AQB_MOD 2019

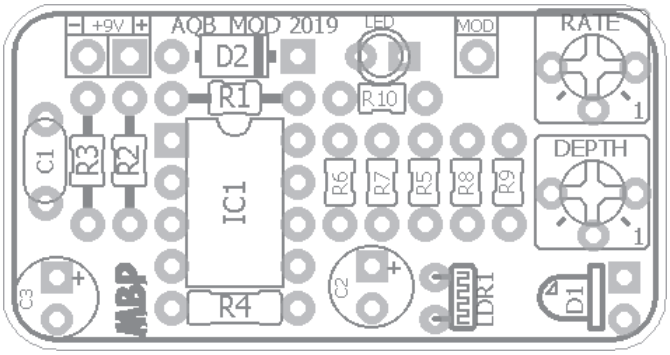
FX TYPE: delay modulation

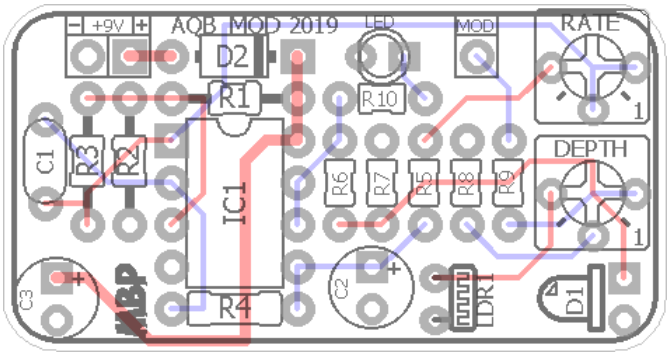
The **AQB_MOD** is an add-on board to enable modulation on the Aquaboy (DM-2) project. For the 2019 version, I've added an optional LED that displays the modulation rate and an additional resistor to prevent the depth control from being too extreme.

Controls

- **RATE:** Sets modulation rate from slow to fast.
- **DEPTH:** Sets modulation depth from min to max.
- **SW:** Switches the modulation on and off.

Layout &Traces





B.O.M.

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Resistors	
R1	220k
R2	220k
R3	220k
R4	220k
R5	2k2
R6	1k
R7	1k
R8	220k
R9	47k
R10	4k7
Caps	
C1	10n
C2	22uF
C3	22uF
Diodes	
D1	LED
D2	1N4001
LED	LED
Photocell	
LDR1	9203
IC	
IC1	TL062
Switch	
SW	SPDT
Pots	
RATE	100kC
DEPTH	100kB

Shopping List			
Value	QTY	Type	Rating
1k	2	Carbon / Metal Film	1/8W
2k2	1	Carbon / Metal Film	1/8W
4k7	1	Carbon / Metal Film	1/8W
47k	1	Carbon / Metal Film	1/8W
220k	5	Carbon / Metal Film	1/8W
10n	1	Film / MLCC	16v min.
22uF	2	Electrolytic	16v min.
LED	2	Red, Diffused	3mm
1N4001	1		
9203	1	Photocell	
SW	1	SPDT On/On	
100kC	1	9mm or 3362p Trimmer	
100kB	1	9mm or 3362p Trimmer	

Parts

You can use either metal shaft 9mm pots or trimmers for the Rate and Depth control. Pots obviously give you the ability to dial in all kinds of different modulation. But, if you one just one type of modulation (say a slow, subtle modulation on longer delays) then trimmers allow you to just “set and forget” without having to drill more holes in your enclosure.

9mm metal shaft potentiometers (100kC, 100kB):
http://smallbear-electronics.mybigcommerce.com/alpha-single-gang-9mm-pc-mount/

Bourns 3362p (100k):
https://www.mouser.com/ProductDetail/Bourns/3362P-1-104LF?qs=sGAEpiMZZMvygUB3GLcD7l-39JMs%2F%2F%2FLOs09gVZSzi2c%3D

https://www.taydaelectronics.com/potentiometer-variable-resistors/cermet-potentiometers/3362p/100k-ohm-trimmer-potentiometer-cermet-1-turn-3362p.html

9203 photocell:
http://smallbear-electronics.mybigcommerce.com/photocells-cds-5mm-diameter/

You can also use some of the cheap Tayda ones:
https://www.taydaelectronics.com/resistors/photoresistors/photo-conductive-cell-resistor-ldr-650nm-radial-ke-10720.html

SPDT Mini (On/On):
http://smallbear-electronics.mybigcommerce.com/spdt-on-on-mountain-10tc410/

SPDT regular size (On/On):
http://smallbear-electronics.mybigcommerce.com/spdt-on-on-short-lever/

Low -profile Electrolytic cap (22uF):
http://smallbear-electronics.mybigcommerce.com/electrolytic-radial-low-profile-16v-1-f-100-f/

- For the LEDs, use 3mm, red diffused for both D1 and LED parts.
- You can use a TL072 instead of the 062 for the IC.

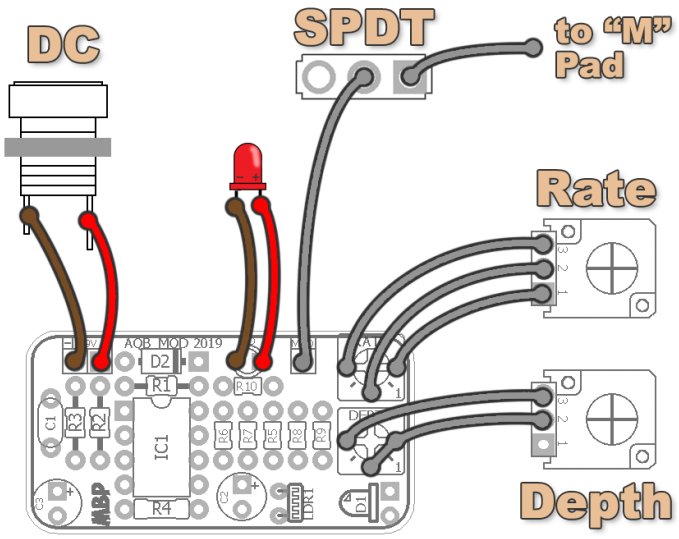
Voltages

When powered, pin8 of the TL062 should read about 9v, pin4 0v and all other pins will have varying voltage.

Notes

Bend the legs on your photocell and D1 so that the top of the LED points toward the face of the photocell. You can enclose the LED and Photocell in some heat shrink or tape, but it’s not absolutely required. However, when testing it outside the enclosure put a towel or something over it to block your room lights from interacting with the photocell. This will let you know how well the modulation will work once in the enclosure.

Wiring1



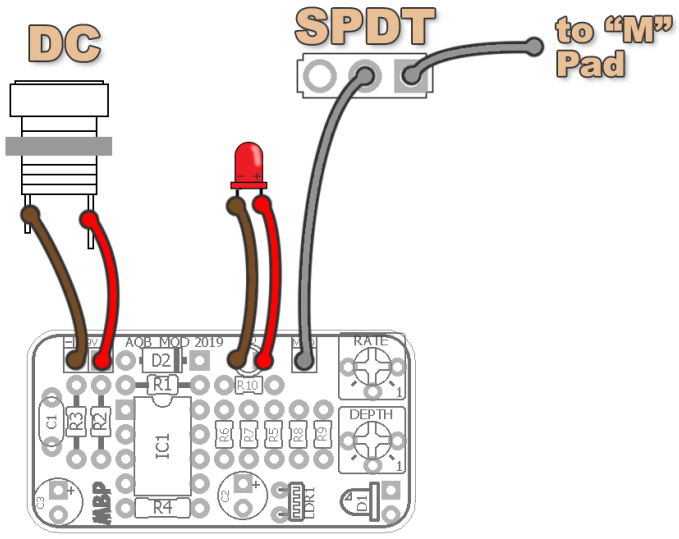
This wiring shows external pots, SPDT switch to turn the modulation on and off and external LED that flashes in time with the Rate setting. Connect the wire from the SPDT to the “M” pad on the Aquaboy.

Note 1: in this case, connect pads 2 and 1 of the Depth pot on the AQB_MOD PCB as shown.

Note2: you can just leave the external LED off if you do not want the flasher.

Experimental:
It’s possible to hook up the Mod board without the switch to turn modulation off. To do so wire the Mod pad on the AQB_ MOD PCB directly to the “M” pad on the Aquaboy PCB. Make R9 220k instead of 47k. When you turn the Depth pot all the way down, the modulation should go most of the way off. You may still hear a very slight amount, though.

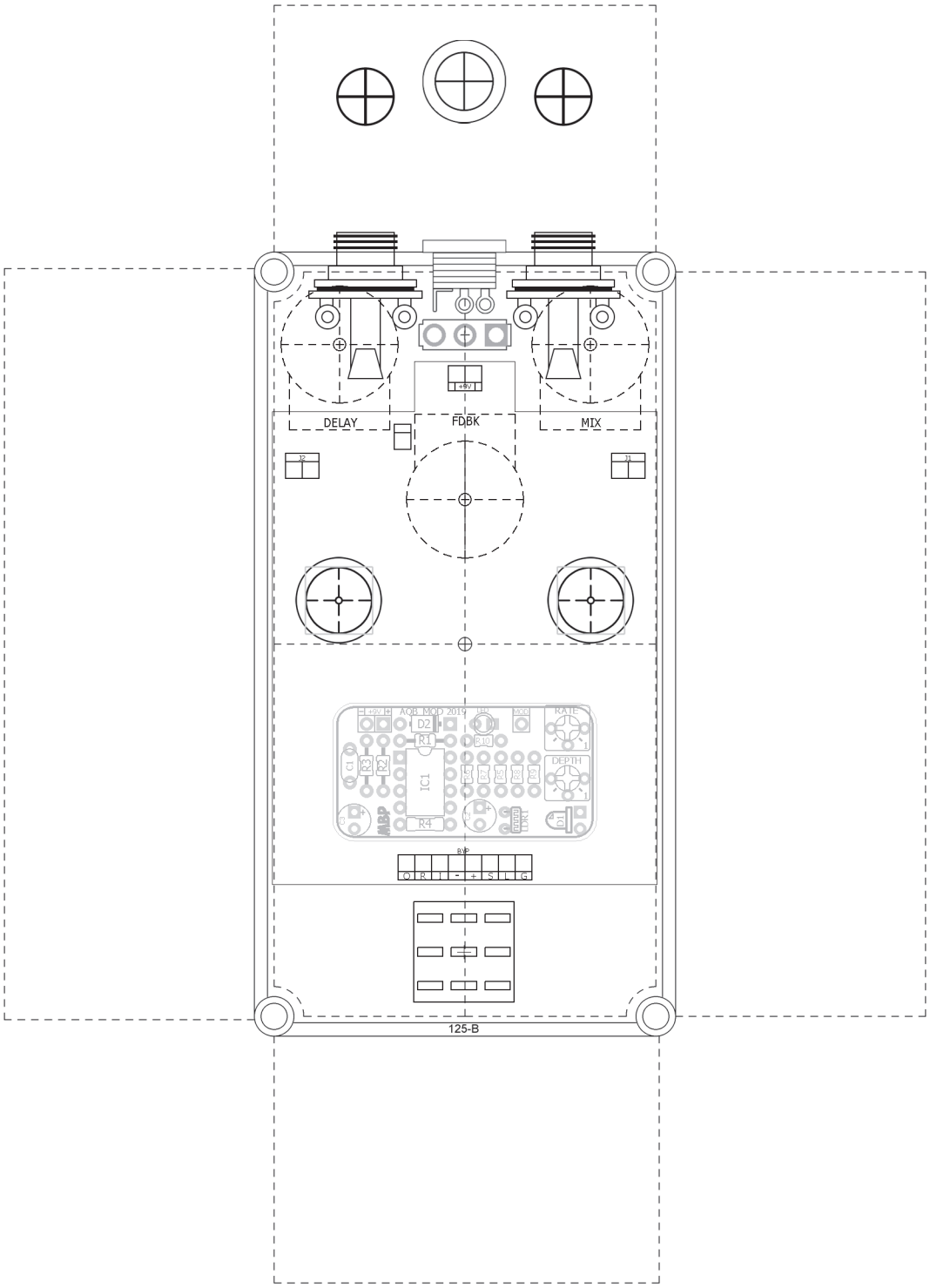
Wiring2



This wiring shows the pots using trimmers. Use this if you only want fixed modulation with the delay.

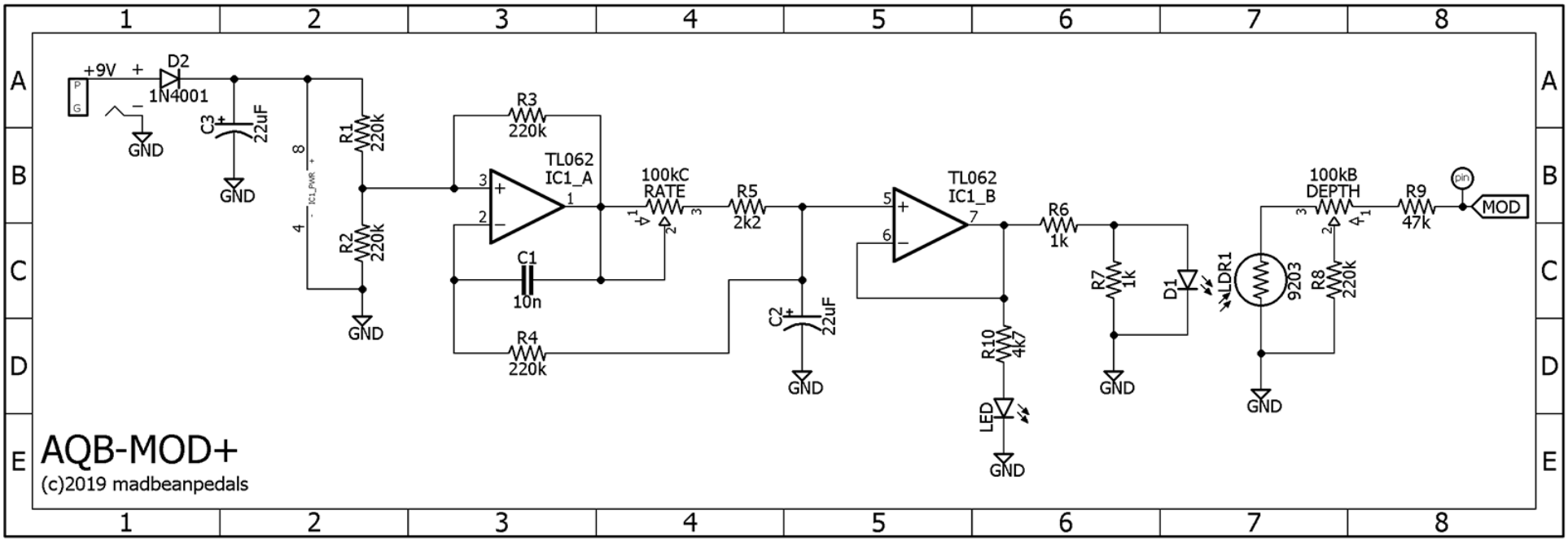
Note1: you can just leave the external LED off if you do not want the flasher.

125B Drill Guide



The AQB_MOD board has to fit under the Aquaboy PCB. Use some 3m foam tape to securely affix it to the enclosure. You could also use velcro!

Schematic


+9V
D2
1N4001
GND
C3
22uF
GND
R1
220k
R2
220k
GND
R3
220k
TL062
IC1_A
C1
10n
R4
220k
100kC
RATE
R5
2k2
C2
22uF
GND
TL062
IC1_B
R6
1k
R7
1k
D1
LDR1
9203
R8
220k
GND
R10
4k7
LED
GND
100kB
DEPTH
R9
47k
pin
MOD
AQB-MOD+
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