

Frank Rothkamm

From: rothkamm VIP [info@fluxrecords.com]

Sent: Thursday, September 07, 2006 9:59 PM

To: frank@supermodern.com

Subject: Discreet Mathematics of 768 Frequencies [FB02] New Work + Interview (Vol 1)



ROTHKAMM™ FB02 New York (June 29, 2006 9:04 PM EDT)

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NEW WORK [COMPACT DISC]

FB02 out now! September 7, 2006

Having laid the cornerstone for sci-fi serialism with his early 21st century album **FB01**, ROTHKAMM returns after 3 years of labor with **FB02**, a highly mathematical *space drama* of Intuitive Future Oriented Retrograde Motion Music (IFORMM).

"**FB02 - Astronaut of Inner Space**" is 100% pure electronic music of intimate, intricate and infinite complexity.

Inner-worldly microtonal melodies and meticulously researched psycho-cybernetic sound architectures make **FB02** embody the laws of a parallel universe.

ROTHKAMM premiered the work on Thursday, June 29, 2006 at exactly 9:04 PM on a Manhattan rooftop stage as a 3D view & sound TRIPHONY. Now, with this special CD designed for home use, YOU can replicate the experience!

ADVISORY: Enjoy a complimentary download of a complete track. Although fully compatible with a regular stereo setup, Headphones or 4.1 speaker installation are recommended for 3D effect.



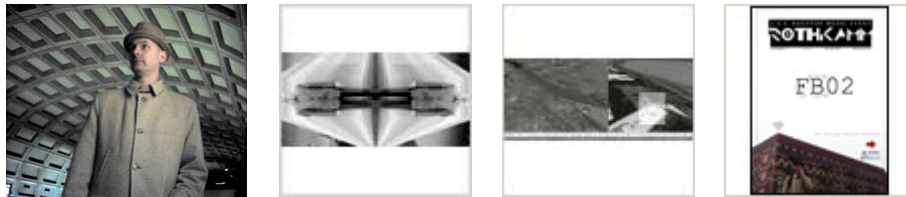
Tracklisting: (recorded in Hollywood, Calif. and New York City :: 2003-2006)

[01] rothkamm Silence of Mute	6:16	
[02] rothkamm ID 8	0:04	
[03] rothkamm Outdoor Heritage of New Jersey	5:20	FREE ↓
[04] rothkamm ID 9	0:04	
[05] rothkamm Astronaut of Inner Space	7:35	
[06] rothkamm ID 10	0:04	
[07] rothkamm Triumph of the Analog Age	5:40	
[08] rothkamm ID 11	0:04	
[09] rothkamm Adventures in Research	8:43	

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INTERVIEW [FRANK ROTHKAMM]



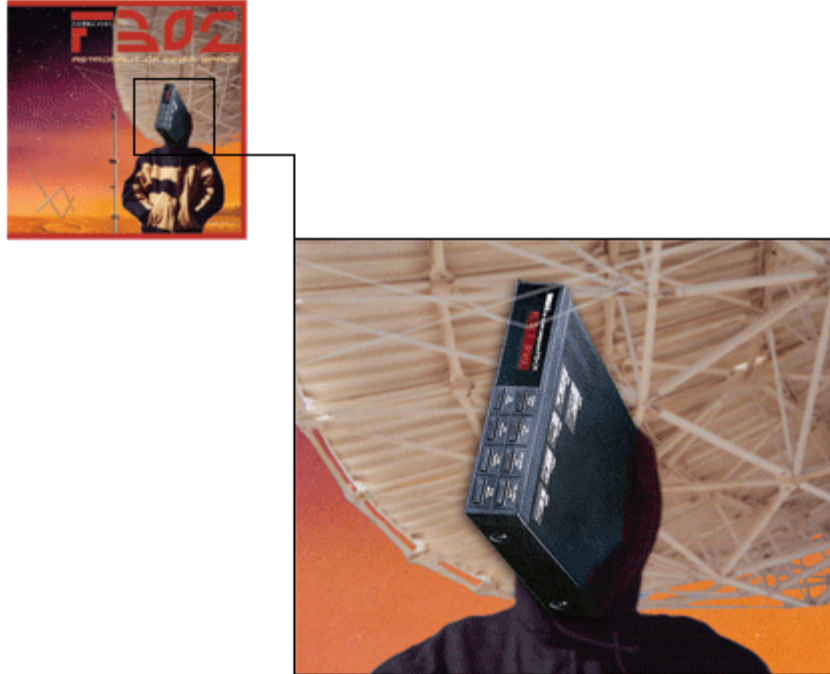
The mystery revolving around the micro-tuning system used in Rothkamm's FB02 compact disc is being unraveled in this interview with DaveX of WDBX radio in Carbondale, Illinois (USA)

DaveX: Interestingly, in the few days prior to your disc's arrival, I had been part of a listserv discussion about microtonal tunings and new instrument designs for accommodating such tunings. The day before I got your disc, I had asked a question about whether or not anyone had ever utilised an entire piano's keyboard, but modified the instrument in such a way as to span only one or two octaves. From there, some other members replied that such a thing was possible in MIDI, and that Carillo had used a 96-tone scale on a piano.

Anyhow, yesterday, I posted about your FB02 liner notes where you mention the IFORMM's "768 frequencies per octave". I said that I assumed this to be the end of the "how many" sort of discussion we were having. Another member wrote off to microtonal composer Warren Burt, who wrote the following...

"Well, I did a piece once tuned in cents, so that might be considered 1200 tones per octave....but the point is, how are the tones used? Is there really a compositional way to make all 1200, or 768 tones perceivable as different from one another? Actually 768 rings a bell....that's the number of tones per octave available on the old Yamaha TX81Z, I think (early fm synth)."

Of course, there is the FB01 in the pic on the cover and as you can see by now, I'm very curious about the IFORMM setup.



=== Featured FB01 sound module (detail) ===

Why 768 frequencies?

Frank: 768 is a machine-dependent divisor of the octave, a digital-age tuning number. As traditional equal temperament divides the octave into 12 steps or 1200 cents, we have $1200/768$ or 1.5625 cents distance between each frequency.

One could successfully argue that humans cannot distinguish between frequencies so close together, but I feel music ought not only be written for today's humans but for the perception of humans far in the future, an idea connected to the concept of sci-fi serialism, that forms the basis of my post-2002 work starting with 'Fanfare for a Lost Planet'. Our perception, and indeed our neural paths in the brain that govern understanding, will increase with exposure to 'higher', superfine or supermodern tuning systems.

When I started experimenting, I found that coarse resolutions would produce "off-tuning" of "wrong notes", interesting but somehow not right. So I increased the resolution, the frequencies-per-octave, until I could not perceive any difference between "right" or "wrong" until the whole frequency spectrum became something of a quantum-mechanical field where I really don't know where anything is exactly, I only know its probability.

So what you listen to on FB02 will change each time you listen to it, because your perception of frequencies will increase each time.

DaveX: How are you able to utilize all these?

Frank: A mechanical approach to utilize all these frequencies would be to build a keyboard with 448 octaves, based on the traditional 7 octave piano. I thought about it and calculated that the keyboard would have to be over 341 feet long and each of my arms would have to extend to about 170 feet. So either this or I would clone myself 64 times and we all would sit in front of each piano, intuitively connected to the same mind.

Ultimately, I adapted both approaches in the IFORMM computer model. The basis of the 768 frequencies-per-octave tuning system is the traditional 12 step equal temperament and its keyboard, but with a quantum mechanical twist: each step has a "uncertainty principle" which will make the note of equal temperament derive from its proper place and fall anywhere up 63 steps higher. On the IFORMM instrument the amount of quantum mechanization can be

adjusted in real-time, thereby allowing a continuum between equal and "quantum equal" temperament, between modern and supermodern temperament.

To make an analogy: as you play the piano a super fast tuner would retune each key just before you hit it. The tuner would retune the key slightly higher, but never higher than the next key on the piano. The tuner would throw a magical dice before it tunes the key: whatever number shows up would be the amount of re-tuning. As the player of the piano, you could change during play how many sides the dice would have: anywhere from 1 side (the "Zen dice" or a sphere) to a dice with 64 sides.

```

:ap fb01-micro-on

::ap current-note 0 = if rnd-bubble then ;;ap \ trigger process
::gp [ 2 params ]
  %transpose + to current-note
  to current-velocity

  magic-number
  master-transpose + to offset-note

current-note offset-note + dup \ actual note
127 > swap 1 < or \ exceed boundaries?
if active-exit then \ exit

ufrnd irnd \ microtuning offset
to offset-cent
fb01max irnd to fb01channel \ distribute among all FB01s

offset-note current-note /n* equalArray + ! \ keep pitch
offset-cent current-note /n* microArray + ! \ keep 100 cent
fb01channel current-note /n* chArray + ! \ keep channel

th f?
current-velocity \ velocity
current-note offset-note + \ pitch
offset-cent
swap th 10 fb01channel or th 70 th 75 th 43 th f0
9 [' ] MIDI-command-event event

\ micro-thru-display
;;gp
:ap

```

=== Forth Musical Language computer code (excerpt) ===

DaveX: Are you encountering any difficulties distinguishing among the sounds, or actually performing with this many available?

Frank: Yes, I do. All the music on FB02 is performed in real-time, basically played by a quartet or band of the "Ego and Its Clones"; multiple time-shifted Rothkamm's playing together as one. Let me explain: After many months of 'training' I was able to intuitively play and steer the IFORMM system, so I no longer had to think: "what does this button do?", but could predict the amount of timbre change any physical action on the controllers would do. And I say predict and not control because some knobs, for example, control an aspect of a probability function. After all, the whole concept here is the "randomization of man and machine".

The system is therefore in a state A at time S when I start to record and in a state B at time S+delta when I'm done. Then I "rewind the tape" and record a 2nd track: system is in a state B at time S and at the end in a state C at time S+delta. While the function of time always stays between S and S+delta, the state of the IFORMM system is non-reversible: it moves forward from state A to B to C to ... In effect this is time travel: it warps a non-reversible linear sequence of events (things that happen in time) into multiple parallel sequences or universes, as the sequences are self-contained and have their own causality. That's the reason why I hint poetically in the liner notes that "you may be able to detect the frequently silent architectures of a parallel universe".

DaveX: Are you planning to go to even greater amounts of available tones?

Frank: I made a proposal in 2005, to build a machine that computes all possible music and then stops. This of course would include greater tuning systems.

The real answer is twofold: if there exists a perceptual or compositional reason a needed tuning system will be devised. if there exists a smallest distance between two frequencies, then a compositional or possibly perceptual effect will be produced.



==The IFORMM data processing instrument system ==

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$$\lim_{I \rightarrow I} \sum_{\substack{i \text{ form} \\ j \neq 0 \geq 1}} I \subset C$$

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