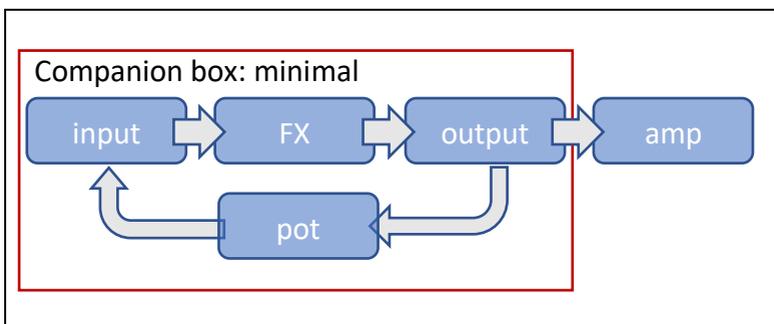


## Companion Box Recipe

Companion Boxes are 'circuit bent' DIY electronic musical instruments. The sounds they make depend on the circuit that is used. The devices I made are based on multi-effects processors by the Zoom company. It is assumed anyone following this tutorial will have knowledge / experience of how to solder. For more information on soldering; find the [adafruit tutorial online](#).

Materials:	Tools:
Used ZOOM multi effects processing unit	Screwdriver,
VHS cassette box (or other suitable enclosure),	Soldering iron, (30w minimum) Solder,
Non-latching push switches (spdt),	Wire cutter & stripper,
10k Potentiometer	Crocodile clips,
Connection wire, (recycle if possible ; e.g.: printer ribbon cables)	Glue – hot glue gun, OR epoxy resin,
	Drill, File, craft knife
Other useful items: Signal generator (e.g.: piezo pickup, oscillator, electric guitar), Amplifier (to listen to the output of the instrument), , Marker Camera and / or notebook.	

The circuit uses feedback to make an audible output. The output is connected to the potentiometer, and back to the input. The potentiometer controls the amount of output signal fed back to the input. This feedback control helps shape the timbre of the instrument. The switches allow the performer to move between patches (moving up and down through a selection of pre-sets) which change the sounds produced.



The device should be powered by battery. The instrument requires external amplification to be heard.



### Step 1

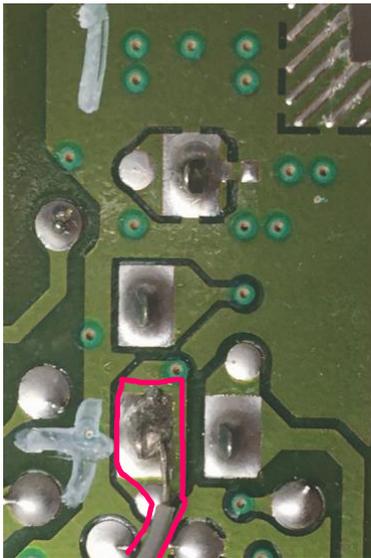
Check the effect circuit still functions. Power the circuit. Send a signal to the input. Listen to the output using an amplifier.

### Step 2

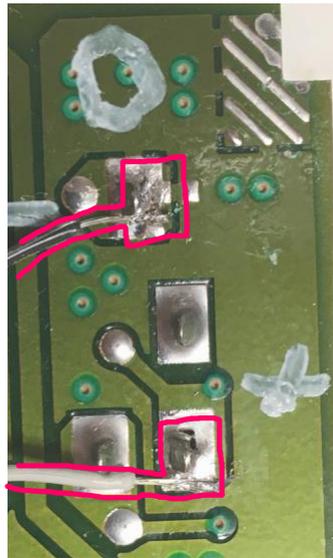
Open the enclosure of the effects unit. Remove the PCB.

### Step 3

Identify the input and output jacks; the markings on the original enclosure are a guide.



Grey – input / positive



White - output / positive  
Black – ground / negative

### Step 3 continued

Identify the positive and negative (ground) connection pads, where the jack sockets are attached to the PCB (the pad closest to the edge of the PCB is ground, the pad closer to the centre is positive). Identify the two PCB mounted switches used to through the pre-sets.

### Step 4

Power up the unit. Using crocodile clips; make a temporary connection from the positive input to the positive output. Connect the output to the amplifier; an oscillating note or pattern will be audible.

### Step 5

Using crocodile clips, join the input pad to lug 1 of the potentiometer and lug 2 to the output pad. Connect lug 3 to ground. Turning the potentiometer should now change the amount of feedback between the input and output. Listen to changes in the sound.

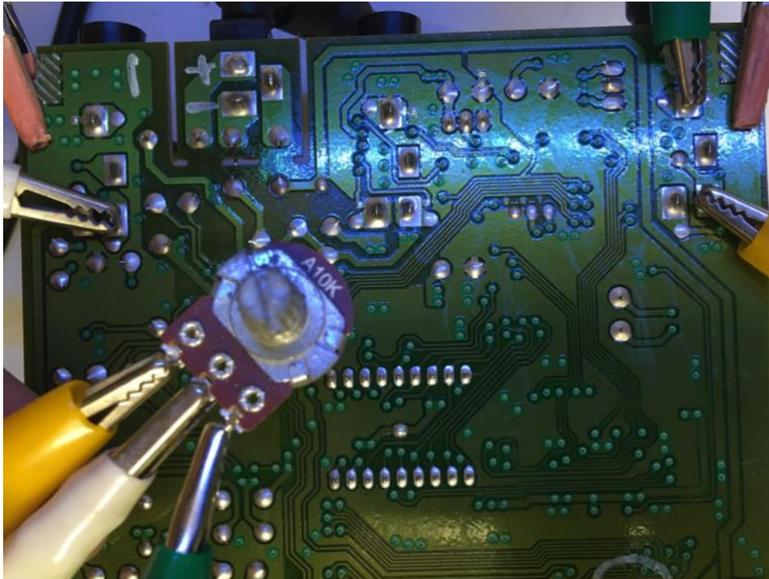
### Step 6

Use the crocodile clips to join the pins of the pads on the back of the PCB mounted push switches. This should change pre-set, and change the sound produced.

### Step 7

After testing the switches and potentiometer, it is time to assemble the parts. The PCB mounted audio and power sockets can be made to fit into the spine of a VHS

cassette case. Put the PCB in place and mark where the holes need to be made.



Green – ground / white – input / yellow - output

#### Step 8

Drill small holes. Carefully make the holes large enough to accommodate the PCB mounted components (audio and power sockets). Check alignment as you go.

#### Step 9

Plan where the new controls (potentiometer & push switches) will work best. Ensure there is enough space for them in the enclosure, without interfering with the PCB. Drill holes and mount the new hardware.

### Step 10

Measure & cut wire to connect new components to the PCB. Connect the potentiometer & push switches using the solder and iron.

### Step 11

Put the PCB in inside the enclosure. Use glue or spacers as needed to secure PCB.

### Step 12

Make music using your new feedback instrument.

### Practice:

The aim of the player is to listen and learn what the instrument is capable of & how it might fit into a performance. Players are expected to learn what their instrument can and cannot do by approaching the instrument with an intention to listen to & judge its output whilst investigating the affordances of the minimal control interface.

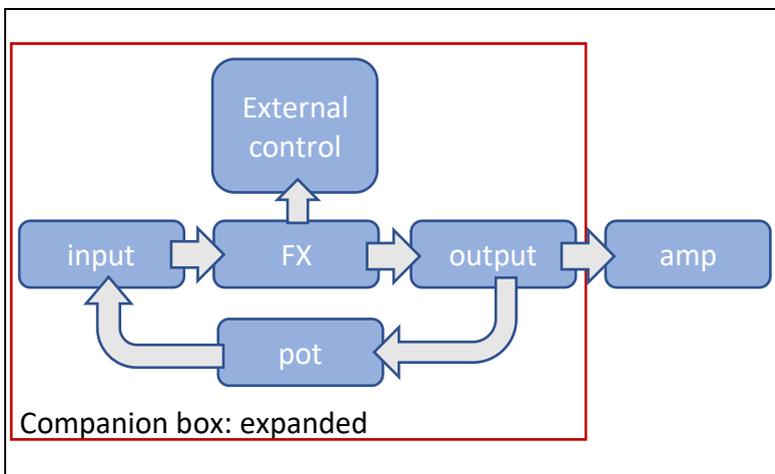
The sounds made will rely on the pre-sets stored on the device, the amount of feedback between input and output and other connections between component solder pads on the PCB.



#### Expansion:

The minimal interface of the instrument can be expanded to increase the amount of timbres available to a performer by making connections from legs of the RAM chip (above/below) to external connections on the interface. Increasing the number of nodes from outside to inside the circuit, increases configurations available to a performer and the chances of creating new tones and sound behaviours.





If this guide is followed, and the maker uses the device to record a performance; please share the sounds:  
[toneburstrecs@gmail.com](mailto:toneburstrecs@gmail.com)

