administered by the Australia Council. I knew of, and admired, Moya Henderson's work with her bass triangles instrument and Paula Dawson's holographic work carried out under this scheme, so I applied for the program and promptly forgot all about it.

Many months later, I was quite surprised to receive a phone call asking me to travel to Lindfield, NSW, to talk to CSIRO officials about the project. It turned out that for a variety of reasons, all the projects I had proposed were impossible, but CSIRO was still eager to work with me on something. Not wishing to leave Melbourne for any extended period, I investigated the facilities at the CSIRO National Measurement Laboratory in Melbourne, and found that they had a machine shop and precise frequency measuring equipment. A long delayed project, one that related to my interests in tuning, resurfaced, and I discussed with Ron Cook, the NML director, the idea of building a set of aluminium tuning forks tuned to the particular microtonal scales I was interested in. This project fitted in very well with the facilities of the NML and my residency began in September '85. The project proceeded in a number of phases. The first phase was to complete research on various systems of tuning, something I had been devoting considerable time to while I was overseas, haunting libraries, looking for English or Latin editions of ancient music theory texts. On completion of this research I decided to build my forks in a 19 tone to the octave scale that was a combination of a number of modes described in Claudius Ptolemy's first century AD *Harmonics*. The scale had many intervals much smaller than those we use on the piano, and which supposedly produced different 'feelings' than one could get with our Western scale.

In October and November '85 the second phase, the making of the tuning forks, took place. The NML provided me with training in using the machine shop, access to tools and materials, and assistance, particularly some very helpful computer programming by Robert Rigby. I provided the labor. A set of 89 tuning forks resulted. A more detailed description of the construction and tuning of the forks can be

found in 'Experimental Musical Instruments' Vol. II No. 5, Feb. 87 (Experimental Musical Instruments, PO Box 784, Nicasio, Ca. 94956 USA). It was also at this time that a related part of the project, returning of a piano accordion into a part of this scale, was also accomplished. Both the tuning forks and the accordion produce the pure, sustained tones I am interested in.

The third part of the project was to compose works for these new instruments. My interest in mathematical composing systems came to the fore here, as did my interest in improvisation, and the first works for the forks were the pieces *Almond Bread Harmonies I and II*, designed for 5 performers who need not be trained musicians. The first performance of *Almond Bread Harmonies I*, performed at the Art Gallery of NSW as part of *Perspecta '85*, was, in fact, performed by a mixed group of musicians and visual artists.

The scores for these pieces were generated by an AIM-65 computer programmed in FORTH, using a Mandelbrot Matrix Program I wrote myself. *Almond Bread Harmonies II* was recorded by the ABC in Melbourne in December '85. A second result of this phase was the improvisational piece *Ptolemaic Phase Dances*, for one performer at the treble forks and moving microphones. This was recorded in March '86 for a projected performance by choreographers Libby Dempster and Susie Fraser.

A fourth part of the project happened in Jan. and Feb. '86. This was experimental work researching the effect of playing sounds in atmospheres different than air. The reasoning was that since air is the fluid medium through which we hear sound, if sound were played through different mediums, say, helium, argon, or carbon dioxide, they would sound different. We jokingly referred to this part of the project as the *Sound on Mars* project, and like most jokes, it stuck, even though it had nothing to do with Mars or interplanetary research whatever. The results were interesting, but impractical. Differing atmospheres resulted in significantly different coloration of the sound, but in the long run this work will perhaps have more application to digital signal processing (where one can easily simulate the effects of playing sounds in different mediums) rather than in the actual making of gas pressure chambers as musical instruments. The chambers did prove useful, however, in the realization of a 'test work', *Pythagorean Gas Dances*, made for choreographer Nanette Hassall.

The large, low bass forks needed resonators in order to be heard efficiently, and a frame was needed to hold both the very heavy bass forks and their resonators. This was designed in March of '86 and built during the remainder of that year by CSIRO. During that period I was again overseas, this time as Video Artist in Residence at the Los Angeles based art-science think-tank International Synergy. While there I used their computers to realize the score for another mathematically based

piece for the tuning forks. *The Exquisite* for solo forks performer wearing binaural microphones. This piece was performed in Los Angeles and Urbana, Illinois and will be used as part of a future performance by choreographer Jane Refshaug honoring the memory of Melbourne performance artist Liz Honybun. Travel after leaving Synergy took me to Albany, New York, where I collaborated with mathematician Henry Hunter in producing the program, based on versions of the computer game 'Life' which generated the score for *Voices, Tuning Forks and Accordion*, a large work designed for both the tuning forks

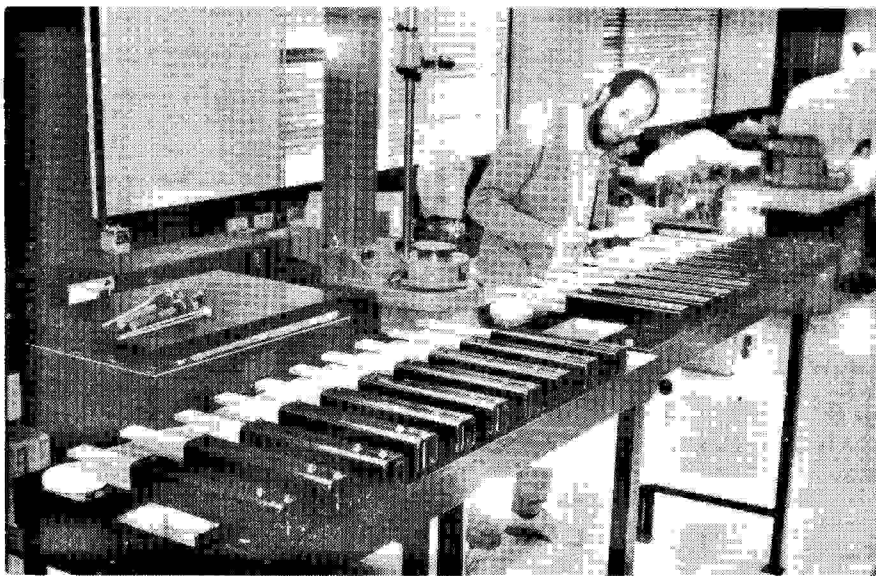
and the just-intonation accordion which was performed on my return to Melbourne in Nov. '86 by the Astra Choir, John McCaughey conducting, Catherine Schieve, accordion soloist, in the Dome Room of the State Library of Victoria. This work used the full range of tuning forks and resonators designed for portability made from Postpak mailing tubes. Each choir member played one fork with one resonator and sang the pitch of that fork. In that way, absolute intonational accuracy was assured.

By this time, the frames for the lower forks were ready, and I returned to the NML to make the larger resonators, from 100 mm ABS pipe, and put the finishing touches on the project. The resonators were finished in February '87, and the frames assembled in time for a live broadcast of the semi-improvisational piece *Improvisation in Two Ancient Greek Modes*, which was broadcast live over ABC Radio National's program 'Music Line' on Feb. 17 with myself and Ernie Althoff performing.

Work with the forks continues, and not just by me. A number of composers, such as Elwyn Dennis, Ernie Althoff and Douglas Ray have also written works using the forks, and the works by Althoff and Ray will receive their first performances later this year in Melbourne. In addition, I hope soon to have *Almond Bread Harmonies II; Voices, Tuning Forks and Accordion*; and *Improvisation in Two Ancient Greek Modes* on a commercially available, privately released cassette recording.

The assistance given me by the CSIRO and the Australia Council in this project was invaluable. It just couldn't have happened without it. I would especially like to thank Ron Cook, Robert Rigby, John Miles, Ken Peel, Stan Boothey and

Irma Mawson of the NML who all gave me such needed and appreciated assistance during the course of this work, John McCaughey and the Astra Choir for their sympathetic performance of my work, Ernie Althoff for much discussion and performing assistance, and Henry Hunter for both his programming skills and the long hours we spent discussing matters which eventually resulted in these instruments and pieces.



Warren Burt tests the bass tenor tuning forks. CSIRO Monash Uni. Feb '87 Photo: Ron Cook

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