PedalSync™

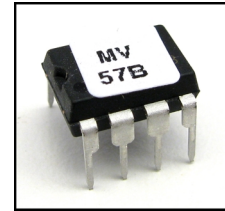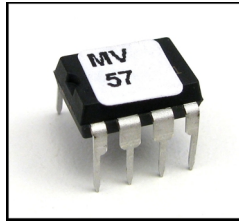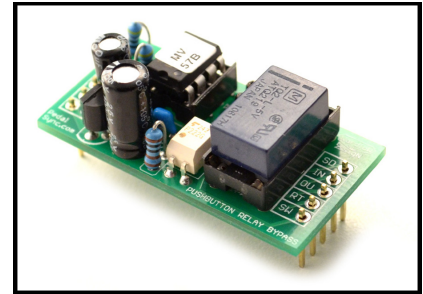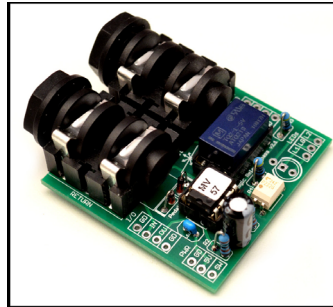### Relay Bypass chips MV-57 and MV-57B

and Modules

Key Features

- Momentary Switch or Logic-Controlled Relay Bypass driver

- Optical MOSFET ReMute™ circuit virtually eliminates switching noise *without sacrificing audio quality*

- Add quiet true-bypass switching to audio effects

- Automate any mechanical switch

- Control alternate signal paths

- MV-57 compatible with numerous PedalSync chips and any 3.3 or 5-volt logic output

- MV-57 module with jacks simplifies scalable pedalboard switching designs.

- MV-57B works well for retrofitting vintage effects with quiet true-bypass operation

- MV-57B module fits conveniently in 9-volt battery compartment

- Power-on light show

- Optional one or two LED output

- Automatic relay reset on power up (MV-57B)

- Efficiently Designed to ensure Low part count

- Use PedalSync™ trademark on your devices and in advertising

- Thru-Hole or SMT

- CadSoft Eagle footprint available for module

Overview

The PedalSync Relay Bypass chip **MV-57** receives a signal from other PedalSync chips and any 3.3 or 5-volt logic source, and switches a relay in response. **MV-57B** is controlled via a momentary pushbutton switch, allowing reliable, quiet, true-bypass designs and retrofitting without the big blue switch.

A compact DPDT latching relay (Panasonic TQ2-L-5V) connects directly to the chip, drastically reducing current draw associated non-latching alternatives.

One or two status LEDs can also be connect to the chip to indicate whether or not the effect is engaged.

Interface

The 28-pin PedalSync chips and modules, including the Tru-Foot™ LFO (MV-55 [B]), Four Pots (MV-56 [B]), Pulse Output (MV-60), each separately store 128 presets. They also include a momentary Bypass switch and corresponding pin output which can be used to control **MV-57**. The Bypass status is stored as a part of each program. Those chips also have additional user-defined logic outputs that can control other **MV-57** circuits.

The **PedalSync 9 Switches chip (MV-62) and module** were specifically designed to control up to nine MV-57 chips in **programmable pedalboard applications**.

> **MV-57B** is controlled via a momentary switch connection to ground. <u>The relay on **MV-57B** always resets to Bypass mode when powered on</u>.

Input (Pin 4)

Connect Pin 4 of **MV-57** to a 3.3 or 5-volt logic source via a 1K resistor. When the pin input is high, the effect is engaged. When the pin input is low (ground), the effect is bypassed.

Connect Pin 4 of **MV-57B** to a SPST momentary switch with the opposite lug of the switch to ground. Each time pin 4 is grounded, the relay toggles to the opposite state.

> *Refer to the schematic, below, for more information.*

Relay

A DPDT latching relay (Panasonic TQ2-L-5V) connects directly Pins 6 & 7 as shown in the schematic, below.

Be certain to include the back-to-back 5.1 volt zener diodes to protect the chip from the relay coil.

LED(s)

When the connected effect loop is engaged, LED1 is illuminated (pin 5 is sent high). LED1 also provides the startup light show when the chip powers on.

When the connected effect loop is bypassed, LED2 is illuminated (pin 3 is sent high).

Bi-color LED

The two LED outputs can be alternately connected to a single bi-color LED.

ReMute™ Momentary Muting Circuit

Prior to relay switching, an optical MOSFET Solid State Relay circuit momentarily mutes the output signal to virtually eliminate switching noise. This circuit should always be used in true-bypass applications.

> *Note:* The use of an optical MOSFET Solid State Relay is critical. Other types of solid state relays, transistor, and FET designs degrade the audio output signal.

While not as critical as the opto-MOSFET, the 100uF capacitor ramps the MOSFET voltage to smooth the audio signal transition.   *See* Schematic at C2.

> **The recommended Opto-MOSFET is the 4-pin Toshiba TLP222G.**

Electrical Considerations

Place C1 as close to pin 1 as possible.

If connecting the chip to the filtered power output from a PedalSync Module, connect the chip and JFET to the common Power Ground rather than the 5-volt digital ground.

Always use filtered and regulated power.

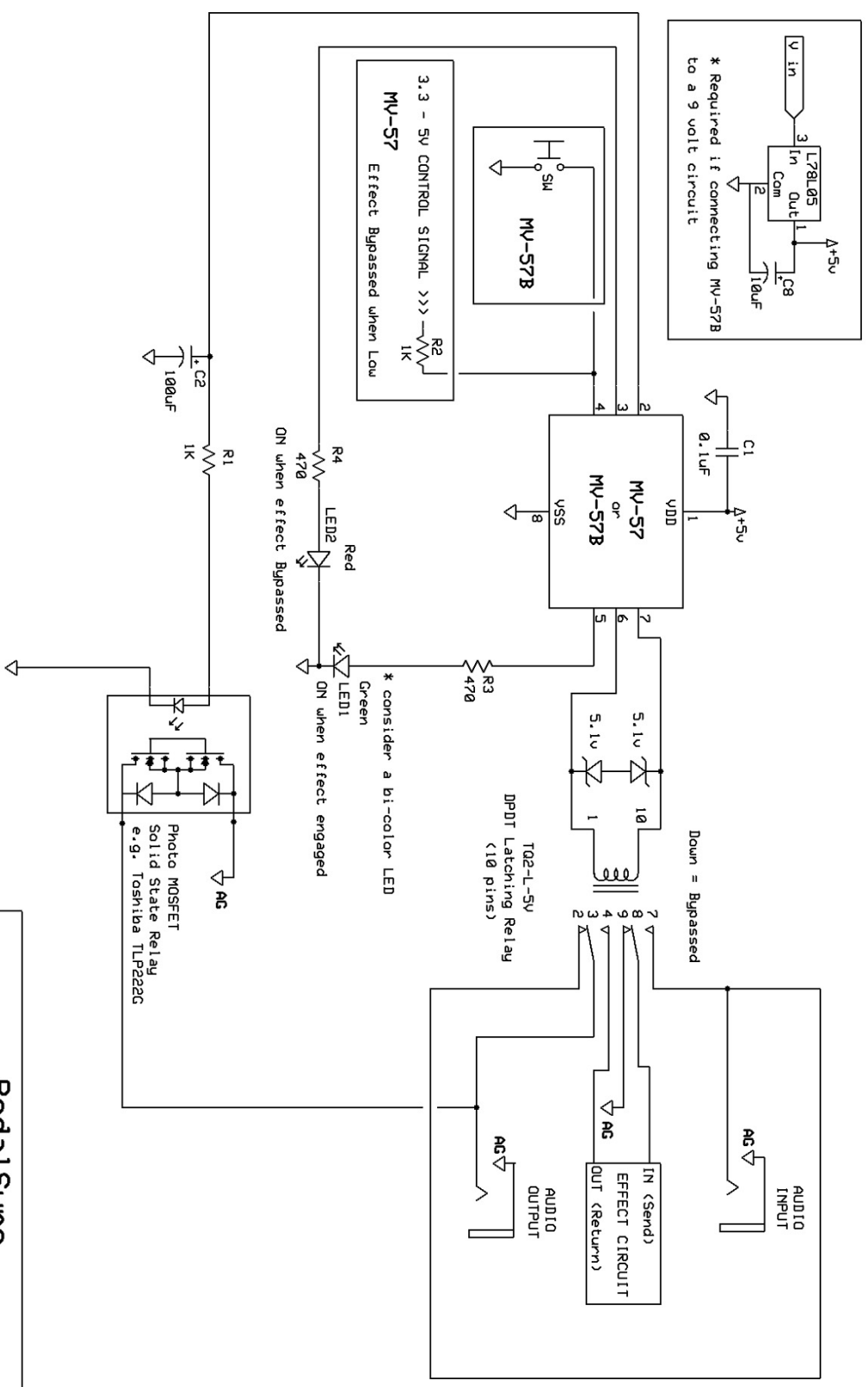## Specifications

Supply Voltage ~ 5 Volts DC

Maximum Output Current sunk or sourced by each output pin = 25mA

Maximum Output Current sunk or sourced by all output pins = 125mA

MV-57 Module with Jacks (LED on) = 6.5mA

Follow this link to find the datasheet for the underlying Microchip 12F508 chip.
http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en020094

MV-57 is activated via a control voltage

MV-57B is activated via a momentary switch to ground

* Required if connecting MV-57B to a 9 volt circuit

L78L05
V in
3 In   Out 1
Com
2
+5v
C8
1ouF

3.3 - 5v CONTROL SIGNAL >>>
MV-57
Effect Bypassed when Low
R2
1K

MV-57B
SW

MV-57
or
MV-57B
VDD
1 +5v
VSS
8

C1
0.1uF

C2
100uF

R1
1K

R4
470
ON when effect Bypassed

LED2
Red

R3
470

LED1
Green
ON when effect engaged

* consider a bi-color LED

5.1v   5.1v

10

TQ2-L-5v
DPDT Latching Relay
(10 pins)

Down = Bypassed

Photo MOSFET
Solid State Relay
e.g. Toshiba TLP222G

AG

AUDIO
INPUT
AG

EFFECT CIRCUIT
IN <Send>
OUT <Return>
AG

AUDIO
OUTPUT
AG

AG = Audio Ground
CONNECT ⏚ TO POWER GROUND, NOT 5v DIGITAL GROUND

PedalSync

Relay Bypass - MV-57 (B)

MoltenVoltage.com

Draft 2.0
2/12/2013

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Modules

Modules based on MV-57 and MV-57B are available.

MV-57 Relay Bypass Module and PCB

The MV-57 Relay Bypass Module PCB is designed for control by an external logic source and must receive a clean 3.3 or 5-volt input, such as the one provided by the PedalSync 9 Switches module. Be certain the 5-volt power supplied to the module is regulated and filtered.
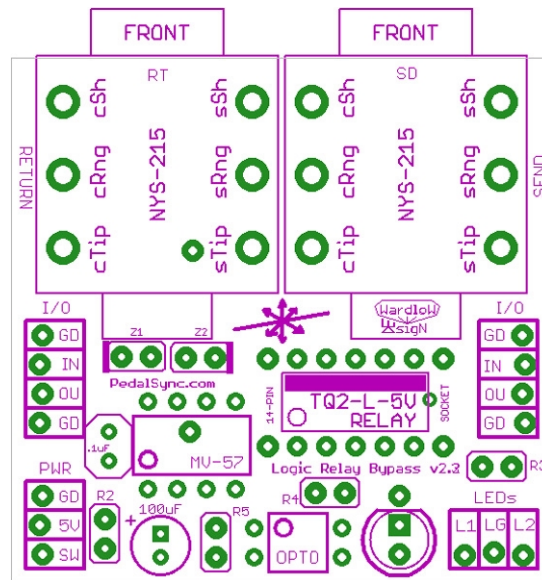
Logic-Controlled Relay Bypass Module with Jacks

The MV-57 Logic-Controlled Relay Bypass Module with Jacks is designed to allow the following connections:

Pin	Connection
IN	Audio Input
OU	Audio Output
GD	Power ground connection
5V	Connection for regulated 5-volt power input
SW	Switching signal from 5-volt logic source, such as 1B-9B connections from PedalSync 9 Switches Modules, or Bypass Out [BO] connection from PedalSync Tru-Foot LFO module
L1	LED 1 (via R3), ON when effect engaged (optional)
L2	LED 2 (via R4), ON when effect bypassed (optional)
LG	Ground connection for LEDs (same as GD)

Connections for Audio Input and Output are on both sides of the board. **When using multiple modules, connect the Output of the first one to the Input of the next.**

The MV-57 Logic-Controlled Relay Bypass Module with Jacks has the following components:

PCB	Component
R2, R5	1K **(brown, black, black, brown, brown)**
R3, R4	470 **(yellow, purple, black, black, brown)**
.1uF	Ceramic 0.1uF (104) non-polarized capacitor with .1" lead spacing
100uF	100uF polarized Electrolytic Capacitor
Z1, Z2	5.1v Zener diodes - align polarity band with PCB
OPTO	Opto-MOSFET Solid State Relay, e.g. Toshiba TLP222G - dot represents pin 1
NYS-215	1/4" PCB-mount Audio Jacks
MV-57	PedalSync MV-57 Logic-Controlled Relay Bypass chip
14-PIN SOCKET	Optional 14-Pin socket for use with the relay
TQ2-L-5V	10-pin Panasonic Relay - orient the text on the Relay the same way as the text on the PCB. Center the Relay in the middle 10 pins of the 14-pin socket

Note that the resistors and diodes are mounted vertically.

There is also a connection for a **PCB-mounted bi-color LED** (*note the polarity*). The middle pin is ground, the longer outside pin is generally red, and the short one green. It is often easier to mount the LED on the other side of the PCB so it sticks through the enclosure, as in the PedalSync NODE™ PedalBoard Module.

> *Note*: **In order to mute the module**, insert a 1/4" connector into the Return jack only. When that module is engaged, the audio signal will be grounded.

Dimensions - MV-57 Logic-Controlled Relay Bypass Module with Jacks

Circuit board: 1.85" (jack side) x 1.80"

Header pins: spaced 0.1"

Jacks (center to center): 0.85" (0.5" and 1.35" from left edge of PCB)

Jack hole size: 29/64"

PCB LED position: 1.325" from left edge of PCB (0.25" left of nearest jack)

MV-57B Pushbutton Relay Bypass Module and PCB

The MV-57B Pushbutton Relay Bypass Module PCB is designed for control by a momentary pushbutton switch. The MV-57B PCB also has an on-board voltage regulator and filter capacitor so that it can be connected directly to a higher voltage external power source in the range of 7-18 volts DC.

The Pushbutton Relay Bypass Module has been conveniently designed to fit in the space of a 9-volt battery compartment, simplifying true-bypass retrofits on vintage pedals.
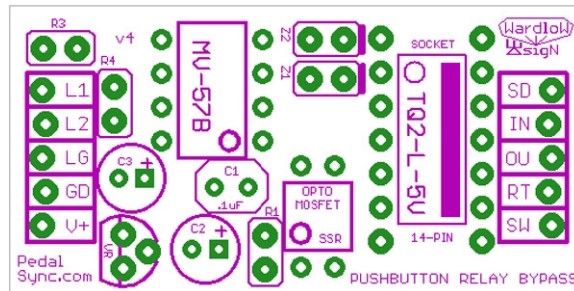
Pushbutton Relay Bypass Module

The MV-57B Pushbutton Relay Bypass module is designed to allow the following connections:

Pin	Connection
L1	LED 1 (via R3), ON when effect engaged (optional)
L2	LED 2 (via R4), ON when effect bypassed (optional)
LG	Ground connection for LEDs (same as GD)
GD	Power ground connection
V+	Connection for 7-18 volt power input
SD	Audio Loop Send
IN	Audio Input
OU	Audio Output
RT	Audio Loop Return
SW	MV-57B, momentary pushbutton switch input. *Other lug* of switch goes to Ground. **Connect switch ground as close and directly as possible to DC power jack.**

The MV-57B Pushbutton Relay Bypass Module has the following components:

PCB	Component
R1	1K (brown, black, black, brown, brown)
R3	470 (yellow, purple, black, black, brown)
R4	470 (yellow, purple, black, black, brown)
C1	Ceramic 0.1uF (104) non-polarized capacitors with .1" lead spacing
C2	100uF 25v polarized Electrolytic Capacitor
C3	10uF polarized Electrolytic Capacitor
Z1, Z2	5.1v Zener diodes - align polarity band with PCB
OPTO	Opto-MOSFET Solid State Relay, e.g. Toshiba TLP222G - dot represents pin 1
VR	L78L05 5-volt Voltage Regulator
MV-57B	PedalSync MV-57B Relay Bypass chip
14-PIN SOCKET	Optional 14-Pin socket for use with the relay
TQ2-L-5V	10-pin Panasonic Relay - orient the text on the Relay the same way as the text on the PCB. Center the Relay in the middle 10 pins of the 14-pin socket

Note that the resistors and diodes are mounted vertically.

For stereo applications using two MV-57B modules, a single momentary switch can be used to trigger both modules.

Dimensions - MV-57B Pushbutton Relay Bypass Module

Circuit board: 1.70 x 0.85"

Header pins: spaced 0.1" and the two header strips are 1.5" apart

Although the socket is very secure, if the module will be subject to excessive vibration, it may be advisable to solder the relay directly or secure it with electrical tape.
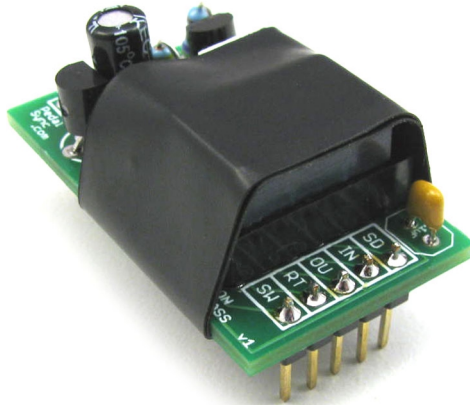
A complete set of CadSoft Eagle footprints for PedalSync modules is available for download at: www.PedalSync.com

Custom programming to suit your needs is always available. Contact info@PedalSync.com for more information.

Support
info@PedalSync.com

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