KillBox

Multi-Mode Kill Switch Box

Overview

Who doesn't enjoy a good little bit of kill switch action every now and then? The stuttering effect adds some great rhythmic and textural variety to a song, but the thing that has always bugged me about them is either a) I get slightly off tempo, b) I don't press quite hard enough and it doesn't kill, or c) my finger just gets really tired.

The Kill Box takes kill switching to the next level. Instead of having to repeatedly press the little button on your guitar with your finger, the Kill Box uses an MCU to execute a predetermined kill pattern. Want to change it up some? Don't worry, you can switch to manual or continuous modes.

The Kill Box has some great, innovative features, such as:

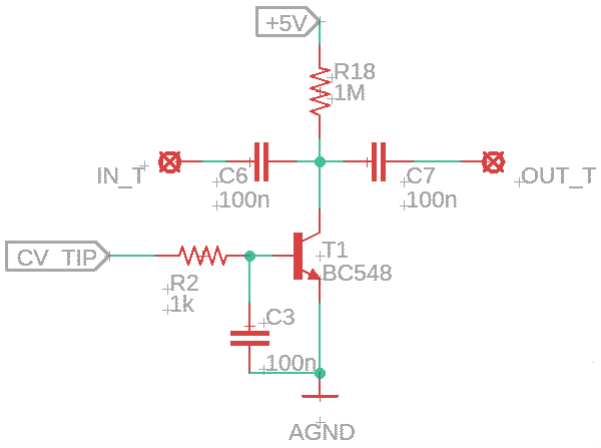
- Full analog signal path with no bypass switching
- Will pass signal through even if not powered on
- Tap Tempo
- 6 pattern presets
- Manual, continuous, or pattern-based modes
- Stereo or mono in
- Mono, dual mono, or true stereo out
- Ability to cut stereo channels synchronously or alternating, to create a dramatic stereo ping pong effect

How it Works

The KillBox works on a very simple principle. When a transistor's base is energized, it begins to conduct from the collector to emitter. If we put our audio signal on the transistor's collector and tie the emitter to ground, then the audio gets passed through a completely passive, fully-analog signal path at all times. When the base is energized, the transistor conducts between collector (where our signal is) and ground, thus shunting, or killing, the signal. This signal path is created in duplicate for use with stereo signals.

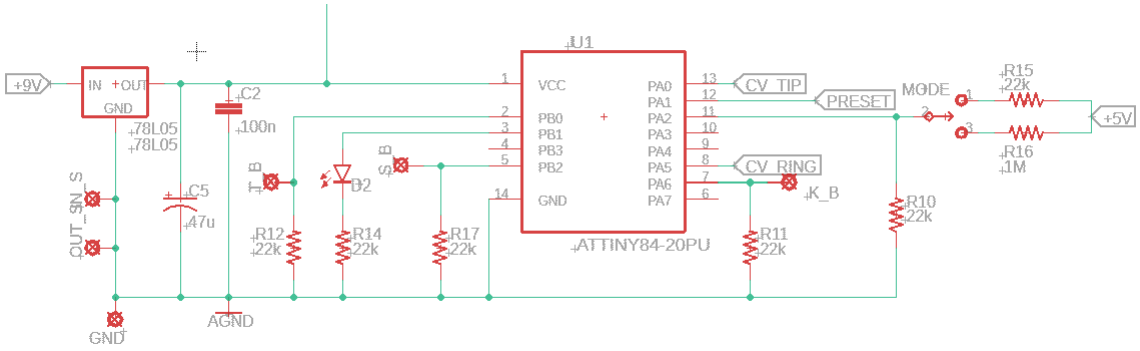
A couple of things to note in the signal path include the presence of a large pull-up resistor on the collector, and the resistor and capacitor connected to the transistor base. The pull-up resistor biases the input signal so that, when the base is energized, we have enough voltage between collector and emitter to conduct completely. If this pull-up resistor is omitted, there will still be some amount of attenuation, but it won't be complete because we don't meet the Vce spec of the transistor. I originally didn't have this in place and could still faintly hear the signal when it was supposed to be completely killed.

The resistor and capacitor connected to the transistor base serve a couple of purposes. First, it limits the current that the transistor can consume. Secondly, it acts as a little bit of smoothing or debouncing on the transistor so that we don't have any chopping of our signal that is not intended.



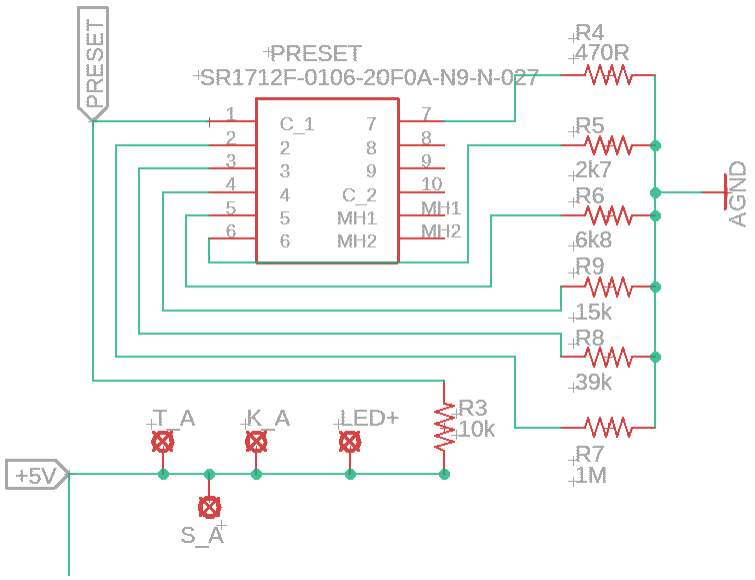
KillBox Signal Path

A manual kill switch box can be made easily with all passive components, but where's the fun in that? The real magic of the KillBox is that it can create a kill switch patter that is tap tempo-synced and that can run either continuously in tempo, or run a preset pattern. To do this, an ATTiny84 microcontroller is used. It has inputs for pattern selection, mode selection, tap tempo switch, and kill switch. It also has outputs for killing the left and right sides individually and a tempo indicator LED.



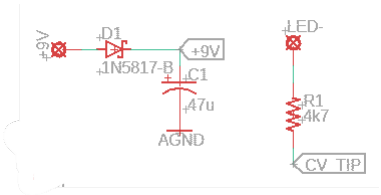
KillBox MicroController

Pattern selection is done by way of a 6-way voltage divider driven by a rotary switch. The microcontroller monitors an analog input and determines which preset to use based on the voltage level on the pin.



KillBox Preset Switching

The power section is rather simple. Additionally, there are pads for a status LED that shows if the signal is being killed or not. This is optional, as is the tempo LED. Use one or the other or use both, it doesn't really matter, it all depends on what you want to see.



KillBox Power Section

BOM

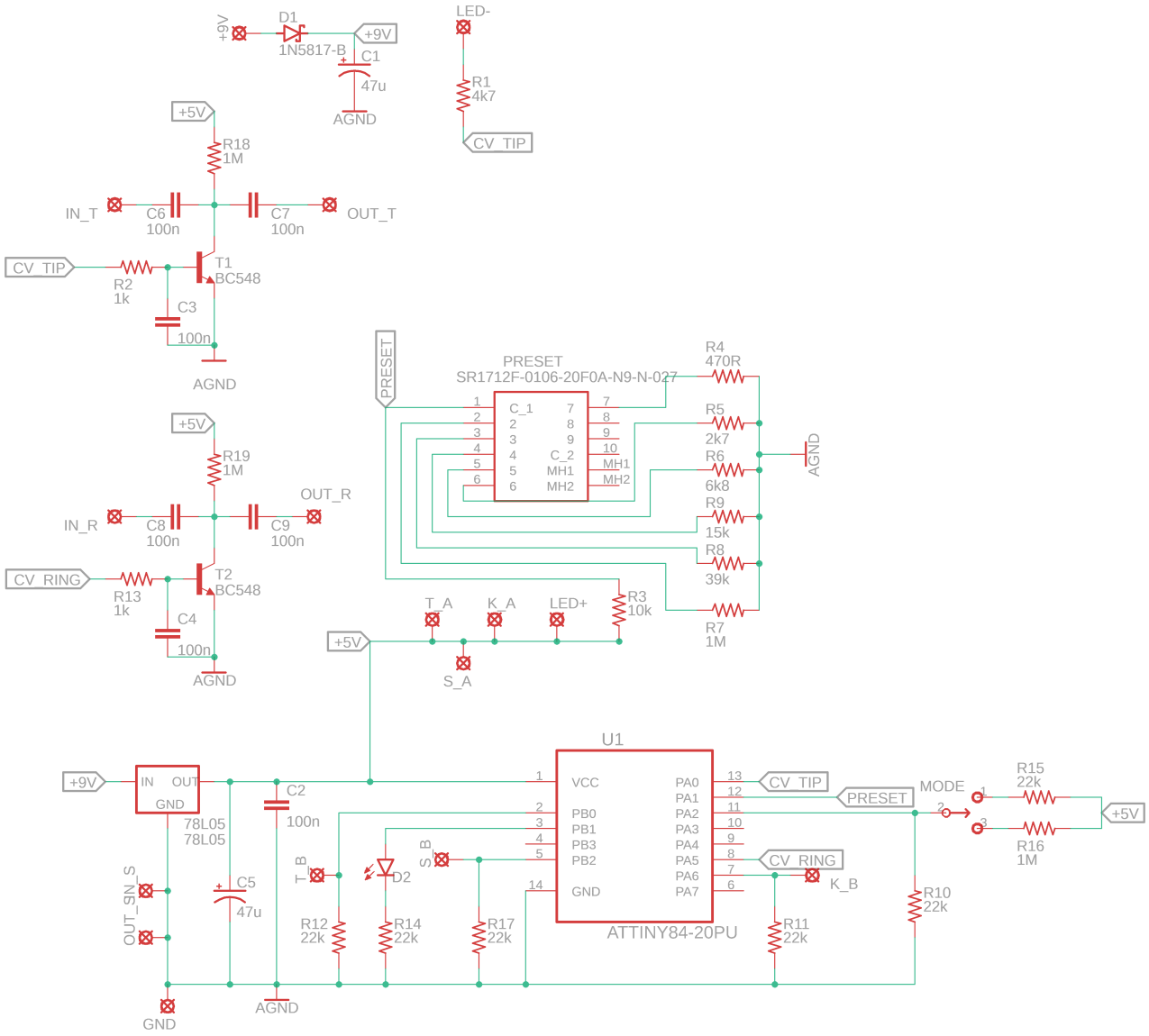
The BOM below is the list of parts I used for mine along with quantities. While most parts are available from Tayda, the rotary switch came from Mouser. I did find some similar footprint ones on Aliexpress, but one was dead on arrival and the other had the wrong number of detents. Note that resistors are all 1/8W metal film.

Part	Qty.	Notes
470R Resistor	1	
1k Resistor	2	
2k7 Resistor	1	
4k7 Resistor	1	

6k8 Resistor	1	
10k Resistor	1	
15k Resistor	1	
22k Resistor	6	
39k Resistor	1	
1M Resistor	4	
100nF Capacitor	7	
47uF Electrolytic Capacitor	2	
SR1712F-0106-20F0A	1	PCB Mount Rotary Switch
SPDT On/Off/On Toggle	1	Mode Switch
1N5817	1	Voltage polarity protection
BC548	2	Other NPN's should work as well
LED	2	
78L05	1	
ATTiny84	1	
Enclosure	1	1590B or 125B
1/4” input jack	2	
DC power jack	1	
SPDT Momentary footswitch	2	

Schematic

The schematic for this project is a little big to be legible on a single sheet, so it is also included as a separate PDF in the project documentation folder in addition to the figure shown below.



KillBox Full Schematic

Build Notes

Here are some things I noted from building the KillBox that might be helpful to you. Please read this section to make sure you don't go through excessive frustration.

Enclosure Size/Drilling

The KillBox fits nicely into a 125B. It will work in a 1590B with great care. I used a 1590B for my build, but it is very tight and not necessarily recommended

Jacks

Whatever jacks you use for in/out and power in 125B are fair game; no restrictions here. If you go for a 1590B, you will need to use lower profile jacks.

LED Indicators

There are pads for two different LED indicators. One is a tempo indicator that shows the tapped in tempo. The other is a status LED that will glow when the signal is being killed. You can use neither, either, or both without issue, it's up to you.

Patterns

The patterns are defined in the code and can be changed to whatever you would like them to be. Note that if you want to do complex patterns, you will need to allocate more space for the pattern array and address the indices correctly. The patterns by default are what I thought might be most used, at least by me.

In Closing

Kill switches aren't for everyone, but maybe the KillBox will make them useful for more people. I had a lot of fun with this one, despite it sitting on the back burner for nearly 3 years after I first started in with it. For such a simple concept, it required the most board revisions of any project to date. I hope you enjoy it!