



MIDI-Solutions and Custom FX

Goblin-3PDT 1.0.1/1.1.0 - Installation

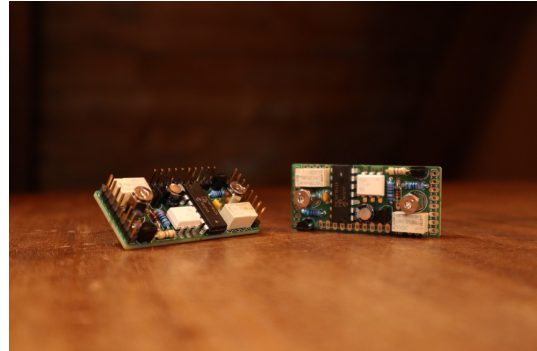
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1 Introduction

1.1 Wait, what?!

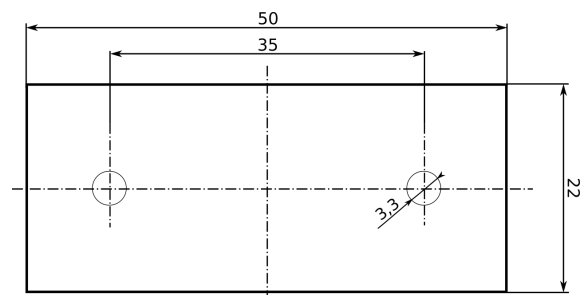
The **Oscillator Devices Goblin** is a MIDI upgrade kit for effects devices. It consists of electronics that are installed in the effects device. These electronics then perform switching tasks controlled by MIDI. This ranges from switching the bypass, via MIDI clock synchronous operation of the Tap Tempo, to the operation of connections for external switches and even encoder buttons to select presets. All devices of the **Goblin** family have three ports and can therefore take on up to three switching tasks at the same time. Due to the possibility of configuration, the Goblin works in almost every effect device.



The **Goblin-3PDT** is a variant for effects devices with true bypass 3PDT switches. For effects devices with soft switches (digital or relay-based switching) there is the slightly smaller **Goblin-SPST**.

1.2 Mechanical Properties

The dimensions of the **Goblin-3PDT** are 50 x 22 mm in the base area. When mounting with the supplied screws and bolts, the height in the mounted state is less than 15mm. The holes are intended for screws with an M3 thread. The holes are symmetrical.



Drilling Plan Goblin-3PDT

1.3 Electrical Properties

Electrical Properties	Min	Typ	Max	
Supply Voltage	7	9	18	VDC
Current draw		8	50	mA
Maximum voltage at the LED-Terminal in role <i>Relay</i>			18	VDC
Maximum voltage at all other ports and roles			5.3	VDC

1.4 MIDI Commands

For the full list of MIDI commands and how to set the MIDI channel see

https://oscillatordevices.com/doc/oscillator_devices_goblin-user_guide_en.pdf

2 Installation

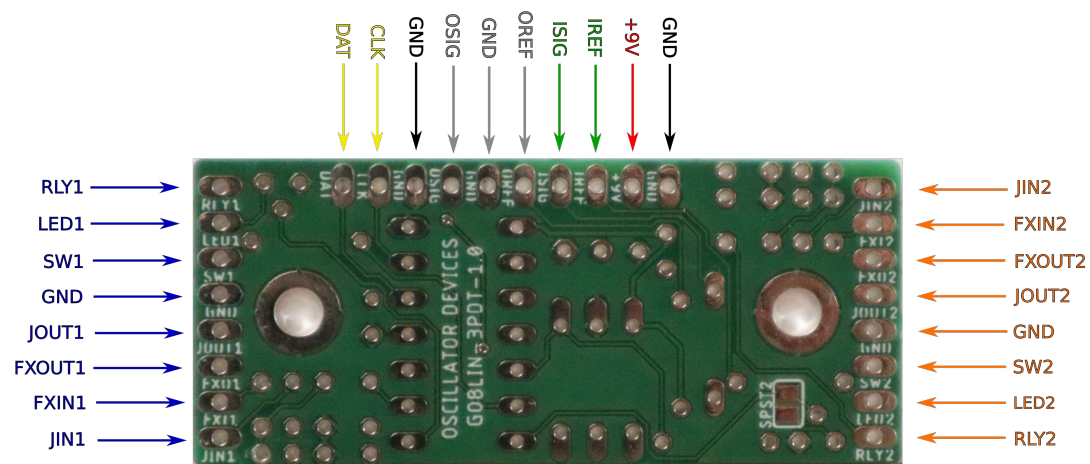
2.1 Ports and Roles

The installation depends on how the 3 ports of the **Goblin** are to be used, i.e. what role they have.

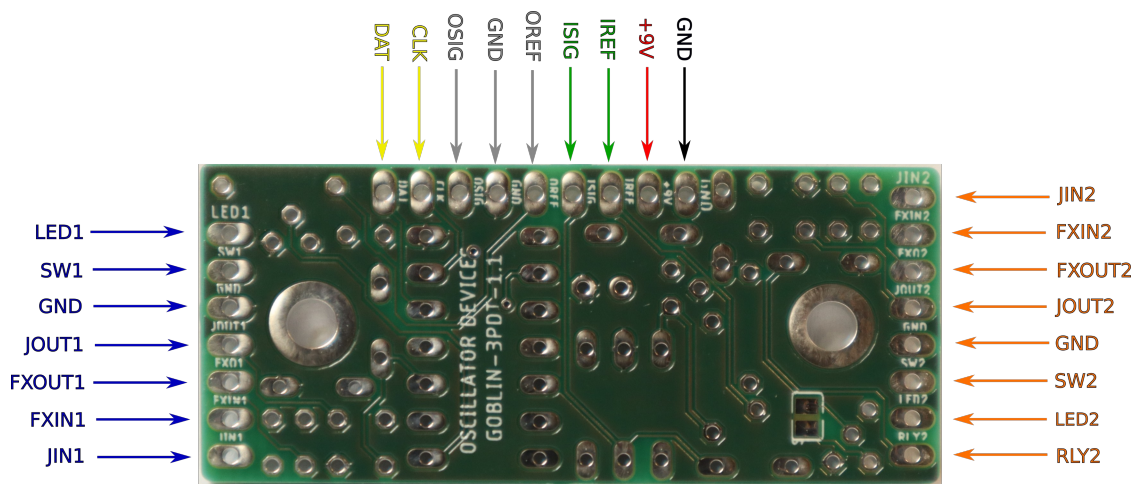
- Role **Relay**: The standard role for the **Goblin-3PDT**. This means that there is a relay that switches the signals of the effect on the 4 terminals JIN, JOUT, FXIN and FXOUT accordingly and also takes over the switching of an LED. This replaces a conventional 3PDT true bypass switch.
- Role **Switch**: With mixed pedals, i.e. with 3PDT and SPST switches, the ports can also control a soft switch, modeled on the **Imp-SPST / Goblin-SPST**. The LED is then used as a status indicator and the port can reliably assume the status "On" or "Off".
- Role **Tap Tempo**: A *Tap Tempo* switch is almost identical to a *Switch*, but has no state. It is neither "On" nor "Off" and its LED blinks independently or there is none at all.
- Role **TRS**: In the role *TRS*, the **Goblin** imitates an external switch with "Tip" and "Ring" (often marked with Footswitch, Ext-Ctl, CTL, EXT, or EXP). The two lines can be open or closed to GND. This way external switch connections can be operated from inside the device. This role is available for *Normally Open* as well as *Normally Closed* switches.
- Role **Encoder**: In the role of *Encoder*, the **Goblin** controls an encoder wheel, as can be found in EHX POG2, Cathedral or Memory Man Hazarai.

The advantage of a *Switch* over *Tap Tempo* is that the *Switch* can safely and reliably assume a state (on or off) at any time. After switching on, it recognizes the status - which can vary depending on the manufacturer - and can restore the last status before switching off. *Tap Tempo* is only able to toggle.

Not all ports of the **Goblin-3PDT** are able to take on every role. Port 3 can only be *Tap Tempo* or *TRS*. The role of an encoder can only be taken by port 2, port 3 is then not available.



Goblin-3PDT-1.0.1



Goblin-3PDT-1.1.0

Name	Port	Function Role <i>Relay</i>	Function Role <i>Switch</i>	Function Role <i>Tap Tempo</i>	Function Role <i>TRS</i>	Function Role <i>Encoder</i>
SW1	1	Connection of port 1 switch	N.A.	N.A.	N.A.	N.A.
LED1		LED port 1	N.A.	N.A.	N.A.	N.A.
JIN1		Jack in port 1	N.A.	N.A.	N.A.	N.A.
FXIN1		FX in port 1	N.A.	N.A.	N.A.	N.A.
FXOUT1		FX out port 1	N.A.	N.A.	N.A.	N.A.
JOUT1		Jack out port 1	N.A.	N.A.	N.A.	N.A.
SW2	2	Connection of port 2 switch	Connection of port 2 switch	Connection of port 2 switch	N.A.	N.A.
RLY2		N.A.	Connection FX port 2	Connection FX port 2	TRS2-Tip	Encoder push button
LED2		LED port 2	LED port 2	N.A.	TRS2-Ring	Encoder LED
JIN2		Jack in port 2	N.A.	N.A.	N.A.	N.A.
FXIN2		FX in port 2	N.A.	N.A.	N.A.	N.A.
FXOUT2		FX out port 2	N.A.	N.A.	N.A.	N.A.
JOUT2		Jack out port 2	N.A.	N.A.	N.A.	N.A.
DAT (SW3)	3	N.A.	Dual LED port 2	Connection of port 3 switch	TRS3-Tip	Encoder A
CLK (RLY3)		N.A.	N.A.	Connection FX port 3	TRS3-Ring	Encoder B
ISIG	MIDI In	MIDI In (Signal/Current Sink) - MIDI TRS-Type A Tip – Din Pin 5				
IREF		MIDI In (Reference/Current Source) - MIDI TRS-Type A Ring – Din Pin 4				
OSIG	MIDI Out	MIDI Thru (Signal/Current Sink) - MIDI TRS-Type A Tip – Din Pin 5				
GND		MIDI Thru (Shield/GND) - MIDI TRS-Type A Sleeve – Din Pin 2				
OREF		MIDI Thru (Reference/Current Source) - MIDI TRS-Type A Ring – Din Pin 4				
+9V	VCC	Supply Voltage 7-18V				
GND		GND				

2.2 Warning notice

There is +5V at the connections SW1/2/3. These connections must not be connected to the circuit board of the effects device. They are only intended for connecting a switch.

The **Goblin-3PDT version 1.0.1** does not have reverse polarity protection. The correct polarity should be checked before the first start-up. Never trust the colors of the lines.

The voltage at the inputs of the **Goblin-3PDT** in the role of *Switch*, *Tap Tempo*, *TRS* and *Encoder* must not exceed 5.3V.

2.3 Voltage Supply

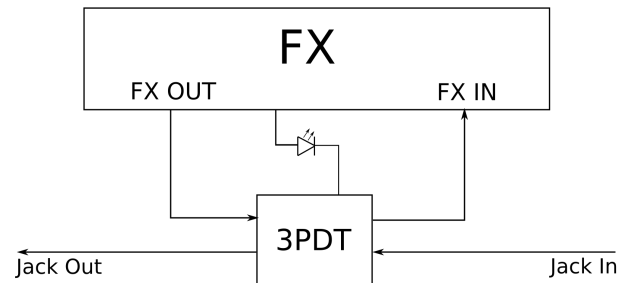
The electronics are supplied via the effects device's supply. In order to minimize interactions with the effects device, the supply for the **Goblin** should be soldered directly to the socket for the power supply of the effects device. In principle, other points for tapping are also conceivable, such as, e.g. the reverse polarity protection diode.

2.4 Wiring Relay

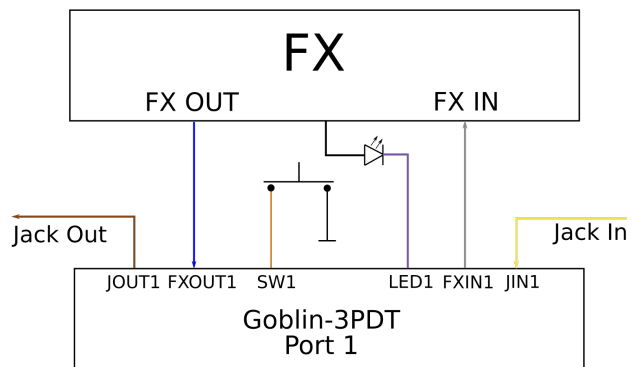
For use with a *Relay*, the existing 3PDT is removed and the existing 5 lines are connected as shown in the graphics.

RLY1/2 remains unused when used with relays. The LED input does not have a series resistor. This must be present in the previous circuit. The LED input switches to GND when the LED lights up. The LED input is the only input - and only in the role of *Relay* - suitable for voltages higher than 5V. 18V should not be exceeded here.

The switch is connected to SW1/2 on one side, the other side can be connected to the associated GND terminal.



Effects device with 3PDT before the installation



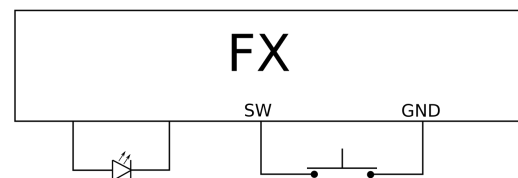
Effects device with installed Goblin-3PDT

2.5 Wiring Switch

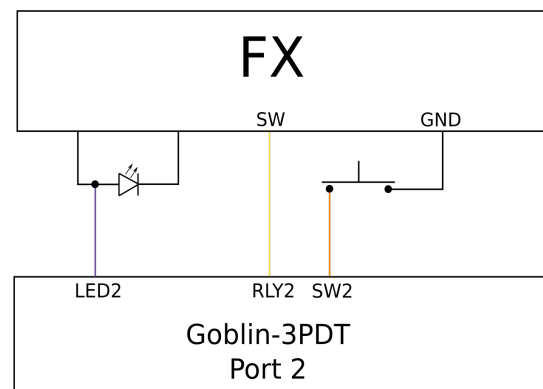
For the role of *Switch*, the positive side of the switch is unsoldered and connected to SW on the **Goblin**. The line that was previously at the switch is connected to *RLY*.

The **Goblin** uses the LED to compare its internal state with the state of the effects device. It measures the voltage on the LED and uses this to decide which state the effects device is in.

In order for the **Goblin** to correctly identify the state, the side of the LED must be found where the voltage changes when the state of the LED changes. To do this, each side of the LED is measured to GND. Once when the LED is on and once when the LED is off. The side where the voltage changes is the one where the wire is soldered.



Role Switch before installation of the Goblin-3PDT



Role Switch with the Goblin-3PDT

The configuration (see Chapter 3 Configuration) is carried out using the two voltage values (effect on and effect off **measured to GND**). The mean value of the two voltages is the LED threshold value (3.2 LED-Threshold). If the voltage is higher when switched off than when switched on, the polarity (see 3.1 Configuration bits- *POL-LED*) must be inverted.

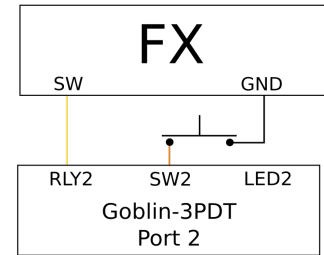
2.6 Wiring Tap Tempo

The wiring of a *Tap Tempo* switch works similarly to that of the *Switch*, with the difference that the LED line is omitted.

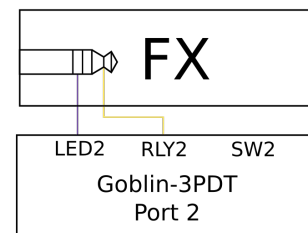
2.7 Wiring TRS

The wiring of the *TRS* is very easy. The corresponding lines are soldered to the pins of the socket. The **Goblin** either leaves the lines open or closes them to GND (and thus the switch).

TRS can be configured as *Normally Open* and *Normally Closed*. With *Normally Open*, the two lines are open at system start and pulses are executed as *Open* → *Closed* → *Open*. With *Normally Closed*, the lines are closed to GND at system start and pulses are executed as *Closed* → *Open* → *Closed*.



Role Tap Tempo with Goblin-3PDT



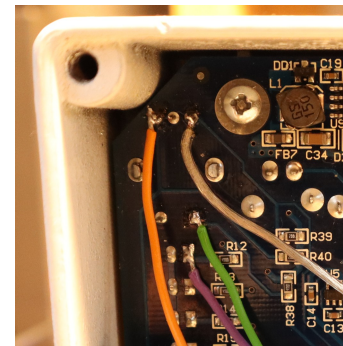
Role TRS with Goblin-3PDT

2.8 Wiring Encoder

In the case of the *Encoder* role, ports 2 and 3 are used together.

The encoder wheel, as used in the EHX POG2 etc., has a push button function. The positive side (+ 3.3V ... 5V) of the push button is connected to *RLY2* (green in the example image).

In addition, the first LED of the LED strip is monitored as a reference. The pin of the LED, which changes its voltage when the LED is switched, is connected to *LED2*. On the POG2 this is the pin that can be found next to resistor *R12* (purple in the picture).



Wiring encoder in a POG2

The two encoder pins are connected to *CLK* (*RLY3*) and *DAT* (*SW3*). With the POG2, the one pointing to the input is to be connected to *DAT* (orange in the picture), the one pointing to the output is to be connected to *CLK*. These can be interchanged on different PCB revisions or devices.

2.9 Wiring MIDI

The wiring of the MIDI ports is carried out according to the table in 2.1. If the supplied sockets are not used, make sure that the *MIDI In* socket is isolated from the housing.

Attention: The *MIDI In* socket must **not** be connected to GND in order to isolate the GND of the MIDI participants.

3 Configuration

The following settings are not necessary for ongoing operation. They are carried out and saved once upon commissioning.

Caution: The following settings, if used incorrectly, can result in the device no longer working properly.

There is a [spreadsheet](#) to help with calculation of the configuration bits and LED threshold.

3.1 Configuration bits

The role of the ports, what kind of switch is connected and some other important parameters are set via non-volatile configuration bits. Each port has a set of identical configuration bits. The following 5 parameters are set using a 7-bit word.

CC	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2-0
	POL-LED	FX-DRIV	POL-FX	POL-SW	ROLE
Port 1: 19 Port 2: 39 Port 3: 59	Polarity of the LED 0 = Low Active 1 = High Active (*)	Driver function of port 0 = Push Pull 1 = Open Drain (*)	Polarity of FX 0 = Normally Closed 1 = Normally Open (*)	Polarity of Switch 0 = Normally Closed 1 = Normally Open (*)	Role of the port 0 (000): Disabled 1 (001): Relay (*) 2 (010): Switch 3 (011): Tap Tempo 4 (100): TRS Normally Open 5 (101): TRS Normally Closed 6 (110): Encoder

(*) = Default setting

- **ROLE:** The role of the port (see 2.1)
- **POL-SW:** Switch polarity. *Normally open* switches are used most of the time.
- **POL-FX:** Polarity of the FX. Usually this value is set to the same value as *POL-SW*. Only for role *Switch* and *Tap Tempo*.
- **FX-DRIV:** The FX side (connection RLY) usually awaits a + 5V line, which is briefly pulled to GND in order to switch the effect. If this is not the case (e.g. OBNE Dark Star) the **Goblin** can drive the + 5V high state itself. To do this, set this bit to *Push Pull*. Only for role *Switch* and *Tap Tempo*.
- **POL-LED:** Polarity of the LED. If the wiring of the LED requires it, set this bit to *Low Active* to recognize the lower voltage as „on“ (See 2.5). Only for role *Switch*.

It should be noted that these settings must always be made together. The entire word is always used.

Before the bits take effect, the setting must be saved (see 3.5 Saving the Configuration) and the device restarted.

3.2 LED-Threshold

The LED monitoring measures the voltage at the anode of the LED. If there is a voltage there that exceeds the LED threshold value, the status is registered as "On". Since LED voltages can vary widely, the threshold value can be set for each port.

CC	#	Funktion
Port1: 29 Port2: 49	n	LED threshold in 0.05V steps. Default is 24 (=1.2V) Only role <i>Switch</i>

These settings have to be saved (see 3.5 Saving the Configuration).

3.3 MIDI Channel

The MIDI channel can either be set via a switch (role *Switch*, *Tap Tempo*, or *Relay*), or via a MIDI command.

3.3.1 MIDI Channel via MIDI command

CC	#	Funktion
6	0	Set MIDI channel to Omni (reacts to every channel)
6	1...16	Set MIDI channel to channel 1...16

These settings have to be saved (see 3.5 Saving the Configuration).

3.3.2 MIDI-Kanal via Switch

The MIDI channel can be easily changed from the outside using key combinations. Port 1 is used for this by default. If another port is to be used, this can be set with the following command.

CC	#	Funktion
7	1/2/3	Change the port for the MIDI channel setting to port 1, 2, or 3

These settings have to be saved (see 3.5 Saving the Configuration). The instructions for setting the MIDI channel using the switch see: <https://oscillatordevices.com/goblin>

3.4 Startup Delay

Some effects devices need some time after being connected to the supply voltage before they are ready for operation. This ranges from a few milliseconds to several seconds. So that the **Goblin** can correctly restore the last state and the boot process of the effects device is not disturbed, the effects device should first be ready for operation before the **Goblin** begins its work. Therefore a delay at the beginning can be useful. This setting must also be saved, see 3.5 Saving the Configuration.

CC	#	Schalter
8	n	Startup delay n*100 ms (Default n = 5)

Please note that a pressed button is immediately recognized and accepted by the **Goblin** when it is connected to the supply voltage. This happens regardless of the start delay, but depending on the polarities set in the configuration bits. In this way, the configuration modes of the effects devices can still be used.

3.5 Saving the Configuration

In order to save the configuration bits and the start delay, the following three commands must be called immediately one after the other. If another command is sent in between, the storage sequence is aborted.

CC	#	Funktion
9	18	1. passcode for the saving sequence
9	52	2. passcode for the saving sequence
9	n	n=0: Saving the Startup delay n=1: Saving the configuration bits of port 1 n=2: Saving the configuration bits of port 2 n=3: Saving the configuration bits of port 3 n=4: Saving the LED threshold of port 1 n=5: Saving the LED threshold of port 2 n=6: Saving the LED threshold of port 3 n=7: Saving the port for the MIDI channel setting with a switch n=8: Saving the MIDI channel from command CC 06

3.6 Dual Color LEDs

If the indicator LED is dual color, the LED inputs of port 2 and port 3 can be used together on port 2. One color is then connected to *LED2* and the other to *DAT(SW3)*. To activate this feature, the role of **port 3 must be *Disabled*** and the **LED threshold value of port 3 must be set to 0**.

3.7 Troubleshooting

The most common mistake during installation is the wrong configuration of the LED threshold value and/or the LED polarity. If this is not set correctly, the effect can be operated with the switch, but via MIDI the on and off command doesn't work properly. In this case, check the configuration and repeat the measurement if necessary. Also make sure that you have measured against GND!

To help with the configuration you can use the spreadsheet at:

https://oscillatordevices.com/doc/oscillator_devices_configuration_helper.xlsx

3.8 Configuration Examples

3.8.1 EHX POG2

With the POG2, port 1 is used as *Relay* and port 2 as *Encoder*. Port 1 is configured as *Relay* by default, so no setting needs to be made. With port 2 as *Encoder*, the role must be changed. In addition, the readings for the LED are 3.3V when the LED is off and 1.5V when it is on. Therefore the polarity and the threshold value have to be changed.

So the configuration bits for port 2 are

POL-LED = 0 (polarity reversed, i.e. Low-Active)

FX-DRIV = 1 (OD)

POL-FX = 1 (High Active)

POL-SW = 1 (High Active)

ROLE = 6 → 110 (Encoder)

This is put together as a 7-bit word and converted into decimal: 0 1 1 1 110 → 0x3E → 62

The command combination is therefore: CC 39 62, CC 09 18, CC 09 52, CC 09 02

The LED threshold value should be between the measured values. 2.4V is exactly in the middle. The LED threshold value is specified in 0.05V steps.

Therefore the command combination is: CC 49 48, CC 09 18, CC 09 52, CC 09 05