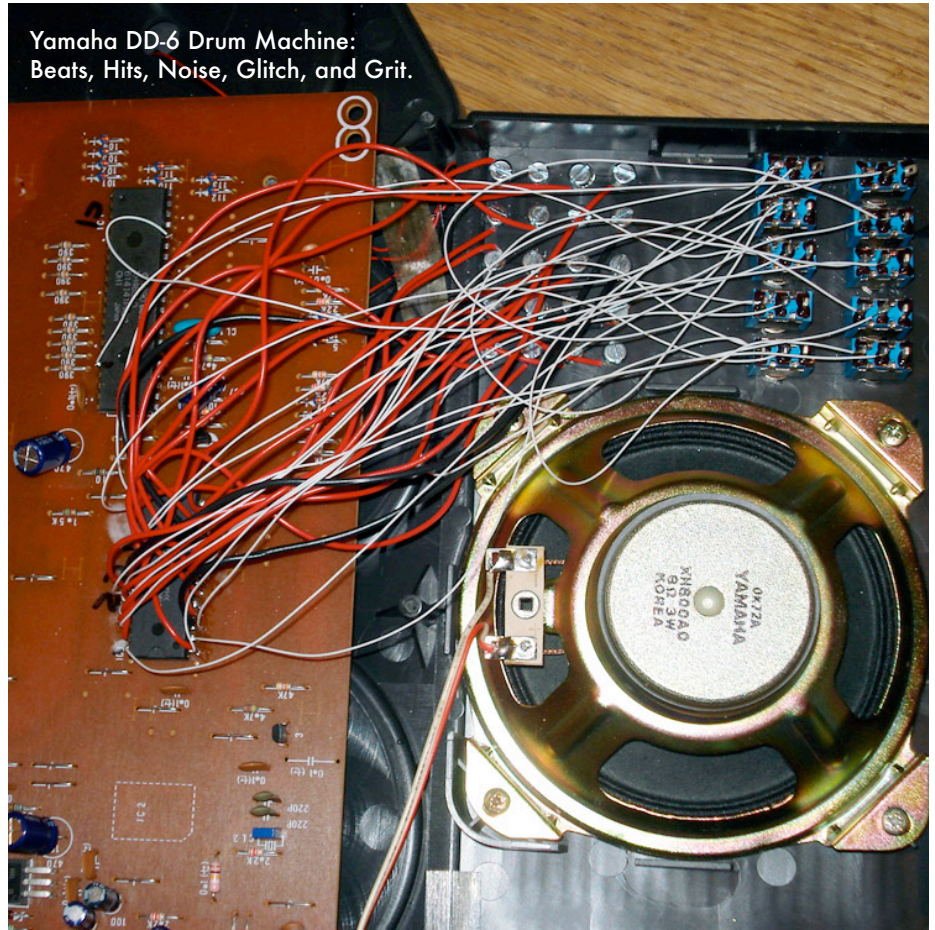


THE  
NOISE  
UPSTAIRS  
WORKSHOP

JUNE 21  
JULY 5

# circuit-bending

Yamaha DD-6 Drum Machine:  
Beats, Hits, Noise, Glitch, and Grit.



## THE NOISE UPSTAIRS presents a FREE Circuit-Bending Workshop at FUEL Cafe 448 Wilmslow Road, Withington

Have you ever wanted your very own circuit-bent toy? Ever wished you could do it yourself?

Circuit-bending is an electronic art which implements creative audio short-circuiting. This renegade path of electrons represents a catalytic force capable of exploding new experimental musical forms forward at a velocity previously unknown. Anyone at all can do it; no prior knowledge of electronics is needed. The technique is, without a doubt, the easiest electronic audio design process in existence.

If you learn to solder and can drill a small hole to mount a switch in, you can circuit-bend. Everything else is a process of non-technical, routine experimentation in which various short-circuits are created in an attempt to alter the target device's audio behavior.

During the course of this workshop you will go from having a basic electronic toy, to having a sophisticated circuit-bent instrument at the very end. In order to make sure that everyone has an exciting and interesting instrument at the very end we are limiting the target toys to ones that are tried and true, and will provide guaranteed results. On the following pages we will provide you with a break down of the toys that we will be working with, along with part numbers for all the switches, knobs, and jacks we will be using from Malpin.

We will provide you with all the necessary tools to circuit-bend, at the workshop, but it is recommended that you purchase the following if you plan on doing any bending between the workshop sessions or thereafter.

- A Low-wattage (30w or less) soldering iron with a very narrow tip.
- Thin rosin-core solder.
- Set of small, all-metal "jeweler's" screwdrivers.

-Small wire stripper.

-Test leads (insulated wire terminated at each end with an alligator clip).

In addition to the optional tools, we will be needing some solid core wire (part# BL85G from Malpin, or similar), and whatever parts the toy you decide on requires.

Other than that, bring yourself, your toy, and your childlike curiosity, and get ready to have a great time!

### contents:

Explanation and Basics	1
Toy Breakdown/Parts	2-3
Breakdown of Process	3
Links and Books	4

The Noise Upstairs  
WORKSHOPS

7/2009

The Noise Upstairs is a free improvisation jam night that has been bringing you some of the most exciting noisicians for the last two years. As part of The Noise Upstairs new proactive facelift, we are offering quarterly workshops, which will run on the weekends preceding the jam night, culminating in a 'featured performer(s)' spot on the night. If you are interested in taking part in the jam night, or the workshop, or for any other Noise related activities, visit the webpage at [www.thenoiseupstairs.com](http://www.thenoiseupstairs.com) and drop us a line, or sign up for the mailing list.

# TOYS

Here is a list and break-down of the toys we're going to be working with. You can find them in charity shops, or in your attic, if your lucky. The best place to find them, however, is eBay.

## Keyboards

### SA Series

This includes the Casio SA-2, and SA-5. These keyboards are noisy, glitchy, and erratic. Good for recording, but very temperamental when it comes to performing.

[www.youtube.com/watch?v=h0s2U-HCHBQ](http://www.youtube.com/watch?v=h0s2U-HCHBQ)

### SK Series

This includes the Casio SK-1, SK-5, and SK-10. These keyboards are 'flagship' instruments as they have nearly endless bends. Very textural, and interactive.

[www.youtube.com/watch?v=38s8FYWT\\_EQ](http://www.youtube.com/watch?v=38s8FYWT_EQ)

## Drum Machines

### DD-6

The Yamaha DD-6 Drum Machine. Good for distorted, glitchy beats and drum hits. Given the very loud built-in speaker and 1/4" output jack, it is stage ready from jump.

[www.youtube.com/watch?v=e10Jq23x\\_XE](http://www.youtube.com/watch?v=e10Jq23x_XE)

### DD-7

The Yamaha DD-7 Drum Machine. Similar to the DD-6 but where the DD-6 does glitches well, the DD-7 does drones well.

[www.youtube.com/watch?v=PZ4iZG0Qmyw](http://www.youtube.com/watch?v=PZ4iZG0Qmyw)

## Talking Toys

### Speak &

This includes the Texas Instruments Speak & Spell, Speak & Math, and Speak & Read. This provide very interesting speech glitches and loops.

[www.youtube.com/watch?v=CFh1xqllgs](http://www.youtube.com/watch?v=CFh1xqllgs)

## Individual toy breakdowns

### CASIO SA-2



This toy is one of the easier toys as it is relatively simple to bend. Due to the way it is built it is difficult to do any exploration on it, so this one involves simply opening it, connecting the bend points, and putting it back together.

#### Parts needed:

- ND91Y (or similar momentary switch)
- FW08J (or similar 1Meg Potentiometer)
- RW75S (or any knob of your choosing)
- FT95D (or similar RCA Jack)

#### Optional Parts:

- An extra ND91Y/FW08J/RW75S set.
- Two short, stubby bolt, or furniture handle to serve as "body contacts"

### CASIO SA-5



The SA-5 is very similar to the SA-2. The main difference is that it has a larger bank of built-in sounds. The parts needed are identical to those needed for the SA-2.

### CASIO SK-1



This toy is very fun to explore and bend. The SK series keyboards are of medium difficulty as you will be finding your own bend points, but nearly every connection you can find will sound amazing.

#### Parts needed:

- 3-10 of FH00A (or similar SPDT switch)

#### Optional Parts:

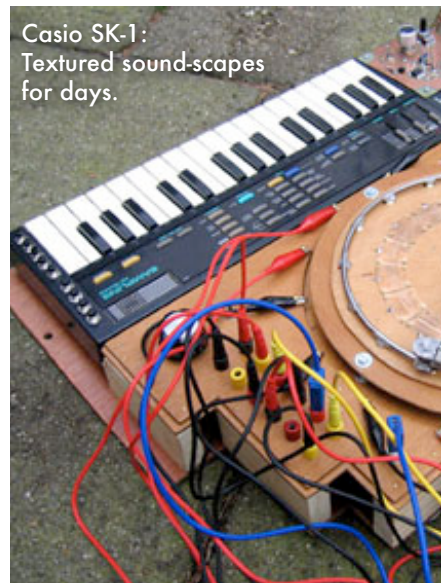
- FW07H (or similar 470k Pot, for pitch control)
- RW75S (or any knob of your choosing)
- 2-3 short, stubby bolt, or furniture handle to serve as "body contacts".

### CASIO SK-5



The SK-5 is very similar to the SK-1. The main differences are more realistic drum sounds, and built-in drum pads. The parts needed are identical to those needed for the SK-1.

Casio SK-1:  
Textured sound-scapes for days.



Rodrigo Constanzo has been circuit-bending since 1998. He has bent countless toys, keyboards, drum machines, and guitar pedals over the years. He can be found performing with, and without, toys as a solo performer, or as part of Takahashi's Shellfish Concern, and Deaf To Van Gogh's Ear.

For more info please visit:

[www.rodrigoconstanzo.com](http://www.rodrigoconstanzo.com)

[www.takahashishellfishconcern.com](http://www.takahashishellfishconcern.com)

[www.deaftovangoghsear.co.uk](http://www.deaftovangoghsear.co.uk)



Speak & Spell:  
Gibberish never sounded  
so good!



### CASIO SK-10



The SK-10 is very similar to the SK-1/5 with the main difference being the size. This is about the size of the SA keyboards. The drums are also a throw-back to the SK-1 'blip blop' sounds.

Parts needed:

- 3-6 of FH00A (or similar SPDT switch)
- HF91Y (or similar 1/4" jack)

### YAMAHA DD-7



The DD-7 is very similar to the DD-6. The parts needed are identical to those needed for the DD-6.

### YAMAHA DD-6



The DD-6, like the SK keyboards are very easy to explore. This toy ranges from medium to advanced difficulty, depending on how far you want to take it

Parts needed:

- 5-10 of FH00A (or similar SPDT switch)

Optional parts:

- 4-20 thin 1" bolts to create a "bolt bay" for complex bending combination.

### SPEAK & SPELL/MATH/READ



The Speak & toys are advanced bends. They are hard to work with, because of the membrane keypad, but yield unique sounds for those who venture their way.

Parts needed:

- 3 of FH00A (or similar SPDT switch)

Optional parts:

- JM01B (or similar mini momentary switch)
- Another FH00A (or similar SPDT switch)
- FW07H (or similar 470k Pot, for pitch control)
- RW75S (or any knob of your choosing)
- A short, stubby bolt, or furniture handle to serve as a "body contact"

## Circuit-Bending 101

### Breakdown of the process involved in bending.

#### 1. Open the Target Toy

Most of the time this is as easy as removing a few screws.

#### 2. Explore and Take Notes

This is main fun part of bending. With the toy open, use a probe and/or your fingers to test different connections on the circuit board itself. Make notes of what you find using a rating system, to make narrowing things down easier.

#### 3. Plan Your Bends

Using the notes you created, you now have to plan on how to implement the bends. This can be done via simple toggle switches, or by incorporating momentary switches, body contacts, knobs, bolt-bays and other assorted methods. The sky's the limit here.

#### 4. Mark, Drill, and Paint

Now that you have a plan of what you want, you must decide where you want it. Most toys have a couple of spots where you can easily fit your mods. Find what works, drill the holes, and if you want to paint the toy, do so during this step.

#### 5. Solder the Connections

With your switches, jacks, and pots in place, solder all of your connections

#### 6. Assemble and Test

Put the whole thing back together and test each bend individually to make sure everything is working as

### Interested in more?

Sign up to the Noise Upstairs mailing list to find out about future workshops, performances, and events.

Visit [www.thenoiseupstairs.com](http://www.thenoiseupstairs.com) to sign up.



# Electronics and Circuit-Bending related books

Circuit-Bending  
*Reed Ghazala*

Handmade Electronic Music  
*Nicolas Collins*

Electronic Projects for Musicians  
*Craig Anderton*

Getting Started in Electronics  
*Forrest Mims*

Do-It-Yourself Projects for Guitarists  
*Craig Anderton*

Gravikords, Whirlies and Pyrophones  
*Bart Hopkin*

Getting a Bigger Sound  
*Bart Hopkin*

Build Your Own Electronics Workshop  
*Thomas Petruzzellis*

## CIRCUIT-BENDING RELATED LINKS

### Anti-Theory

Reed Ghazala is the granddaddy of circuit-bending. His page is pictures, sound clips, and general bending info. [www.anti-theory.com](http://www.anti-theory.com)

### Casper Electronics

Peter Edward's great site, with tons of crazy bends, pictures, soundclips, and even a couple of great guides. [www.casperelectronics.com](http://www.casperelectronics.com)

### Bug Brand

Bristol-based Tom Bugs makes and sells circuit-bent like electronic gadgets. [www.bugbrand.co.uk](http://www.bugbrand.co.uk)

### Experimentalists Anonymous

Colin's webpage has a great forum and blog dedicated to bending and DIY. [www.experimentalistsanonymous.com](http://www.experimentalistsanonymous.com)

### Burnkit2600

Good webpage for general circuit-bending info, links, and guides. [www.burnkit2600.com](http://www.burnkit2600.com)

### Ciat-Lonbarde

Peter Blasser's incredible webpage, with unique and amazing instruments. He also has several 'Paper Circuits', which are a good next step after bending. [www.ciat-lonbarde.net](http://www.ciat-lonbarde.net)

### 4ms Pedals

Dann Green has been making crazy electronics for over a decade. All of their pedals are available as kits or you can DIY with schems/part lists. [www.4mspedals.com](http://www.4mspedals.com)

### Squarewave Parade

Great webpage, with lots of interesting electronics, kits, and forum. [www.thesquarewaveparade.com](http://www.thesquarewaveparade.com)

### Benders Yahoo Group

Long standing e-mail list on Yahoo Groups where you can discuss bending until the cows come home. [groups.yahoo.com/group/benders](http://groups.yahoo.com/group/benders)

### Odd-Music

Oddmusic is a great webpage, and mailing list devoted to odd, DIY, and electronic instruments. [www.oddmusic.com](http://www.oddmusic.com)

### Experimental Musical Instruments

EMI has been in the experimental instruments business forever. It used to be a quarterly journal, but now they sell books, parts, and reference materials. [www.windworld.com](http://www.windworld.com)

## How to Take Part:

### Circuit-Bending Workshop

Interested in signing up for the workshop? Follow the instructions below and you'll be well on your way to circuit-bending nirvana.

### Pick a target instrument

Look through the individual toy breakdowns and video links and decide which toy you want to circuit bend. Buy/order the toy, the parts required for the toy you picked, and any of the optional tools/parts from the first page.



### Book your seat

Given the limited space we have available to us (upstairs at Fuel) we can only accommodate so many people. As soon as you know you want to be involved, e-mail us at [workshops@thenoiseupstairs.com](mailto:workshops@thenoiseupstairs.com) saying what toy you plan on bending, or speak to Anton or Rodrigo at the Noise Upstairs jam.



## THE NOISE UPSTAIRS

EVERY MONTH ON THE  
SECOND THURSDAY OF THE  
MONTH @ FUEL CAFE,  
WITHINGTON.

FOR MORE INFO:

[WWW.THENOISEUPSTAIRS.COM](http://WWW.THENOISEUPSTAIRS.COM)  
[INFO@THENOISEUPSTAIRS.COM](mailto:INFO@THENOISEUPSTAIRS.COM)