Dirty Electronics: 4049 Study/Pinboard 2nd ed.

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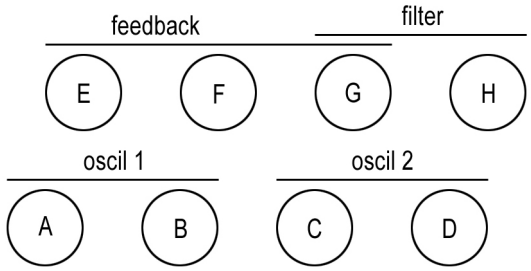
Very Brief Context …
Inspired by: Craig Anderton, Michel Waisvisz, the Crackle Box, David Tudor, Hugh Davies, Scratch Orchestra, Nicolas Collins, Merzbow, Tom Bugs, Tristan Perich, Stanley Lunetta …

The 4049 Study is a circuit that explores the potential of the CMOS logic 4049 IC. The original work for the Study was done in 2009. The Dirty Electronics instruments, the Skull Etching and Pinboard, are based on the 4049 Study, and have different interfaces. The idea was to create a versatile and cheap instrument from commonly available parts that could be built in a workshop as a primer on Dirty Electronics. Much of the inspiration came from Michel Waisvisz's Cracklebox and Tom Bug's Weevils, although a 'noisier', broader spectrum sound was sought to that of the often 'chirpy' Cracklebox.

Important design considerations included: the use of just one IC, no knobs, a touch interface, minimal controls/parameters, silent when not touched, to be able to fit in the pocket and in the hand, and a single coin-cell power supply.

Features
Touch control
Two oscillators
Distortion
Feedback network
Filter
Interference/hum/radio …

Touch Controls



Playing the Instrument
Find your own way to play the instrument.

Some tips: lick your fingers and touch the brass pins. Touching pins A and B will complete the circuit of Oscillator 1. The moister the fingers and the greater pressure on the pins the higher the pitch of the oscillator. Using one finger, instead of two, to touch pins A and B produces a higher pitch. Oscillator 2 (pins C and D) can be played using the same techniques.

The top row of pins, E, F, G, and H, primarily control the feedback network. To complete the feedback circuit touch pin G and either E or F. G is a shared pin. Used with H it acts as a filter control in some instances. Touching pins E and F in isolation will produce earth hum and possibly radio interference.

All of the above can be combined to create interesting modulating results.

Try touching the pins in different combinations to find new sounds.

Jack Socket

The jack socket also acts as a switch. Use a **mono** 3.5 mm jack plug to switch the instrument on properly; or re-wire a stereo jack plug connecting the 'ring 'to 'sleeve'.

Reference

Anderton, Craig. *Electronic Projects for Musicians*. New York: AMSCO, 1980.

Brindley, Keith. *Starting Electronics*. Amsterdam: Elsevier/Newnes, 2005.

Collins, Nicolas. *Handmade Electronic Music: The Art of Hardware Hacking*. New York [etc.]: Routledge, 2006.

Lancaster, Don. *CMOS Cookbook*. Indianapolis: H.W. Sams, 1977

Richards, John. "Getting the Hands Dirty," *Leonardo Music Journal* (18) 2008.

Richards, John. *Nine Easy Pieces for the Sudophone*. 2009.

Part List (see below)

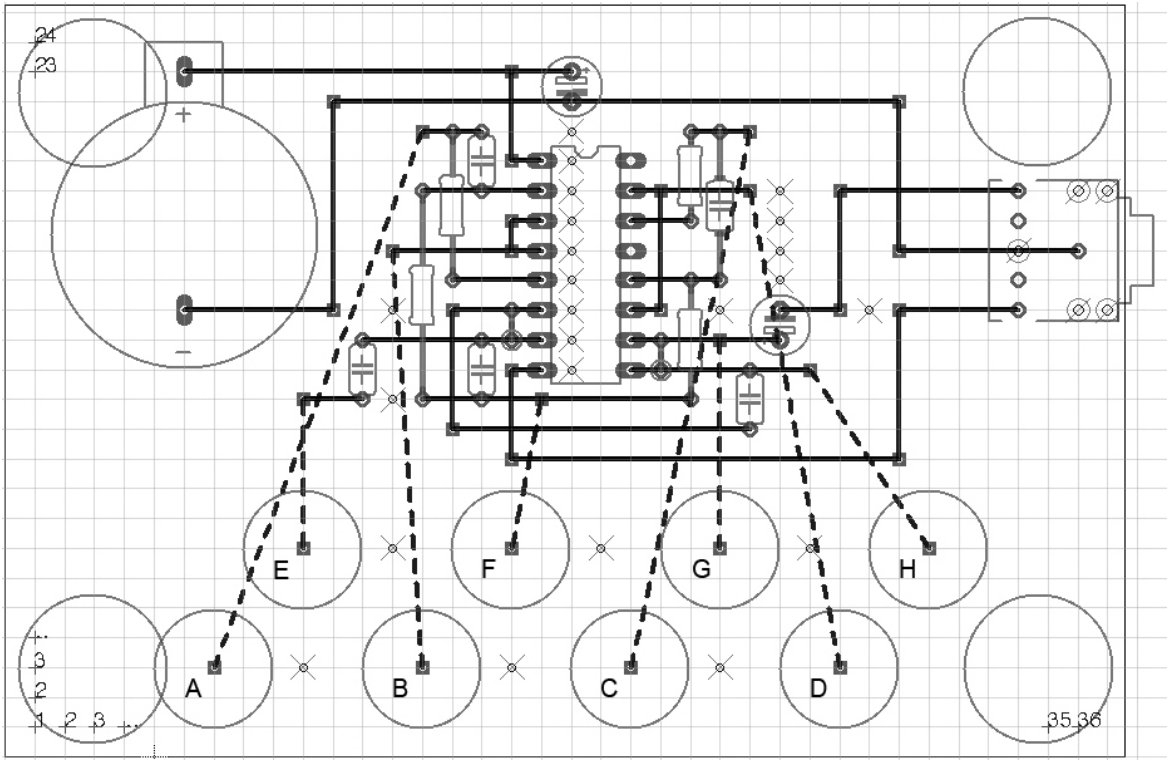
BAT1	3v	
C1	0.1uF	
C2	0.1uF	
C3	0.1uF	
C4	0.1uF	
C5	10uF	
C6	0.1uF	
C7	47uF	
IC1	4049N	DIL16
OUT	AUDIO-JACK	Stereo 3.5 mm
R1	10k	
R2	10k	
R3	10k	
R4	10k	
R5	100k	
R6	100k	

CMOS 4049

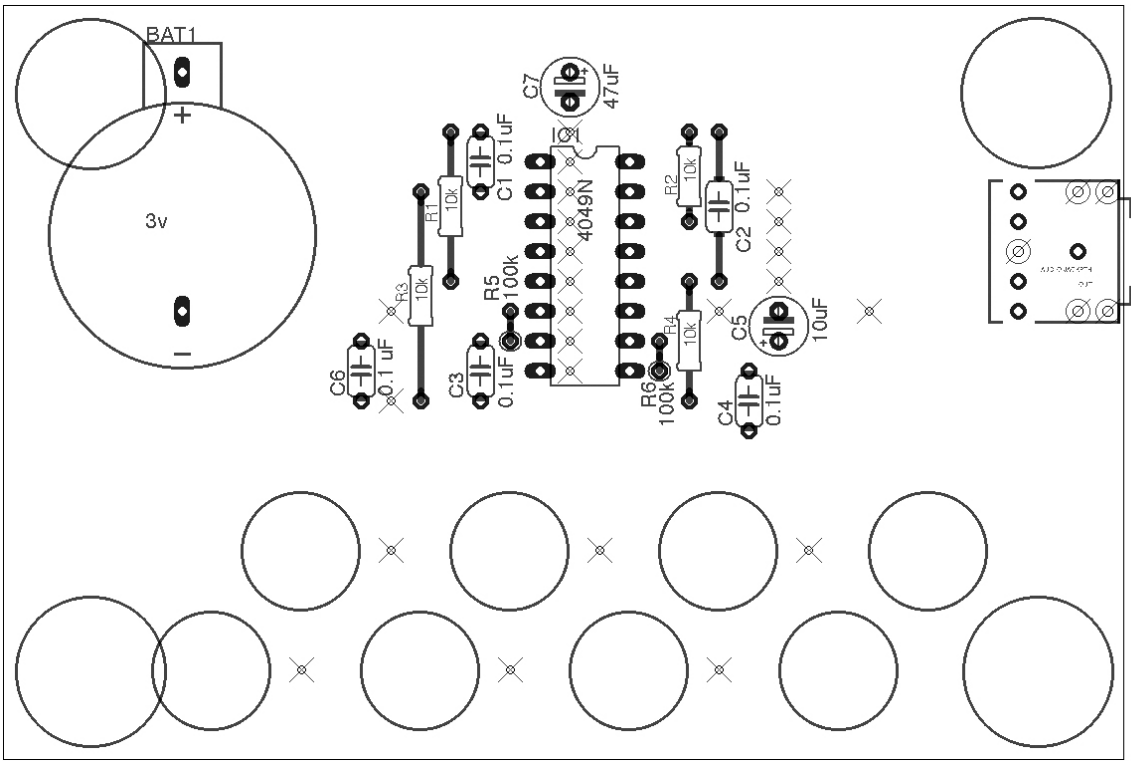
Six logic inverters in one integrated circuit (IC) (see data sheet for more info.). General notes: flat side of triangle symbol represents the input (e.g. pin 3), the triangle symbol point (small circle) the output (e.g. pin 2). NC (pin 13) not connected. VDD – positive power supply, VSS – negative power supply.

4049 Study Stripboard Layout

Routing



Component Values



4049 Study Schematic