

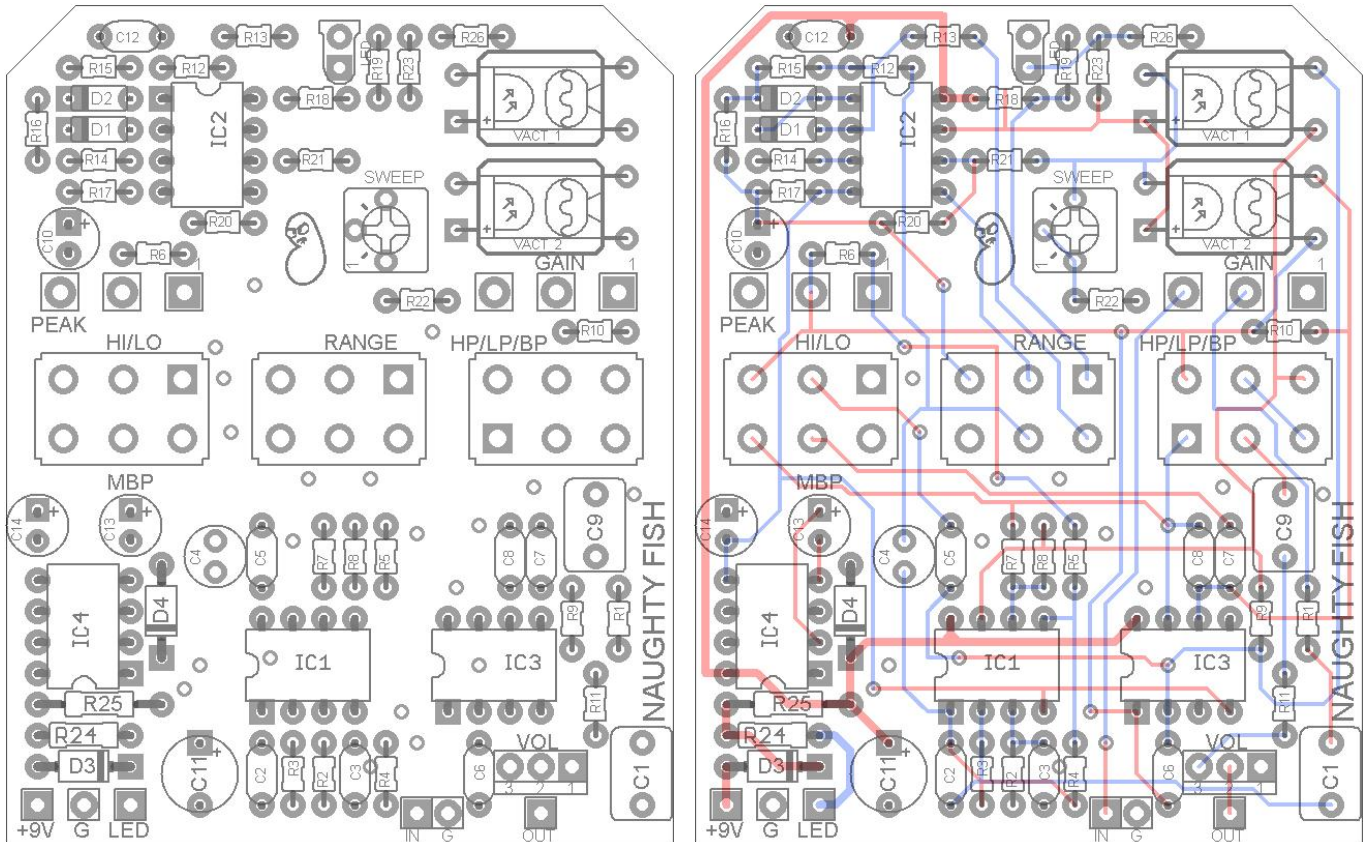
NAUGHTY FISH

FX TYPE: Filter

Based on the Mutron III™

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2.15" W x 2.7" H



Terms of Use: You are free to use purchased **Naughty Fish** circuit boards for both DIY and small commercial operations. You may not offer **Naughty Fish** boards for resale or as part of a “kit” in a commercial fashion. Peer to peer re-sale is, of course, okay.

Resistors		Caps		Diodes	
R1	3k3	C1	1uF	D1	1N914
R2	120k	C2	10pF	D2	1N914
R3	120k	C3	100n	D3	1N5817
R4	4k7	C4	2u2 NP	D4	12v
R5	12k	C5	2n2	LED	3MM
R6	390k	C6	1n8	IC	
R7	22k	C7	2n2	IC1	TL072
R8	22k	C8	1n8	IC2	TL072
R9	220k	C9	1uF	IC3	TL072
R10	220k	C10	4u7	IC4	LT1054
R11	560R	C11	220uF	Vactrols	
R12	22k	C12	100n	VACT_1	MI1210CLF-R
R13	12k	C13	10uF	VACT_2	MI1210CLF-R
R14	1M	C14	10uF	Switches	
R15	1M			RANGE	DPDT
R16	330R			HI/LO	DPDT
R17	47k			MODE	DPDT
R18	180k			Trimpot	
R19	120k			SWEEP	5k
R20	120k			Pots	
R21	120k			GAIN	1MC
R22	330R			PEAK	250kB
R23	1k			VOL	100kB
R24	4k7				
R25	10R				
R26	1k				

Value	QTY	Shopping List Type	Rating
10R	1	Metal / Carbon	1/4W or 1/2W
330R	2	Metal / Carbon	1/8W
560R	1	Metal / Carbon	1/8W
1k	2	Metal / Carbon	1/8W
3k3	1	Metal / Carbon	1/8W
4k7	2	Metal / Carbon	1/8W
12k	2	Metal / Carbon	1/8W
22k	3	Metal / Carbon	1/8W
47k	1	Metal / Carbon	1/8W
120k	5	Metal / Carbon	1/8W
180k	1	Metal / Carbon	1/8W
220k	2	Metal / Carbon	1/8W
390k	1	Metal / Carbon	1/8W
1M	2	Metal / Carbon	1/8W
10pF	1	Ceramic	25v or more
1n8	2	Film	25v or more
2n2	2	Film	25v or more
100n	2	Film	25v or more
1uF	2	Film	25v or more
2u2 NP	1	Non-Polar Electrolytic	25v or more
4u7	1	Electrolytic	25v or more
10uF	2	Electrolytic	25v or more
220uF	1	Electrolytic	25v or more
1N914	2		
1N5817	1		
12v	1		
LED	1	3MM	
TL072	3	DIP	
LT1054	1	DIP	
VTL5C3	2	Macron MI1210CLF-R or VTL5C3	
DPDT	2	PCB Mount	ON/ON
DPDT	1	PCB Mount	ON/ON/ON
5k	1	Bourns 2262P	
1MC	1	PCB Mount	16mm
250kB	1	PCB Mount	16mm
100kB	1	Alpha	9mm

You must use the following DPDT switches in order to mount them to the PCB:

On/On: <http://www.smallbearelec.com/servlet/Detail?no=1392>

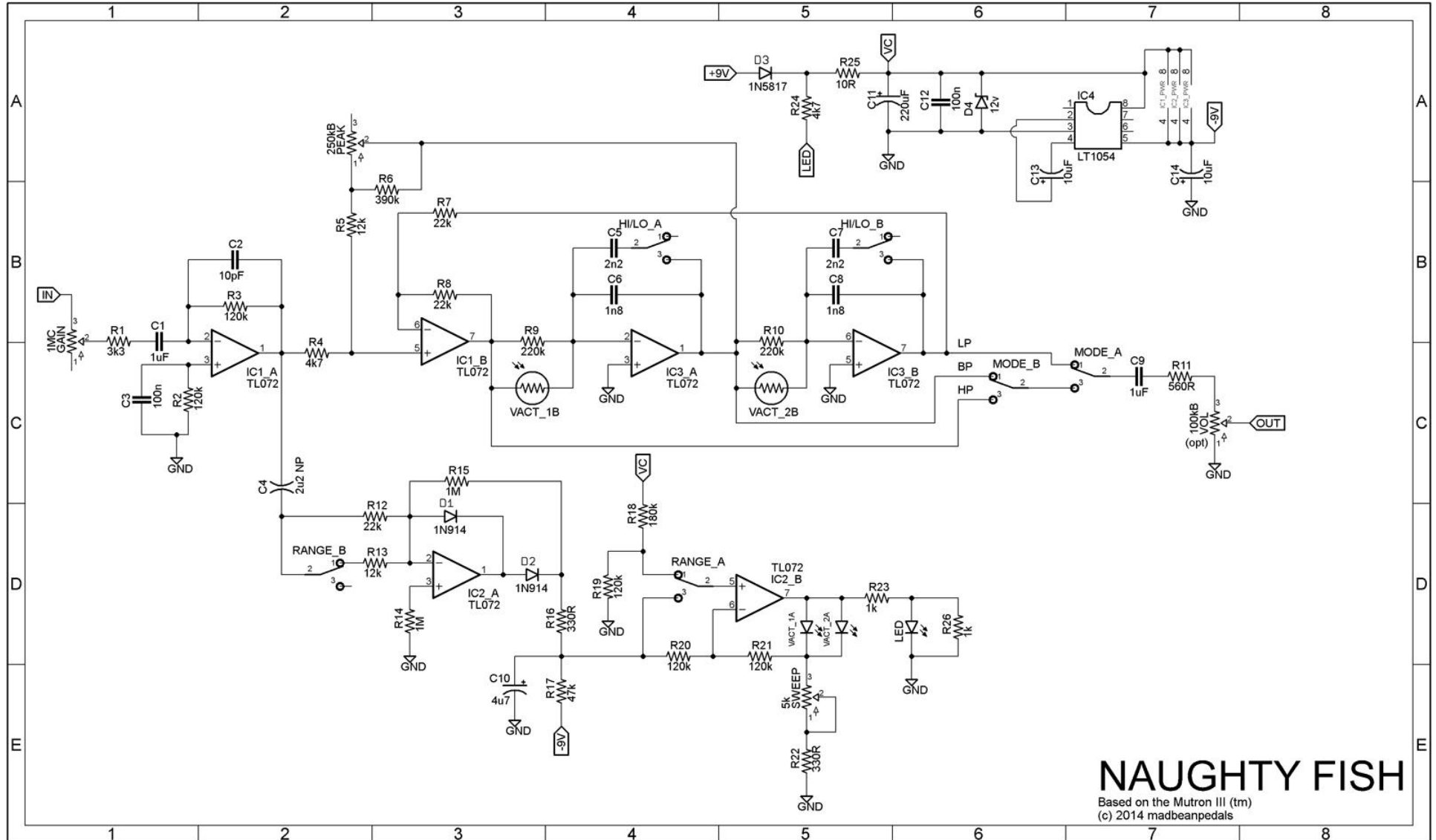
On/On/On: <http://www.smallbearelec.com/servlet/Detail?no=1175>

Use these 16mm pots for the Gain and Peak controls:

<http://www.smallbearelec.com/servlet/Detail?no=692>

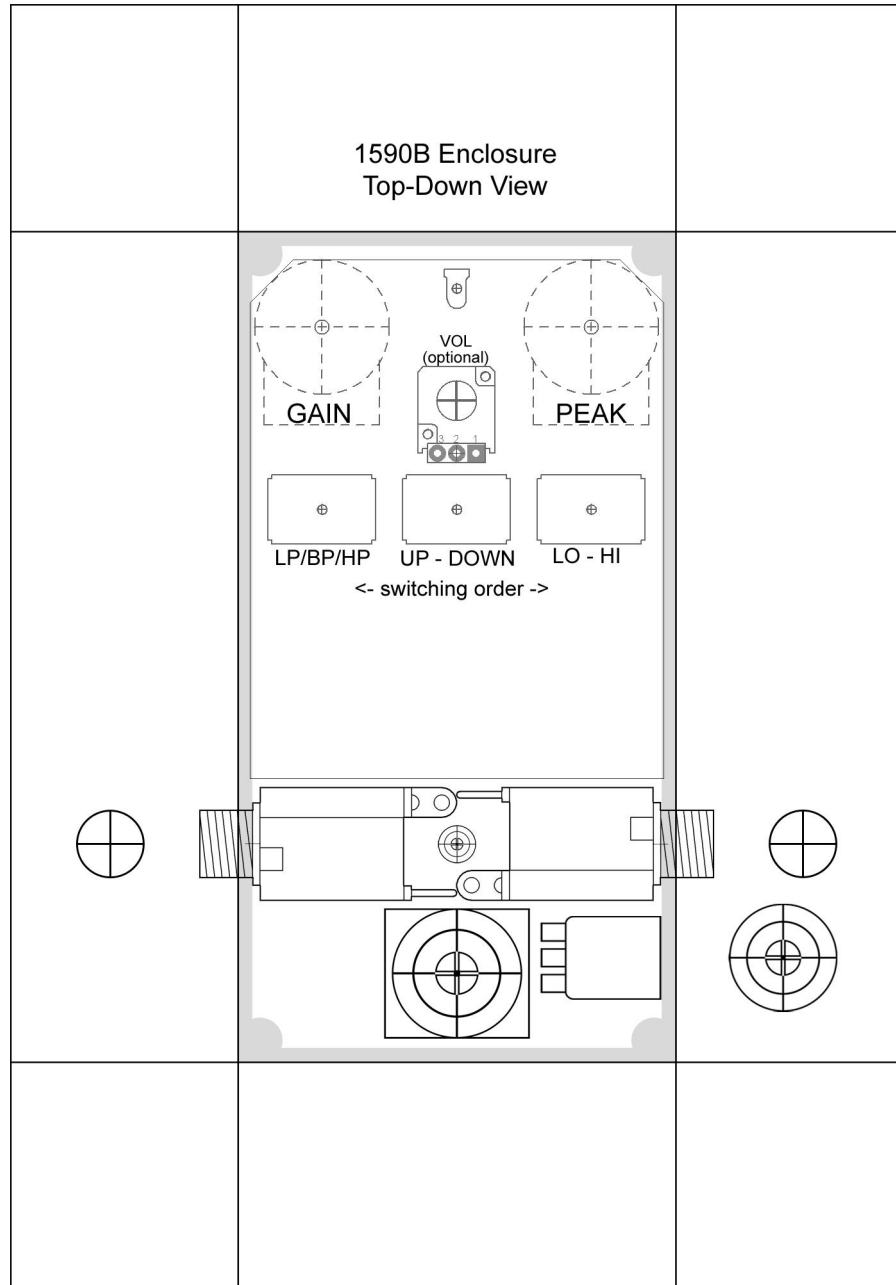
And, this Alpha pot for the optional Volume control:

<http://www.smallbearelec.com/servlet/Detail?no=693>



Note: I forgot to change the name of the On/On/On switch to Mode on the PCB. It is (incorrectly) labeled HP/LP/BP on the PCB.

1590B
4.64" W x 6.69" H



Download the Photoshop file used to make this drill template:
http://www.madbeanpedals.com/projects/NaughtyFish/NaughtyFish_DRILL.zip

What is best in life? Crush your enemies? See them driven before you? Hear the lamentation of their women? Yes. And so is making a clone of a super expensive piece of vintage gear in a small enclosure...like the Naughty Fish.

The **Naughty Fish** is a Mutron III™ clone, like the madbeanpedals Nautilus, but shrunk down and simplified. Whereas the Nautilus required a large rotary switch and a 1590BB enclosure, the Naughty Fish uses no rotary and fits in a 1590B. The Naughty Fish also replaces the output section of the Nautilus with an optional volume control to save space (neither of those are present in the Mutron III). In that sense it is a more accurate clone than the Nautilus, although both the Nautilus and Naughty fish are nearly identical in terms of results.

- Gain – The input gain of the filter effect. This drives not only the filter portion, but also the envelope. As the control is turned up, more overdrive is produced and the envelope becomes more sensitive to dynamics.
- Peak – Adjusts the intensity of the resonant peak of the filters.
- Sweep – This trimmer follows directly from R.G. Keen's suggestion. It allows one to make small adjustments to the overall LED brightness in the envelope section. The LEDs are what drive the Vactrols which in turn produce the sweeping filter effect.
- Hi/Lo – Selects between two sets of filters, high and low.
- Up/Down – Selects two different modes for the LED drivers. The Up setting drives the LEDs from dark to light and the Down setting is the opposite.
- Mode – Selects three different filter types. HP is high-pass, LP is low-pass and BP is band-pass.
- Vol – This is an optional output volume control. I highly recommend using it since the output volume can increase quite a bit when the Gain pot is turned up.

The original Mutron used a custom made dual Vactrol which is no longer available. The Vactrol consisted of two photocells, one for each filter stage, and an LED driver in a cylindrical case. The Nautilus uses two Vactrol drivers so there are two photocells, but one LED per photocell. It is imperative that you use the correct Vactrol for this build, otherwise it will not work correctly.

You should use either the Macron MI1210CLF-R: <http://www.smallbearelec.com/servlet/Detail?no=1255> or, the VTL5C3: <http://www.smallbearelec.com/servlet/Detail?no=347>

If you are unable to get either of these, then roll your own Vactrol using an LED and photocell with specs as close to 20-50k light and 10M dark as possible. The closest match for this is the 9203 photocell listed here: <http://www.smallbearelec.com/servlet/Detail?no=711>

The LED on the Naughty Fish PCB is envelope driven. It will give you some visual feedback as to how the envelope is behaving, and thus how the Vactrols are being driven. You should mount this LED to the external part of the enclosure.

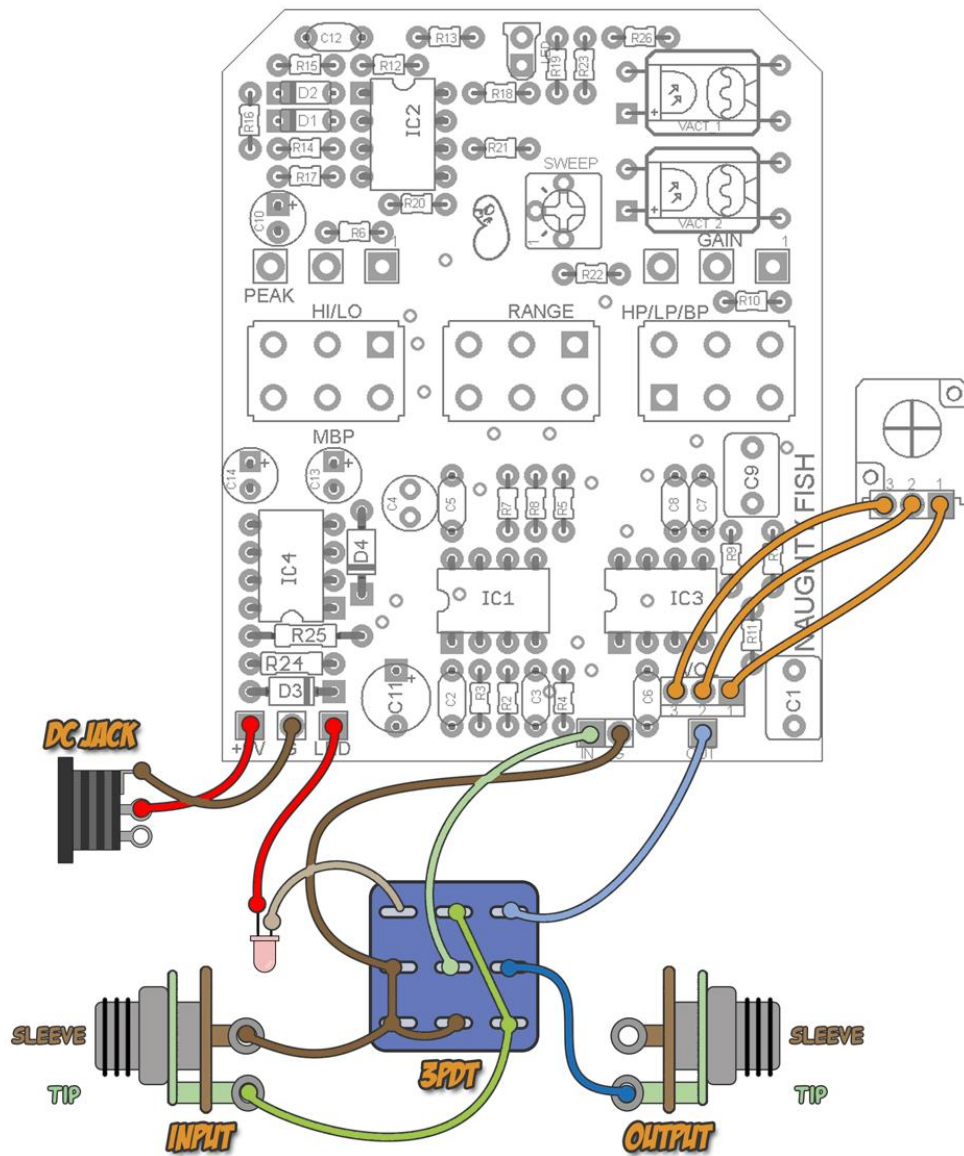
Technology of Envelope Controlled Filters: http://www.geofex.com/Article_Folders/ECFtech/ecftech.htm
Musictronics Mutron III info: <http://www.effectsdatabase.com/model/musitronics/mutron/3>

There are many subtle settings to be found in conjunction with the switches and potentiometers. Take time to explore...it is one of the most enjoyable effects to fiddle around with.

The 1MC Gain pot is a bit too high in value, IMO. The first 1/3rd of the pot turn feels a little on the dead side to me...but that is the value used in the Mutron. If you find it bothersome, use a smaller value like 500kC. I even built one with 250kC and it still had plenty of gain range for my taste.

Start with the Sweep trimmer in the middle of its rotation. As you play around with the Naughty Fish, try tweaking the trimmer up and down in small increments to get a feel for how it changes the envelope response. There is no one "ideal" or preferred settings here...it is simply a tweak to alter the envelope to your liking.

Wiring Diagram



If you do not wish to use the optional Volume pot, simply jumper pads 3 and 2 together on the PCB and wire everything else as shown above.

