Soft-Touch Relay Bypass

mas-effects.com/relay-bypass

v2.0

INTRODUCTION

Typical 3PDT latching mechanical switches are noisy, hard to press, and prone to mechanical failure after repeated use. A controller board with a relay is a great alternative, and provides some other really great options you couldn't otherwise do.

This tiny and featureful relay bypass board can do a LOT.

- Allows soft touch, momentary switches to toggle your DIY guitar pedal, using a relay to provide true bypass.
- Quick tap to switch between engaged and bypassed.
- Hold the foot switch to temporarily toggle until you release it
- Fits easily in a tiny 1590A enclosure
- Remembers state when powered off
- Hold when powering on to toggle auto-on/ auto-off
- Passes signal when powered off

GENERAL-PURPOSE SWITCHING

This relay module is designed specifically for bypassing and engaging an audio signal. It connects your board's input to GND when bypassed to help reduce noise, and is labeled for audio bypass to make wiring simpler.

If instead you want a general-purpose switch to use anywhere, check out our digitally-controlled relay switch module instead: mas-effects.com/relay-switch

SPECIFICATIONS

Input voltage:	6V to 12V DC
Typical current:	4.7mA
Typical switching current:	15mA
Max switching current:	22mA
Required foot switch or button:	SPST, momentary, normally-open

GETTING HELP

For any questions or problems, visit our forum at mas-effects.com/support

USAGE INSTRUCTIONS

TOGGLE ENGAGE/BYPASS

When bypassed, the sound signal will go directly from your input to your output jacks. Tap the foot switch to engage the effect and route the signal to your audio PCB. When engaged, tap the foot switch again to switch to bypass.

TEMPORARILY ENGAGE/BYPASS

Holding the foot switch while the effect is engaged will temporarily bypass it, and it will re-engage when you lift your foot. Similarly, holding the foot switch while bypassed will temporarily engage it.

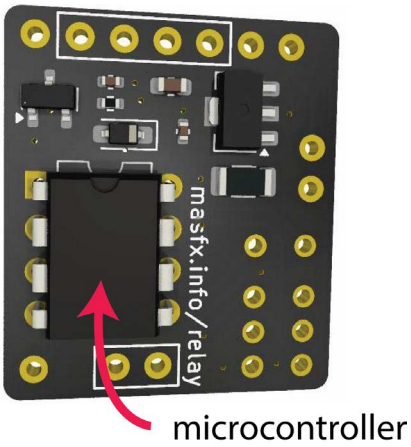
HOW TO BUILD

1. INSTALL MICROCONTROLLER

Solder the microcontroller to the PCB over the spot marked ***U1***. Optionally solder an 8-pin DIP socket instead, and install the microcontroller in the socket.

Ensure the dot or the half-circle on the microcontroller is oriented the same as the one drawn on the PCB.

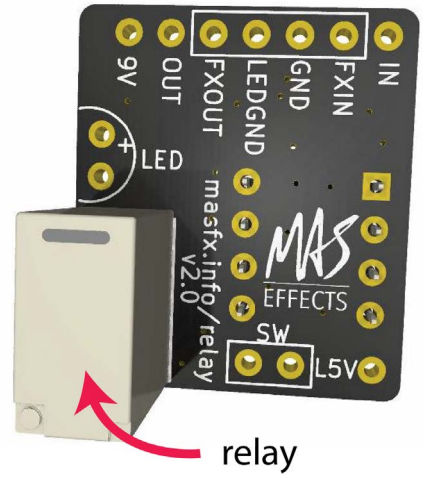
You may have received either an ATtiny13 or an ATtiny85. The differences don't matter for this application.



2. INSTALL RELAY

Flip the PCB over and insert and solder the relay on the ***K1*** spot.

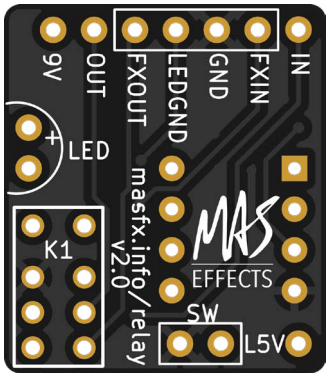
Its orientation is important, but the non-symmetric spacing of its 1st and 8th pins ensure you install it correctly.



3. CONNECT A SWITCH

Connect a momentary switch or button (not included) to the two ***SW*** pads. If using a momentary SPST foot switch, you can mount it on the side with the relay. It will fit nicely in the spot next to the relay.

WIRING GUIDE



CONNECTIONS

- **9V**
  Connect to a 6V to 12V power supply.
- **OUT**
  Connect this to the tip of your output jack.
- **FXOUT**
  Connect this to the output of your audio PCB.
- **LEDGND**
  Provides a connection to GND when effect is engaged. See “Adding LEDs” below.
- **GND**
  Connect this with all the other ground points of your pedal.
- **FXIN**
  Connect this to the input of your PCB.
- **IN**
  Connect this to the tip of your input jack.
- **LED**
  You may directly connect an LED to these two points, ensuring the anode connects to the “+” side. This has a built-in current limiting resistor, so no additional resistor is needed.
  See “Adding LEDs” below.
- **L5V**
  Supplies 5V when the effect is engaged. Useful for driving a transistor.
  See “Adding LEDs” below.
- **SW**
  Connect both of these points to a momentary button or switch to control the module.

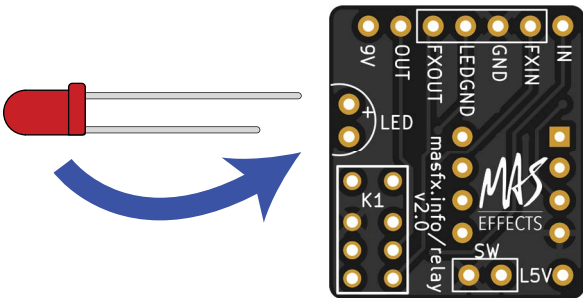
NOTE: PEDALPCB

This PCB can be directly connected to PedalPCB builds with a ribbon cable, or 4 wires. The 4 connections in the box at the top correspond to the 4 connections on nearly all PedalPCB boards.

LEDGND goes to PedalPCB’s *SW*.
FXOUT to *OUT*
GND to *GND*
FXIN to *IN*

ADDING LEDS

OPTION 1: SIMPLE LED



The ***LED*** spot on the PCB can power an LED, and no additional resistor is necessary. The PCB has a pre-soldered 4.7 kΩ resistor for this LED.

The anode (+) side of the LED, with the longer leg, should be connected to the pad labeled with a "+"

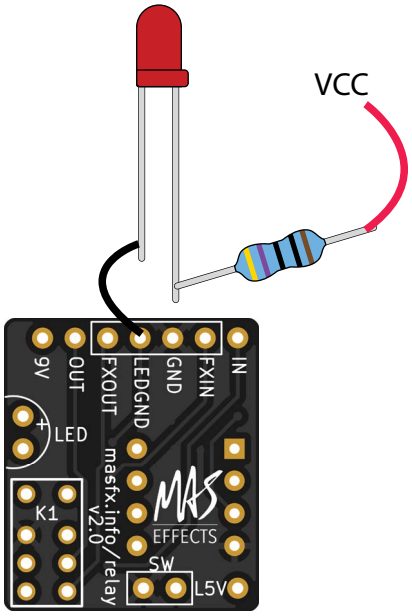
The cathode (-) side of the LED connects to the other pad.

OPTION 2: LEDGND

The ***LEDGND*** pad will float when the pedal is bypassed, and sink to GND when the pedal is engaged.

i.e. you can use it as your LED's GND connection point.

NOTE: This is also directly compatible with the PedalPCB "SW" pad, and can be connected directly to it. The 4 pads in the box at the top of this PCB can be wired directly to the 4 pads at the bottom of most any PedalPCB board.

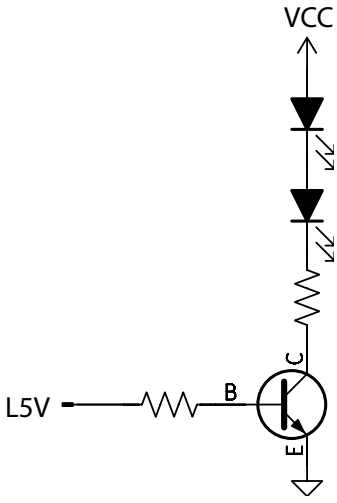


OPTION 3: L5V

The ***L5V*** pad will float when the pedal is bypassed, and supply a **small amount of current** at 5V when the pedal is engaged.

This is the same behavior seen in earlier versions of this kit.

It can power a single LED through a current limiting resistor (that you provide externally), or more commonly it can be used to drive a transistor.



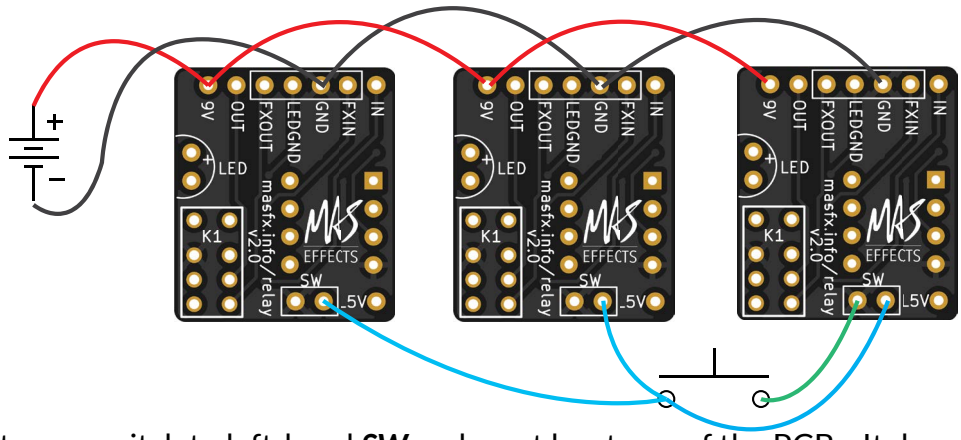
CUSTOMIZING

MULTIPLE KITS WITH ONE BUTTON OR SWITCH

You can use a single switch to control multiple relay bypass kits.

Connect each PCB's ***9V*** and ***GND*** to your power source.

Connect one side of your button or switch to the right-hand ***SW*** pad on each PCB.



Connect the other side of your button or switch to left-hand ***SW*** pad on at least one of the PCBs. It does not need to be connected to each PCB since it's actually a GND pad, and the GND net should already be connected for the power.

CHANGING BOOT MODE

When powering up the module, by default, it will remember and boot into the most recent state. To change this, hold down the button while plugging in power and it will cycle to the next mode and blink the LEDs to indicate its current mode.

To change it again, unplug and repeat.

- 3 blinks: boot with effect ENGAGED
- 4 blinks: boot with effect BYPASSED
- 5 blinks: REMEMBER bypass/engage state

OTHER CUSTOMIZATIONS

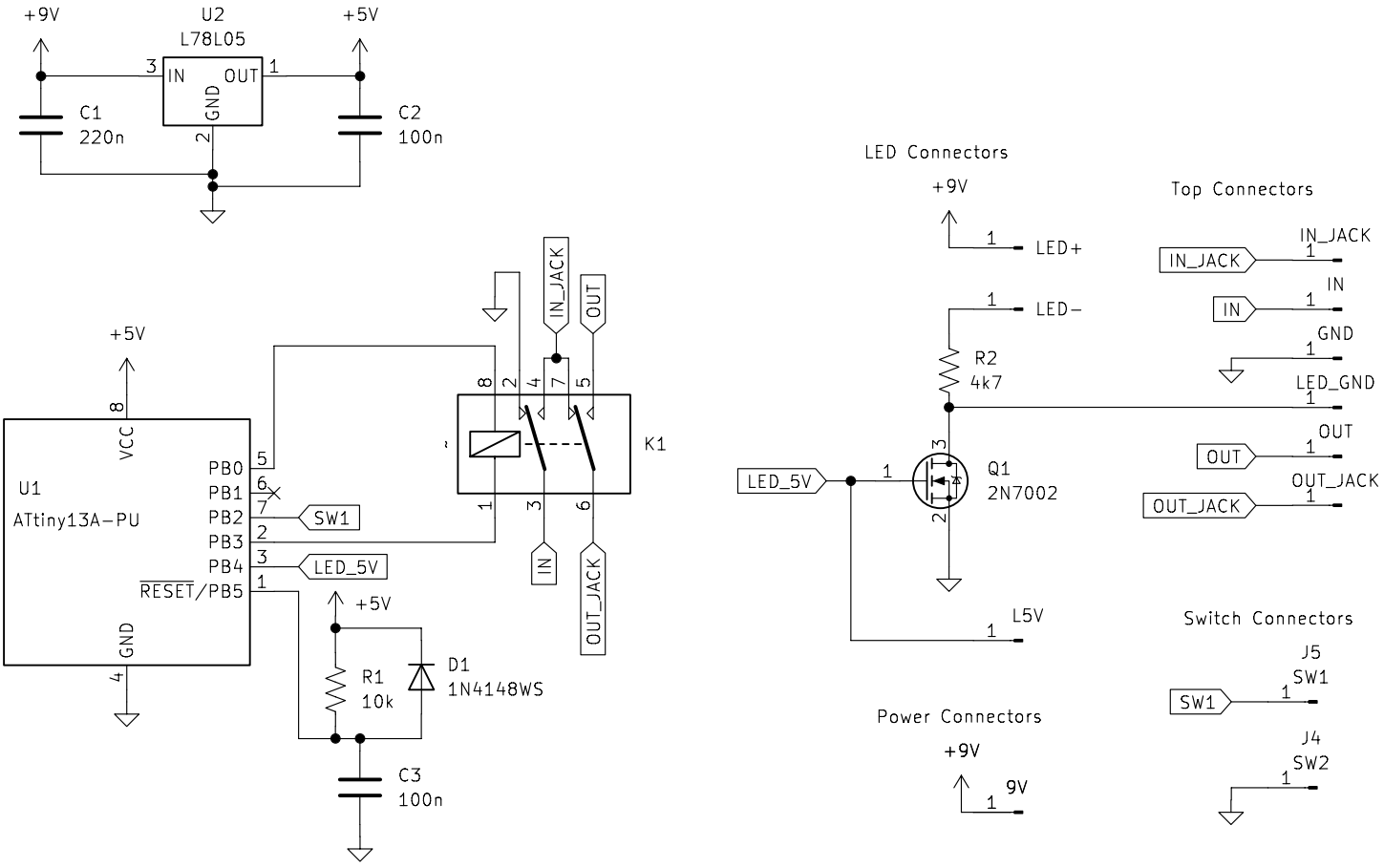
Some operational parameters can be easily tweaked before programming the microcontroller. e.g., switch timing, whether or not "hold for momentary" is enabled, etc. You can modify the source and customize it yourself (see appendix). Alternatively, reach out and we may be able to customize any kits you plan to order.

Some changes may require a fee, but most do not.

Reach out directly at mas-effects.com/contact or start a discussion in our forum at mas-effects.com/forum.

APPENDIX

SCHEMATIC



BILL OF MATERIALS (BOM)

Pre-soldered to PCB

C1	220uF
C2, C3	100nF
R1	10kΩ
R2	4.7kΩ
D1	4148
Q1	2N7002
U2	L78L05

Included with kit

U1	ATtiny13 or ATtiny85
K1	FTR-B4CB4.5Z

Not included, Required

SPST, normally-open, momentary switch or button

KIT REVISIONS

2.0: Added 2 new ways to wire LEDs (“LED GND”, and “LED” on silk screen). Old method is still there, labeled “L5V.”

Rearranged wires to match PedalPCB.

Rewired RESET pin to work better with Strymon power supplies.

1.5: Replaces through-hole voltage regulator (U4) with a pre-soldered SMD version (U3). No through-hole caps. Removed optocoupler.

1.49: Uses the 1.4 PCB and same hardware setup, but adds memory to the bypass state. By default it will remember whether the effect is engaged or bypassed (and uses wear leveling to store this). Holding the switch down at startup will toggle the behavior.

1.4: No longer uses RESET pin as GPIO. Reconfigured the way the muting circuit is connected to GND, using jumper

1.3: Switched to latching relay. Not as DIY-friendly if you scratch-build (from a kit, however, it’s exactly the same as V4). It requires you to write a fuse to disable the RESET pin and turn it into a GPIO pin. After doing this you can’t re-program the ATtiny without special equipment. i.e. if you’re not careful you may waste some microcontrollers.

1.2: Refined (details forgotten) version of the initial release. Non-latching

DOCUMENT REVISIONS

2025-11-21 v2.0

2023-07-16 Refreshed guide

2023-07-18
Added missing GND to pin 2 on relay in schematic.

Earlier versions:

1.49: mas-effects.com/relay-1.49.pdf

1.4: mas-effects.com/relay-1.4.pdf

1.3: mas-effects.com/relay-1.3.pdf

1.2: mas-effects.com/relay-1.2.pdf

SOURCE AND LICENSE

https://github.com/mstratman/relay-bypass