



IRISH RESEARCH COUNCIL
An Chomhairle um Thaighde in Éirinn

This research is supported by the IRC
Government of Ireland Postdoctoral
Fellowship programme.

Subverting algorithmic policies of sonic control in Nicolas Collins's *Broken Light* (1992)

Dr Eamonn Bell
Department of Music
School of Creative Arts
Trinity College Dublin

Presented at
American Musicological Society
Annual Meeting
November 2020

TRANSCRIPT

Available as supplementary material

FULL PAPER w/SLIDES and BIBLIOGRAPHY

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1. Introduction

2. On *Broken Light*



3. On algorithmic policies of sonic control

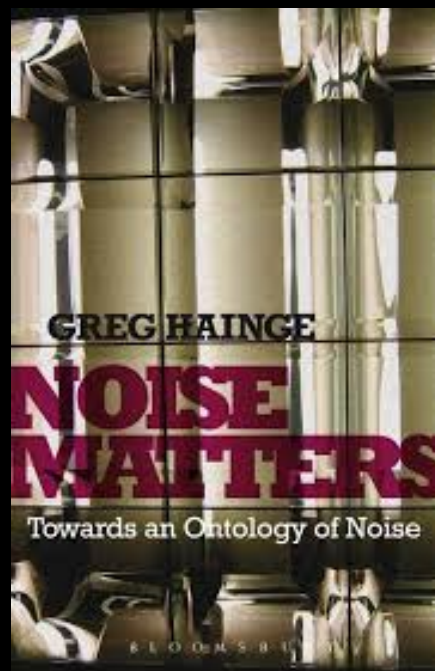
4. Conclusion



(Kelly 2009)



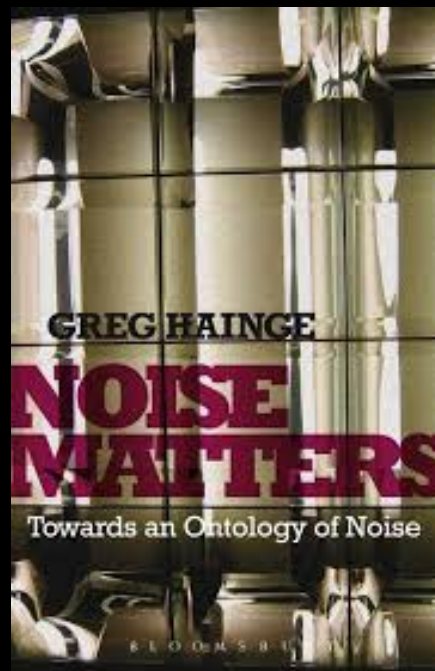
(Kelly 2009)



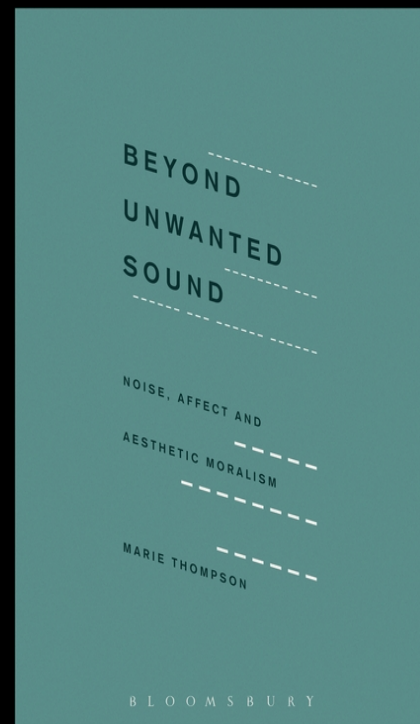
(Hainge 2013)



(Kelly 2009)



(Hainge 2013)



(Thompson 2017)



Recent STS accounts of circuit-based electronic music/“hacking”

(Teboul 2018; 2020)

(Nakai 2014; forthcoming)



Media archaeology

(Ernst 2013; 2016)

Kittler “middle period” (*per*
Winthrop-Young 2017)



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~~1. Introduction~~

The Plan

2. On *Broken Light*



3. On algorithmic policies of sonic control

4. Conclusion

~~1. Introduction~~

2. On *Broken Light*

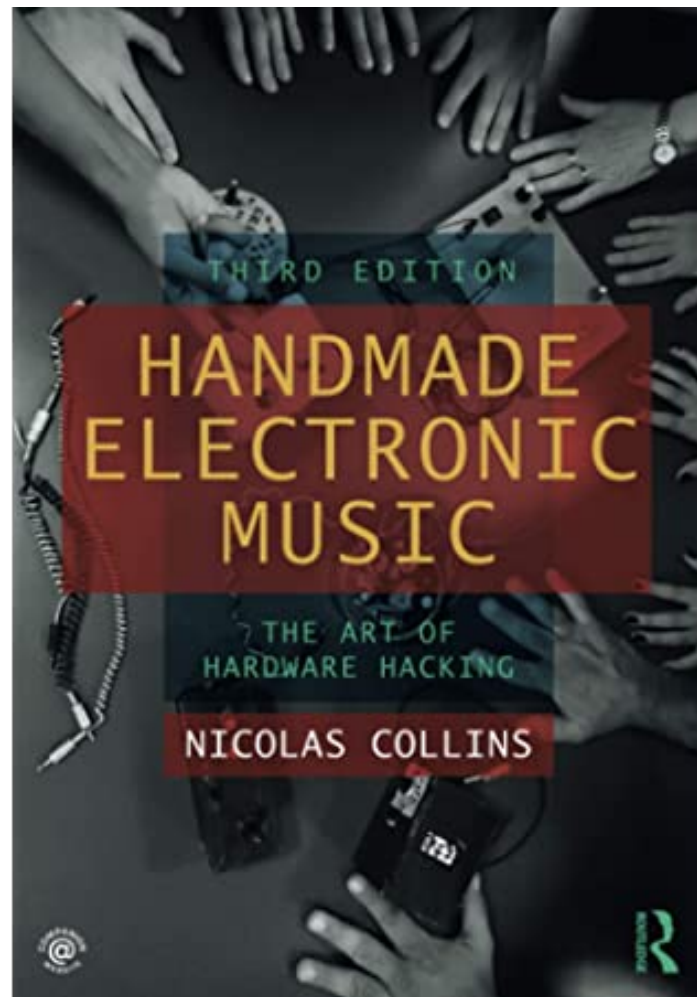


3. On algorithmic policies of sonic control

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Nicolas Collins (b. 1954).
Photo credit: Marty Perez

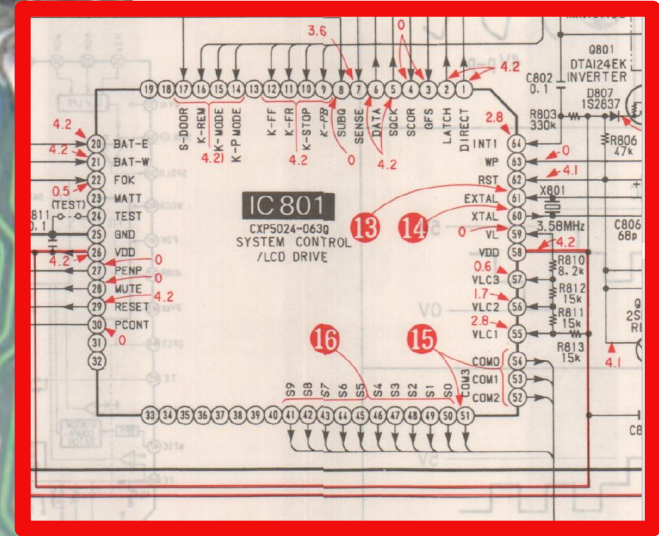


3° edition (2020)

I Musici, Christmas Concertos: Corelli, Manfredini, Torelli, Locatelli. Recorded 1984. Philips 412 739-2, 1990. CD.

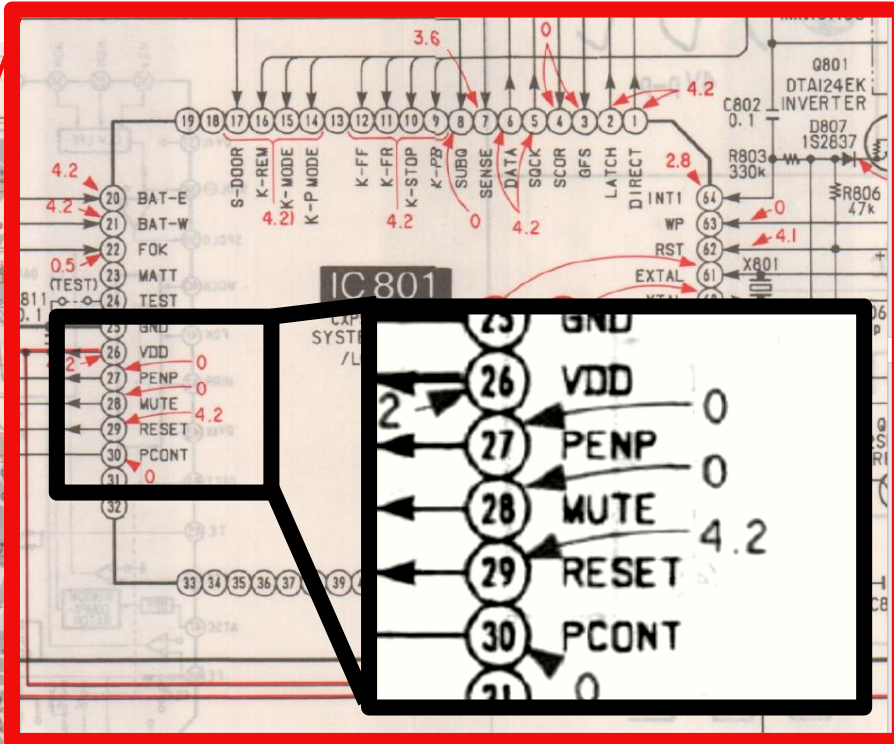


Soldier Quartet. 1983 Lineup.



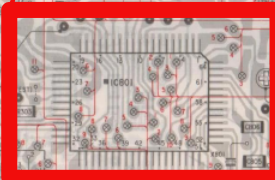
Lifted “mute” pin on chip in Sony D2 Discman
(wires go to switch for mute enable/disable.)
(Collins 2009)







● Semiconductor Location

Ref. No.	Location	Ref. No.
D401	B-12	Q302
D402	C-12	Q303
D403	E-9	Q304
D418	J-23	Q305
D501	B-18	Q409
D502	B-18	Q410
D503	B-18	Q412
D504	B-18	Q413
D505	F-19	Q414
D507	G-13	Q423
D801	E-12	Q424
D801	I-18	Q451
D803	I-18	Q452
D804	J-14	Q453
D805	I-14	Q501
D806	J-19	Q502
D807	I-17	Q503
		Q504
IC301	F-22	Q506
IC302	I-22	Q507
IC303	H-21	
IC501	G-17	Q801
IC502	G-19	Q802
		Q803
IC503	F-14	
IC504	C-18	
IC505	B-19	
IC801	E-18	
IC802	D-14	
IC801	I-13	
IC802	I-19	





Set-up for *Broken Light*, showing hacked Sony D2 Discman; modified Sony remote control (in blue box); breakout box for connecting footswitches to remote control; footswitches to call up tracks for three movements ("1", "2", "3"), scratch across CD ("S"), and nudge through tracks ("N"). (Collins 2009)



Under the control of the performers, the CD player “scratches” across the disk, isolating and freezing short loops of recorded music. As it slowly steps from one “skipping groove” to the next, the lush contrapuntal texture of the *concerto grosso* is suspended in harmonic blocks, with the insistent rhythmic feel of the loop superimposed. The performers’ parts, both written and improvised, mesh and clash with the CD, with a respectful nod to Terry Riley’s *In C*.

(Collins 2009)



II

(Violin I)

(Violin II)

(Viola)

(Cello)

Footswitch

N

N

N

N

N

N

N

N

N

N

VARIATION

OPEN REPEAT TO RESOLVE

LAST LOOP

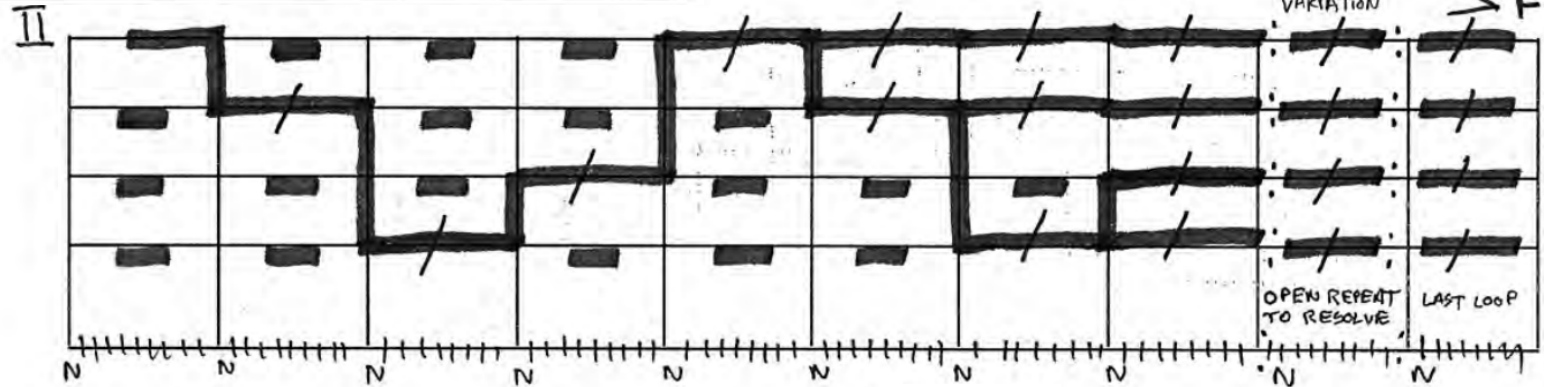
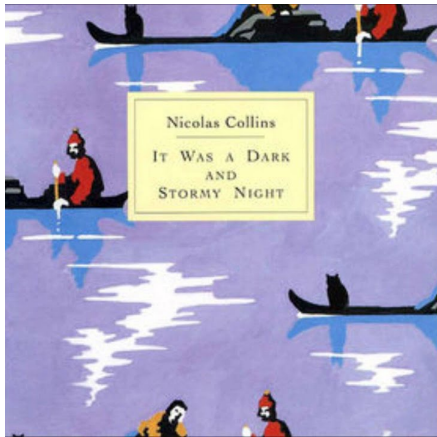
> F

Detail from score for Nicolas Collins, *Broken Light* (1991, rev. 1992)

SECTION 2 VARIATIONS

Number of players active in each CD harmony loop (take rests)
 Number of changes: 1 resolution
 repeat/alternate old & new pitch
 sequence of more than 1 pitch after resolution
 Single or double stop
 Step or gliss harmony resolution

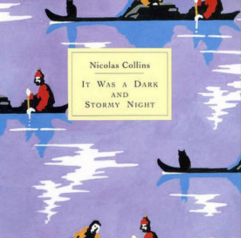
c. 1:00 [Excerpt ends]



Section 2: c.4 minutes

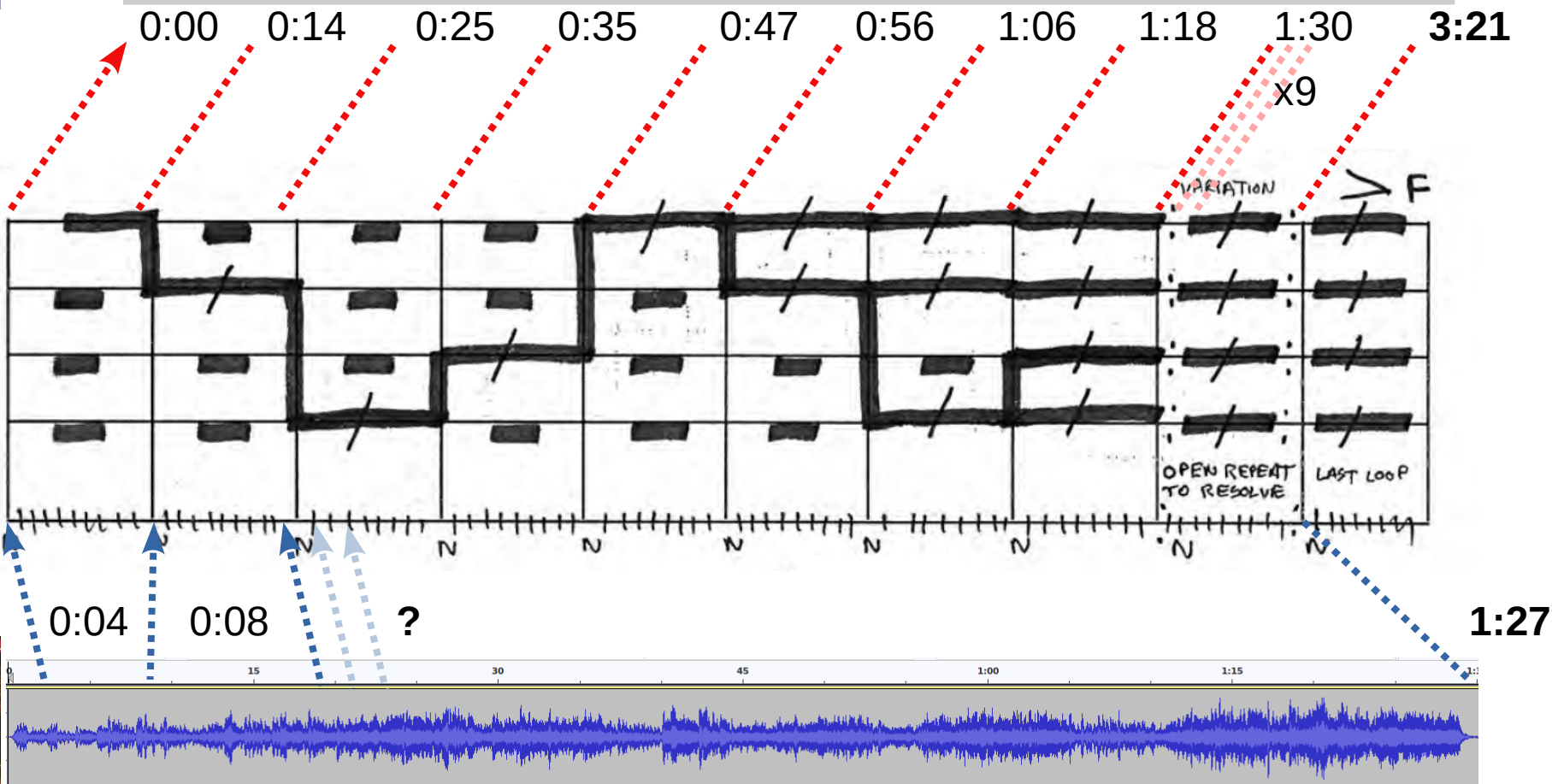
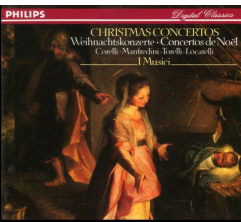
Slow movement. Sustained bowing with passing dissonances resolved. Begin with Violin 1 taking pitch from harmony, passed on to Violin 2 at loop harmony change; Violin 2 changes to new pitch for new harmony mid-way through "bar," then passes this new note on to Cello at next harmony change, then viola. Octave change permitted on any pass. Then repeat sequence but add up instruments rather than replacing 1 for 1; each new player can select any previous player's pitch on entry. Once full quartet is in, continue form of sustained bowing, carrying pitch over loop harmony change and then "resolving." Variations as indicated on score. Listen carefully for resolution to F at end; fade out on last breathy CD loop.

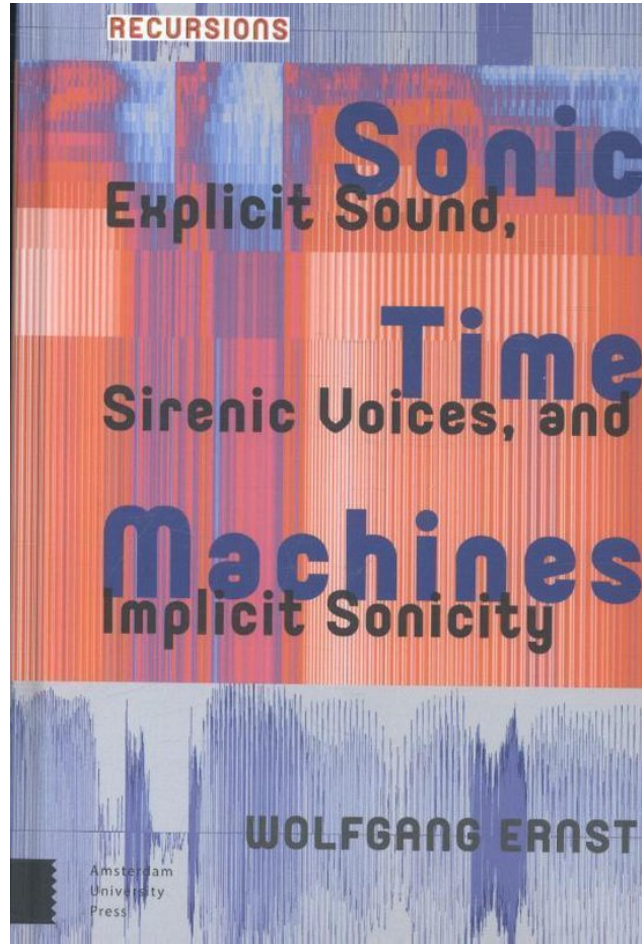
The Soldier Quartet
 Nicolas Collins
Broken Light, II. "Locatelli" (3:45)
It Was a Dark and Stormy Night
 Trace Elements Records, 1997



■ ■ ■ ■ ■ Footswitch press (“Nudge”) [time in recording of *Broken Light*]

■ ■ ■ ■ ■ Loop source [time in recording of Locatelli, Op. 1/8, II mvt.]





(Ernst 2016)

Collins's other work with CDs

- *In CD* (1992) [for Impossible Music ensemble]
- ***Still Lives* (1992)**
 - *Still (After) Lives* (1997)
- *Shotgun* (1995)
- ***Die Schatten* (1996)**
- *microstoria_snd processed* (1997)
- *Broken Choir* (1997)
- ***English Music* (2002)**

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Sony CDP-101 interface



Image credit: British Library

“CDs featured certain conveniences that transcended the other available modes.”

(Plasketes 1992, 112)



Philips CD 104 interface

Sony CDP-101 interface



Image credit: British Library

“CDs featured certain conveniences that transcended the other available modes.”

(Plasketes 1992, 112)



Philips CD 104 interface

“[Y]ou didn’t have to bother with delicately moving a phonograph arm or engaging in a frustrating rewind-stop-play-stop-rewind tango with your tape player.”

(Mnookin 2007 quoted in Daniel 2019, 161)

The CD “Tweak”-osystem



Photo represents sound without Monster Cable's CD SoundRing™

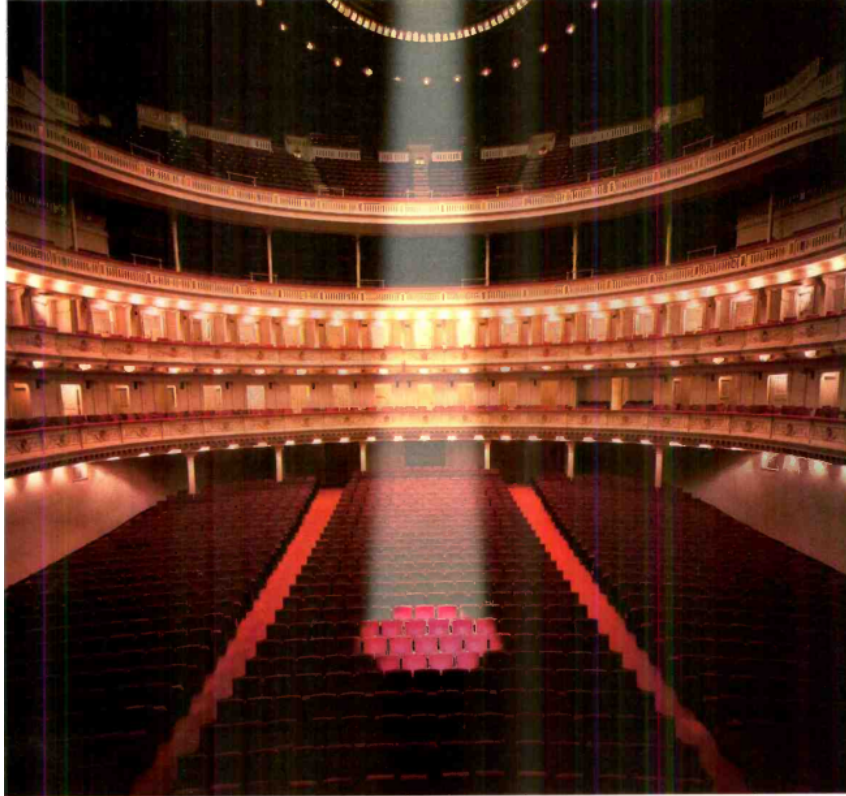
Photo represents sound with Monster Cable's CD SoundRing™

Detail from ad for Monster Cable's CD SoundRing™ in *High Fidelity* Feb. 1989



Detail from Denby, “Twin Tweaks” in *New York Magazine*. July 16, 1990.

(Perlman 2003; Downes 2010)



Sony creates seventh row, center. Forever.

INTRODUCING THE SONY COMPACT DISC PLAYER

The inventor of digital audio processing is pleased to raise the curtain on the CDP-101. Hailed by the discriminating ears at *High Fidelity* as "the most fundamental change in audio technology in more than eighty years."

There are compelling reasons for such applause.

The CDP-101, based on the world's first compact disc system co-developed by Sony and Philips of Holland, offers concert-hall freedom from distortion, wow, flutter, and other sonic gremlins. Plus an awesome dynamic range exceeding 90dB. To bring you the full

beauty of Mahler or the Moody Blues as never before.

This highest of fidelity remains faithful, too. Because the digital discs are read by laser beam, there's none of the physical wear inevitable with tape or vinyl. While the CDP-101 ingeniously ignores scratches, dust, and finger prints.

Equally ingenious, an infrared remote control even lets you select tracks without budging from your armchair. Yet for all its sophistication, the CDP-101 is thoroughly compatible with whatever sound system you now own. We suggest you hear the CDP-101

soon. For a sound you can't believe, from the audio innovator you assuredly can.

SONY.
THE ONE AND ONLY



© 1983 Sony Corp. of America. Sony is a registered trademark of the Sony Corp. 1 Sony Drive, Park Ridge, New Jersey 07656
CIRCLE NO. 6 ON READER SERVICE CARD

"...even lets you select tracks without budging from your armchair..."

Sony ad copy for the US market c. 1983.

See, for example *HiFi and Stereo Review*, September 1983





Sony prototype digital audio compact disc player "Goronta" c. 1981.



Sony prototype digital audio compact disc player "Goronta" c. 1981.

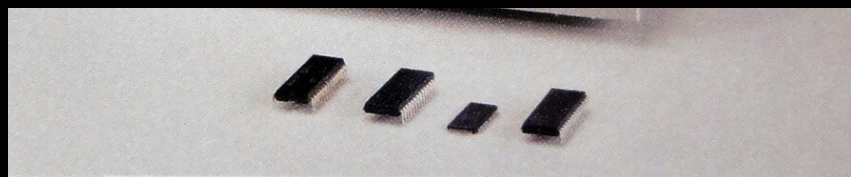


Sony CDP-101. Released 1982.

Philips TDA1541A [DAC]



Philips/Signetics SAA7000 [concealment]



Sony Discman D-20
Main PCB





Policies of sonic control

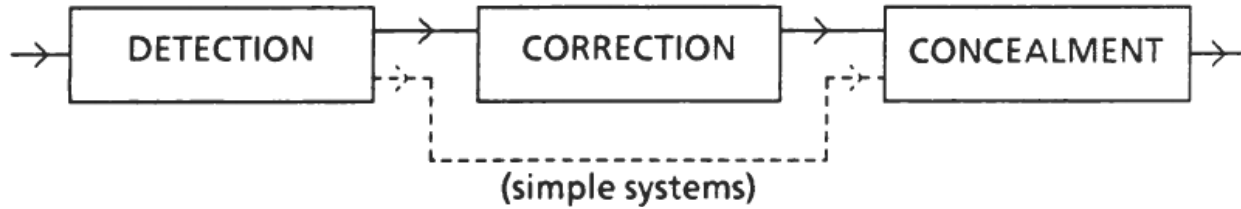
- regulate what and when the data that the medium inscribes is understood as sound and what and when it is understood otherwise



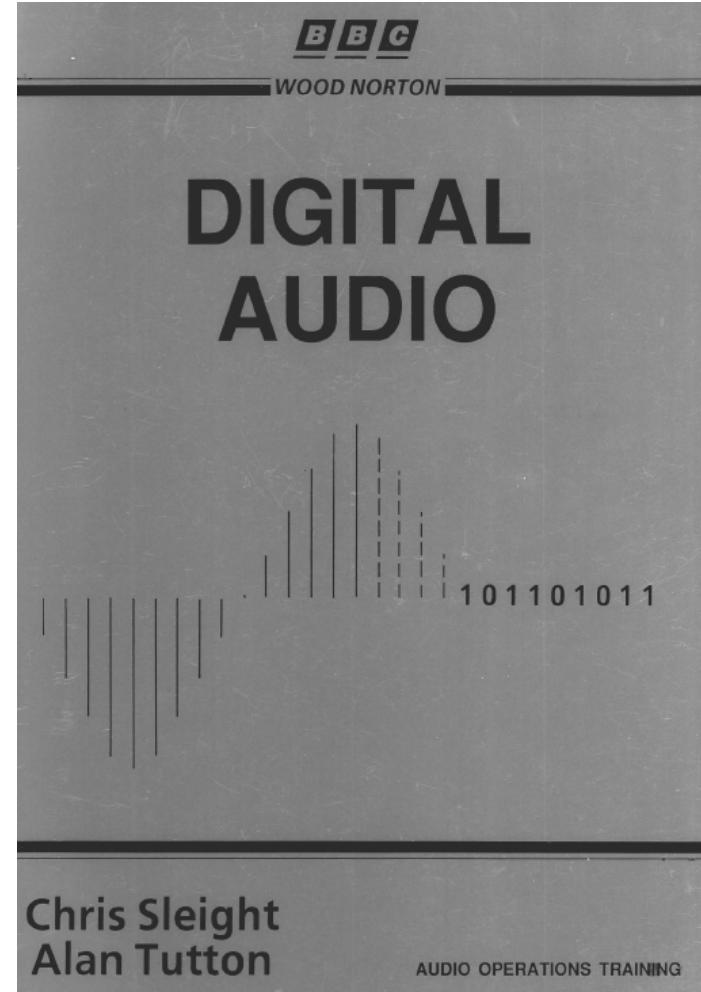
Algorithmic policies of sonic control

- regulate what and when the data that the medium inscribes is understood as sound and what and when it is understood otherwise
 - more or less autonomously
 - in hardware and software
 - generally, but not always, without the oversight or control of their users (Kittler 2012 [“Protected Mode”])
 - not user-modifiable without significant deviation/“de-description” (Akrich 1992)

Correct, *then* conceal

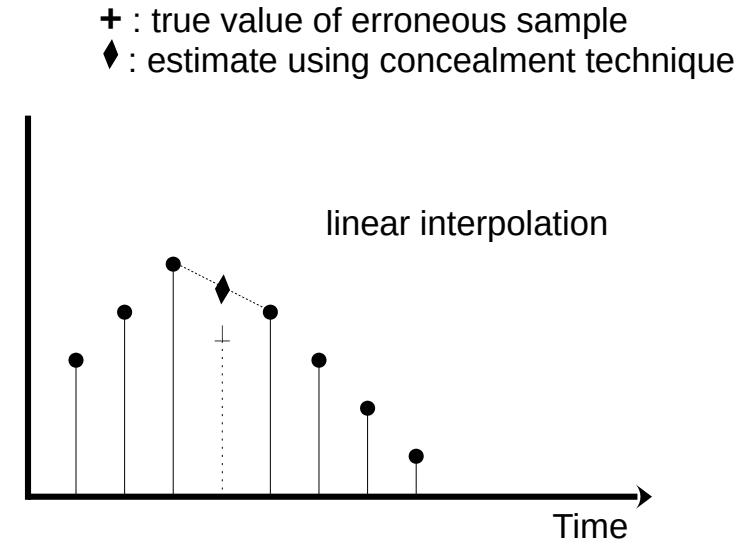


(Sleight and Tutton 1990, 4.3)



Error concealment

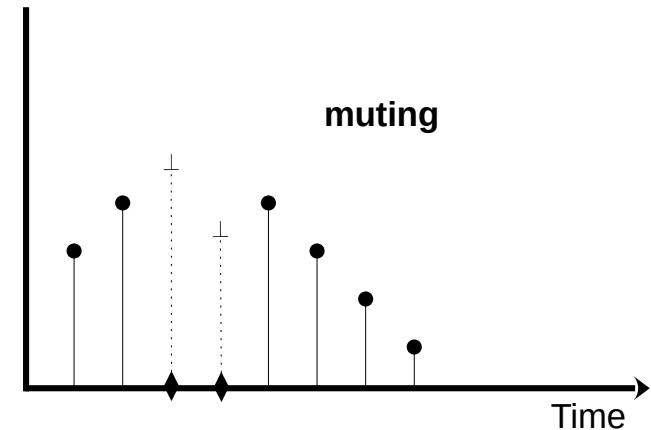
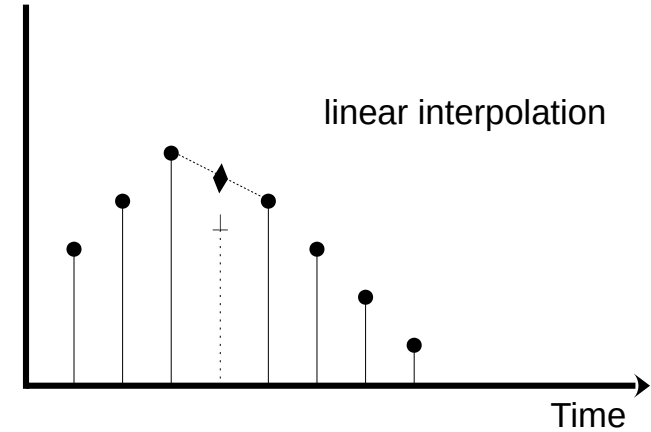
- Used when CD error-correction (CIRC) fails
- Two main strategies
 - interpolate (guess)



Error concealment

- Used when CD error-correction (CIRC) fails
- Two main strategies
 - interpolate (guess)
 - **mute** (to digital silence)

+ : true value of erroneous sample
◆ : estimate using concealment technique





Muting (for error concealment)

- Pre-CD research into tape dropout showed listeners tolerated 10ms muting in musical context (Cardozo and Domburg 1968)
 - Research conducted out at Philips/TUE/[NL] joint venture
- Carried forward to “Audio Long Play” and descendant CD project (Peek 2010)
- “perceptual technics” (Sterne 2012)



Muting — summary

- Part of the day-to-day operation of CDs
- As shown by *Broken Light*, **to facilitate track cueing**
- ...but also **to conceal the effects of damage and defect**
 - More often than manufacturers estimated they would (Ranada 1982, 70)

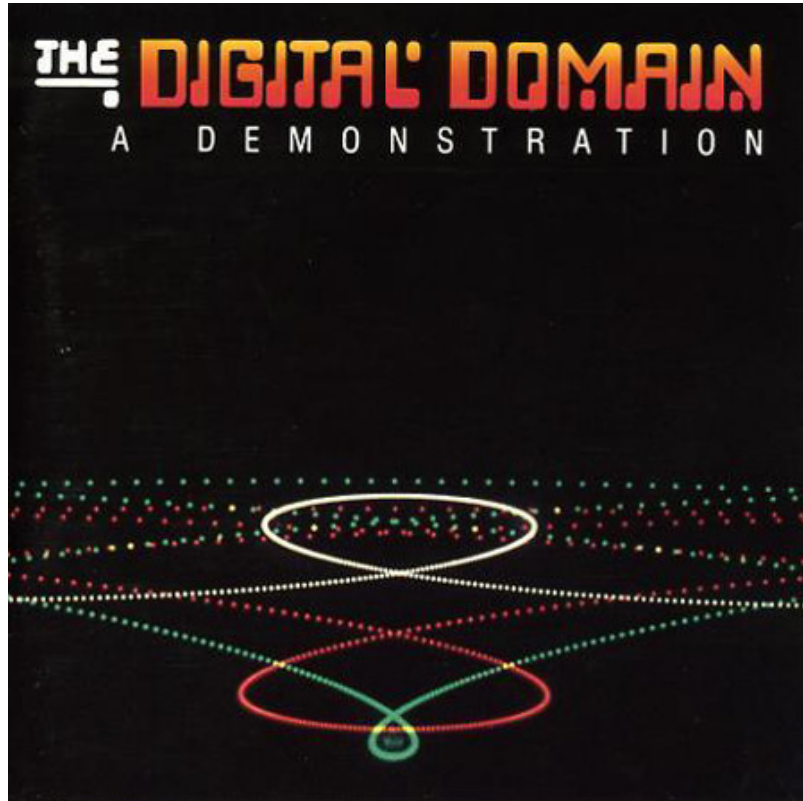
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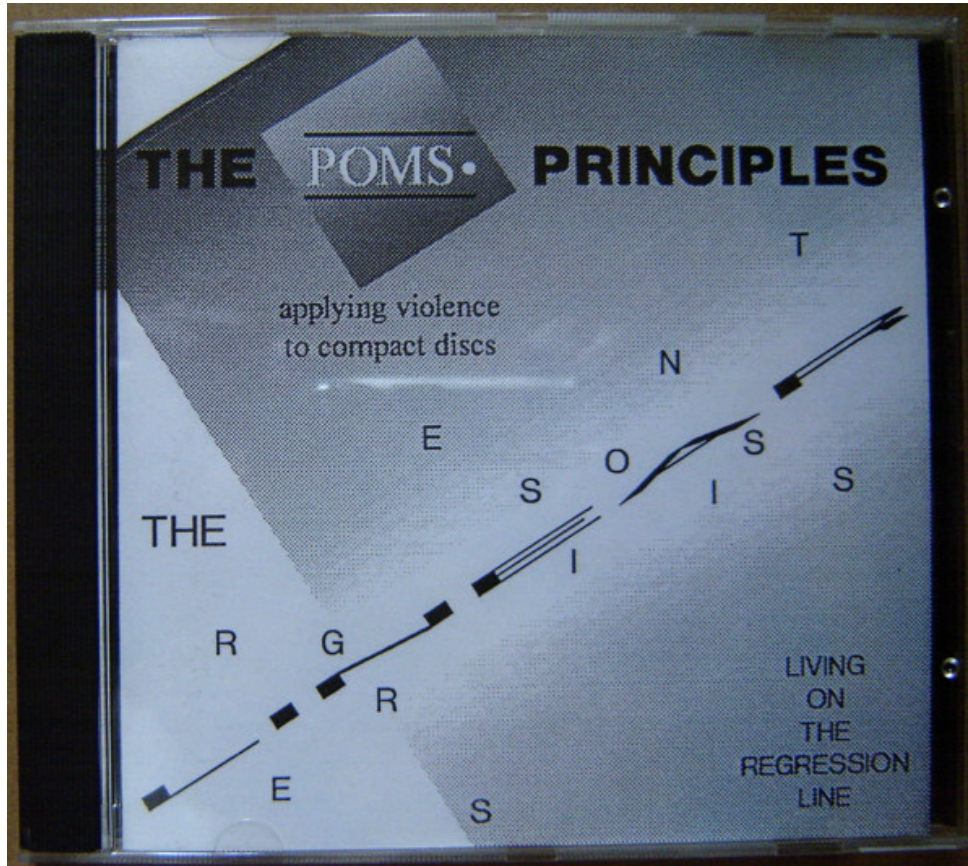
~~3. On algorithmic policies of sonic
control~~

4. Conclusion



Various Artists, The Digital Domain: A Demonstration. Elektra 9 60303-2, 1984. CD.

(Kromhout 2014; Anderson 2015)



The Linear Regressionists, Living on the Regression Line. Pursuit Of Market Share/RRRecords POMS ROI-001/CD-002. Germany, 1990. CD.

(Mowitt 1987; Downes 2010)

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Ranada, David. "Digital Debut: First Impressions of the Compact Disc System." *Stereo Review*, December 1982.

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Teboul, Ezra "A Method For The Analysis Of Handmade Electronic Music As The Basis Of New Works." PhD diss., Rennslaer Polytechnic Institute, 2020.

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Further information

For the presentation text, slides, full image credits, links to media resources, and the complete bibliography, please see <https://www.eamonnbell.com>

Comments and questions welcome in advance of live Q&A
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