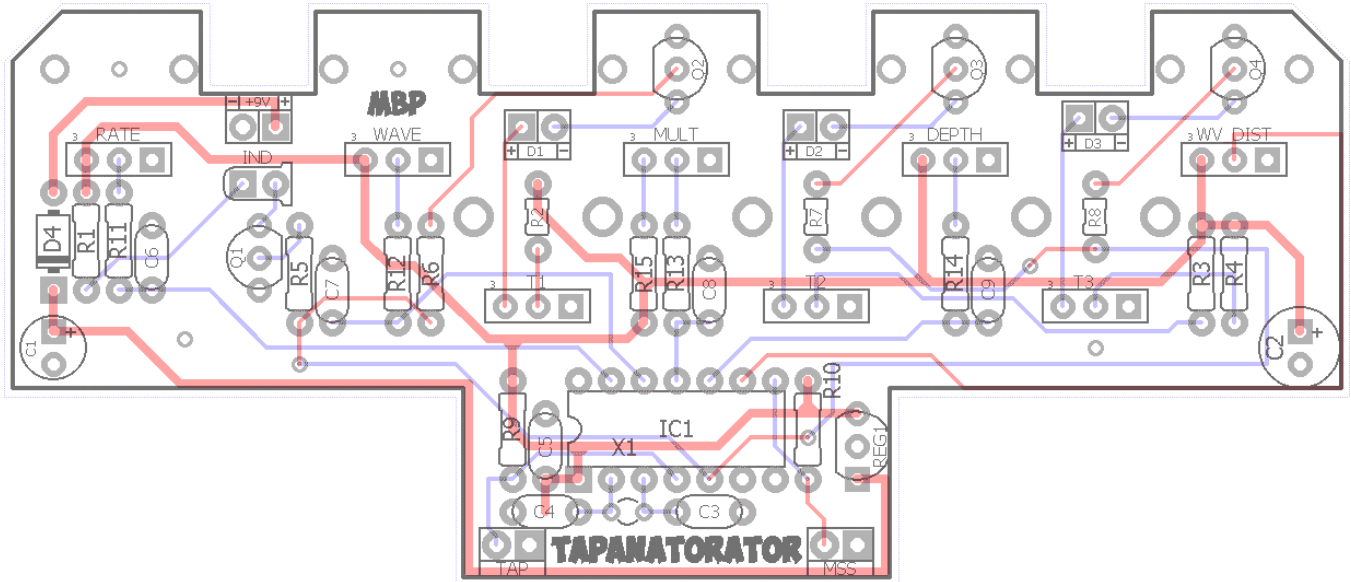
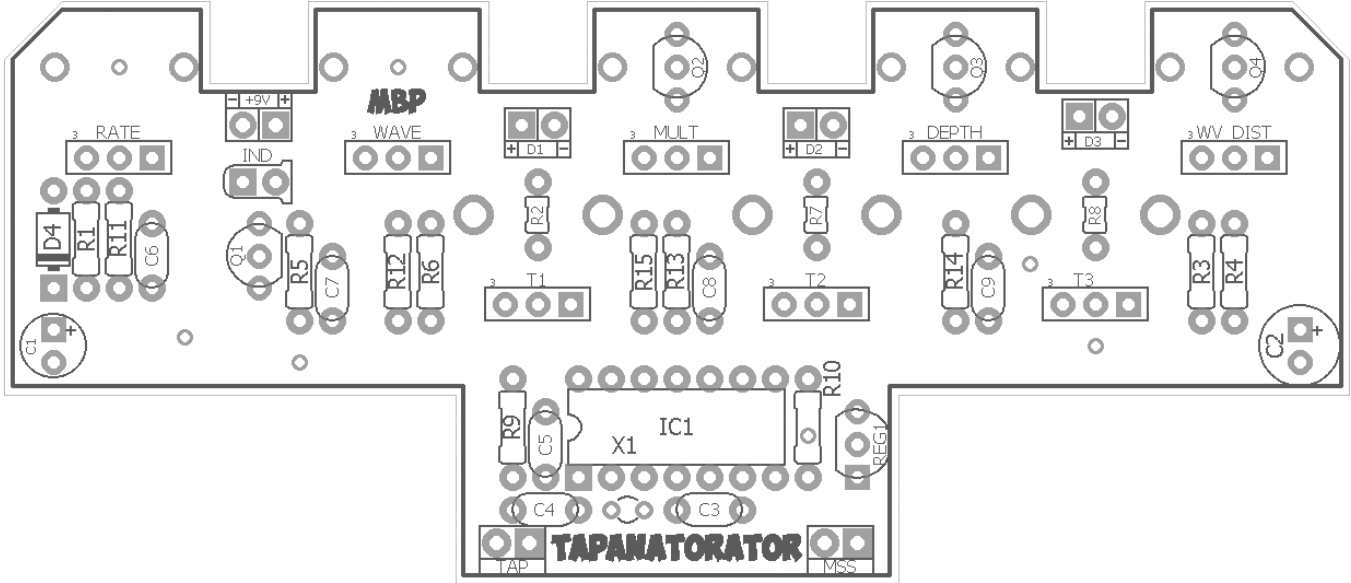


TAPANATORATOR

FX TYPE: Utility

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4.1" W x 1.775" H



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B.O.M.					
Resistors		Caps		Diodes	
R1	1k	C1	47uF	D4	1N5817
R2	330R	C2	100uF	Transistors	
R3	330R	C3	22pF	Q1 - Q4	2N3904
R4	330R	C4	22pF	Regulator	
R5	10k	C5	100n	REG1	LM78L05
R6	10k	C6	100n	Crystal	
R7	10k	C7	100n	X1	20MHz
R8	10k	C8	100n	Controller	
R9	10k	C9	100n	IC1	Tap LFO
R10	10k			Switch	
R11	1k			TAP	MOMENTARY
R12	1k			MSS	MOMENTARY
R13	1k			Pots	
R14	1k			DEPTH	10kB
R15	3k6			MULT	10kB
				WAVE	10kB
				WV_DIST	10kB
				RATE	10kB
				T1	5kB
				T2	5kB
				T3	5kB

Shopping List			
Value	QTY	Type	Rating
330R	3	Metal / Carbon Film	1/4W
1k	5	Metal / Carbon Film	1/4W
3k6	1	Metal / Carbon Film	1/4W
10k	6	Metal / Carbon Film	1/4W
22pF	2	Ceramic / MLCC	~16v
100n	5	Film	~16v
47uF	1	Electrolytic	~16v
100uF	1	Electrolytic	~16v
1N5817	1		
2N3904	4		
LM78L05	1		
20MHz	1	Crystal	
Tap LFO	1	PIC	
MOMENTARY	2	Footswitch	
10kB	5	Right Angle, Metal Shaft	9mm
5kB	3	Right Angle, Plastic Shaft	9mm

Note- You will also need 1/8" jacks and plugs or additional DC jacks for the Controller/Effect connections. Please see the build notes for more explanation.

Component Buying Guide

LM78L05: <http://smallbear-electronics.mybigcommerce.com/ic-78l05/>

20 MHz Crystal: <http://smallbear-electronics.mybigcommerce.com/crystal-20-000-mhz/>

TAPLFO2D: <http://smallbear-electronics.mybigcommerce.com/ic-taplfo-2d/>

Momentary switch: <http://smallbear-electronics.mybigcommerce.com/momentary-spst-no-soft-touch/>
Or, <http://smallbear-electronics.mybigcommerce.com/cic-blue-3pdt-momentary/>

Right Angle Pots:

<http://smallbear-electronics.mybigcommerce.com/alpha-single-gang-9mm-right-angle-pc-mount/>

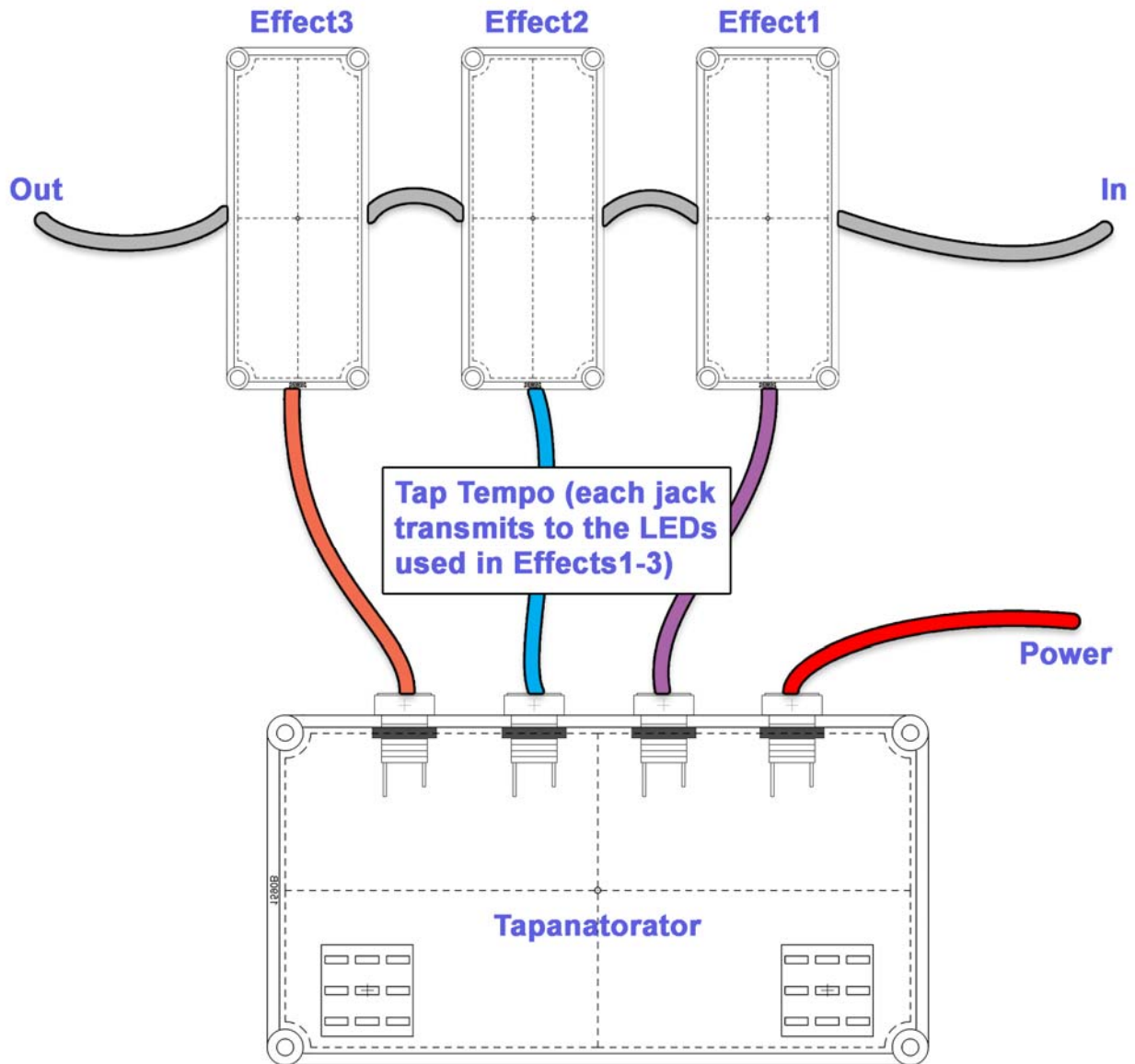
<http://smallbear-electronics.mybigcommerce.com/alpha-single-gang-9mm-right-angle-pc-mount-w-knurled-plastic-shaft/>

DC Jacks: <http://smallbear-electronics.mybigcommerce.com/dc-power-jack-all-plastic-unswitched/>

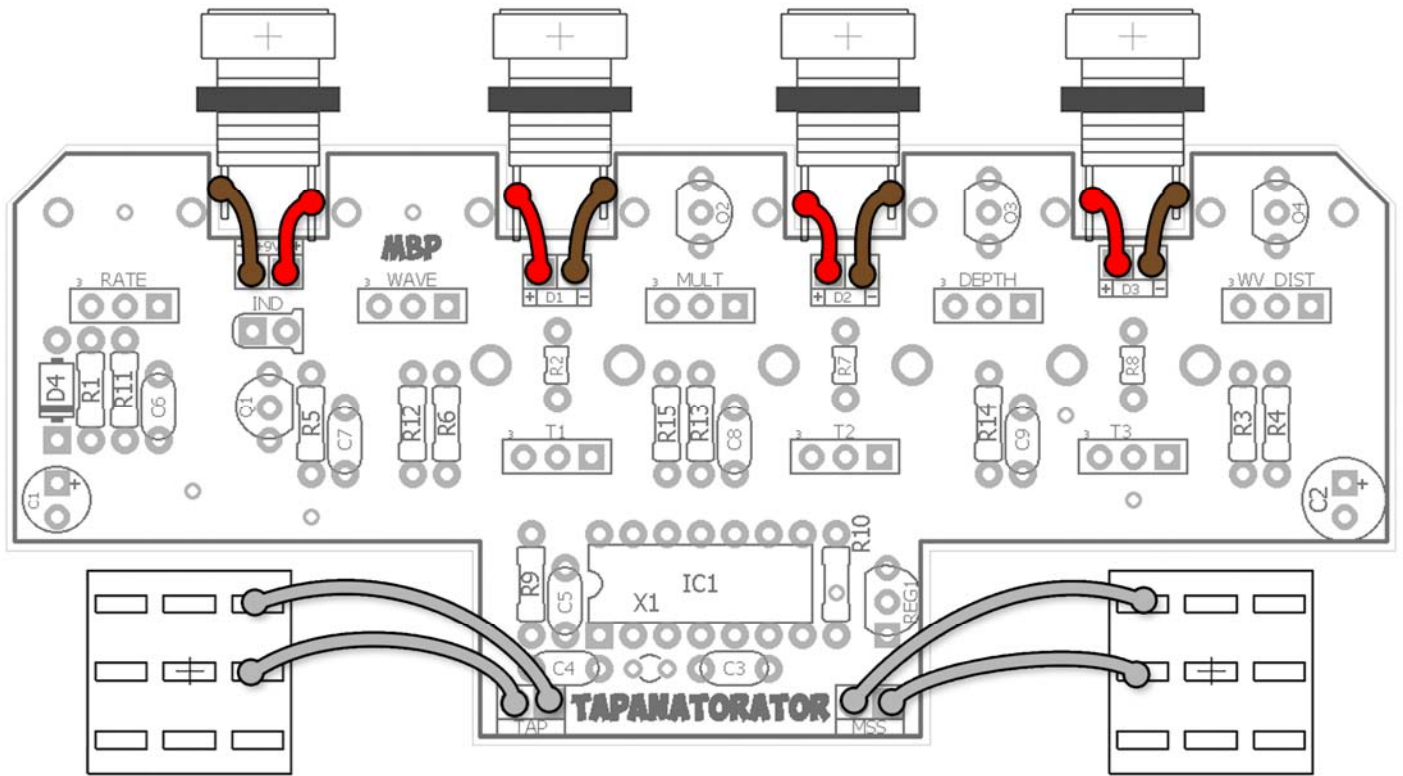
1/8" Jacks: <http://smallbear-electronics.mybigcommerce.com/1-8-mono-pc-mount/>

1/8" Plugs: <http://smallbear-electronics.mybigcommerce.com/1-8-mono-straight/>

Control Diagram

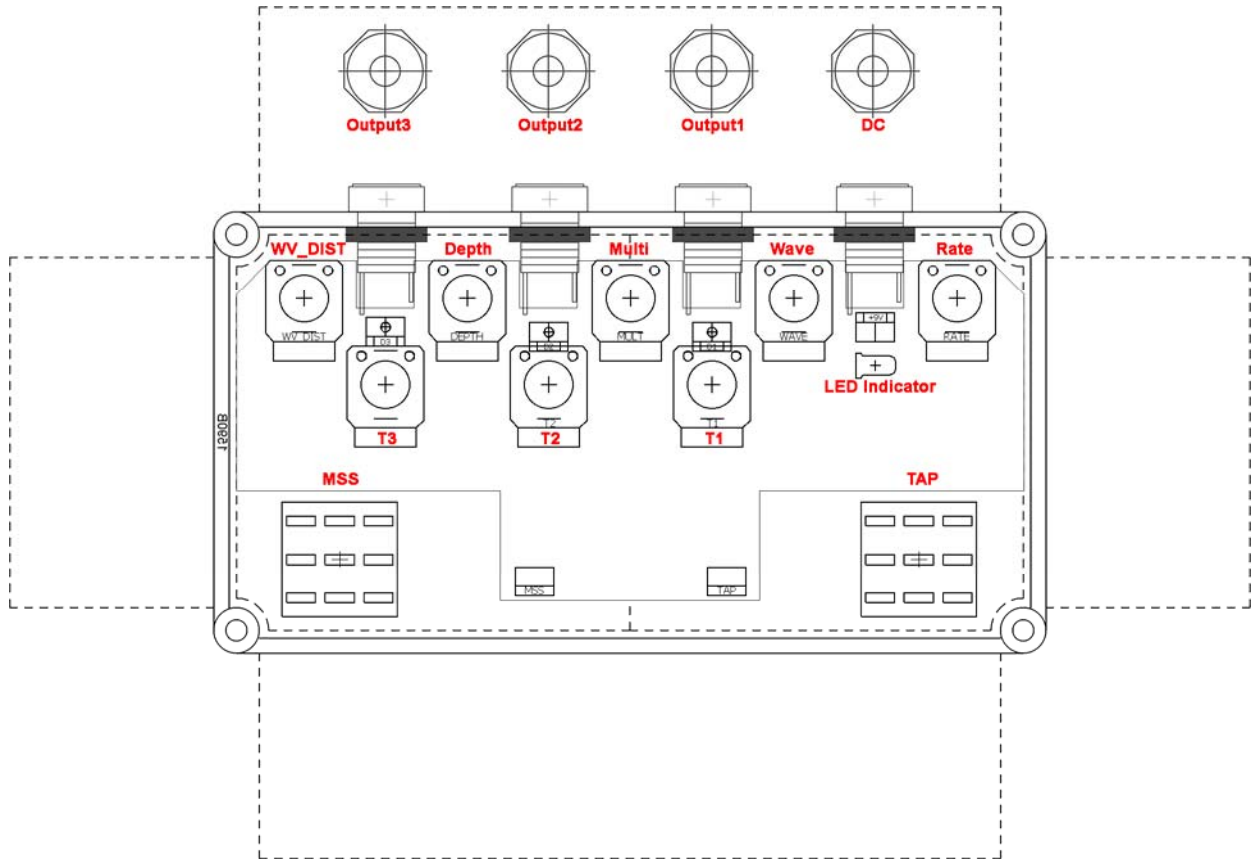


Wiring Guide



1590B Drill Guide

6.46"W x 4.43"H



The “LED Indicator” shows the LFO output from the TAPLFO and should be mounted on the enclosure (like a bypass LED).

Download the Photoshop drill template:

http://www.madbeanpedals.com/projects/Tapanatorator/Tapanator_DRILL.zip

Overview

The Tapanatorator is a stand-alone modulation controller which utilized the Electric Druid TAPLFO chip. The controller sends tap tempo sequences from one to three optically driven modulation effects simultaneously. This allows for syncing multiple effects to one tempo and wave modulation type. There are three effects projects designed specifically for the Tapanatorator (a phaser, wah and tremolo) which can be purchased separately. Details on those effects can be found in their respective build documents.

The Tapanatorator does not produce an audio effect on its own.

Controls

- **Rate:** Potentiometer speed control.
- **Wave:** This control is continuous and the degree of turn selects the wave type. The wave types are Ramp Up, Ramp Down, Pulse (square), Triangle, Sine, Sweep, Lumps and Random from left to right.
- **Multi:** Selects the multiplier for either the Rate or tapped tempo from 0.5x through 4x speed from left to right.
- **Depth:** Controls the overall peak/valley illumination level of the LEDs driven by the LFO output.
- **WV_Dist:** Sets the amount of “wave distortion” applied to the output. Nominal position is halfway for zero distortion. Turning the control left or right “swings” the output from front to back of the pulse.
- **TAP:** This footswitch allows you to tap the tempo output (same as the Rate control but tapped).
- **MSS:** This footswitch allows you to cycle through the Multi (multiplier) steps rather than using the Multi control. If you do not wish to use this foot-switch simply leave the pads unconnected.
- **T1-T3:** These pots sets the maximum brightness of the LED outputs to help you fine tune the effects they are driving. More detail on this below.

For an in-depth look at the TAPLFO PIC, please see the Electric Druid datasheet:

<http://www.electricdruid.net/datasheets/TAPLFO2Datasheet.pdf>

Depth vs. T1-T3

These controls may seem redundant but they actually do different things. The Depth control sets the amount of “peaks and valleys” in the LED brightness and works for all three outputs simultaneously. T1-T3 set the maximum brightness of the individual LEDs driven through outputs 1-3. When the Depth control is turned down, the LEDs retain most of their maximum brightness (peak) but their valleys (minimum brightness) get shallower rather than darker. T1-T3, on the other hand, set the total brightness possible on each individual output.

The Depth control is something you will likely use continuously whereas T1-T3 are more “set and forget”. For example, let’s say you have the Tapanator connected as such: T1 – Tremolo, T2 – Wah, T3 – Phaser.

T1 will tend to work best when set to the maximum. Then the Depth control will change the overall intensity of the tremolo in relation to the un-affected guitar signal (same goes for the Wah and Phaser).

T2 will also work well when set close to or near maximum. However, turning T2 down slightly will change the corner frequency of the Wah effect making it slightly darker.

T3 tends to work best set a little below full up. When it's all the way up the Phaser tends to “pop” a little at the height of its frequency sweep. So, T3 will be set just below where this happens.

T1-T3 will also come in handy if you want to try a different optical effect instead of the three projects I designed for the Tapanatorator. It will let you adjust the LED for the best result on that particular effect.

Jacks

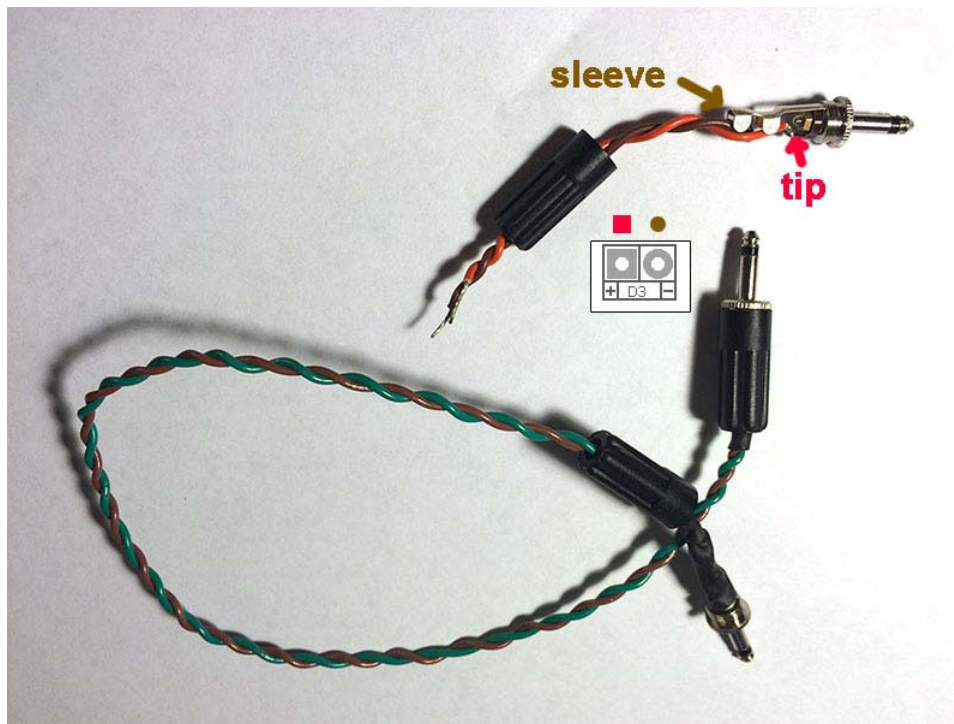
D1, D2 and D3 are the individual outputs from the Tapanatorator that connect to the driven effects. These outputs send the voltage modulation to the LEDs used in the driven optical effects. To connect each output, you will need to use a jack for each. These must be isolated from the enclosure so you will need to use plastic encased jacks, not metal ones.

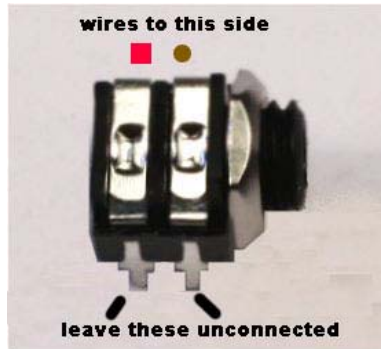
You can use either a 1/8” jack and plug (links on page 3 of this doc) or you can use DC jacks. Either method is fine but there are some caveats.

1/8” jacks – You’ll either need to find the appropriate 1/8” male two-conductor plug or make your own. Making them is very easy. The only downside is that the plugs available are a bit on the larger side. Instructions on making the plugs are shown below.

DC Jack – This is probably the easiest method. Simply use additional Lumberg style DC jacks for connecting the controller to the effects. Then you can use any extra DC connector to make the connection instead of having to make them from scratch. The caveat here is that you need to be sure to clearly label (or remember) which jacks are power and which are for the Tapanatorator otherwise you might plug them in the wrong place (although doing so temporarily is not likely to hurt anything).

Wiring 1/8” Jacks & Plugs





(jack photo from smallbear website)

Use two lengths of wire (probably best to use different colors). Wire one to the tip of a 1/8" jack and the other to the sleeve. Twisting the wires helps keep them neat and strong. Before wiring the second plug, be sure to thread the plug covers over them! Some heat shrink will help lock the wires in but is not necessary.

Make sure your wires are long enough to connect between the Tapanatorator and the effects they are driving; 1 ft. or 1.5ft. should be plenty.

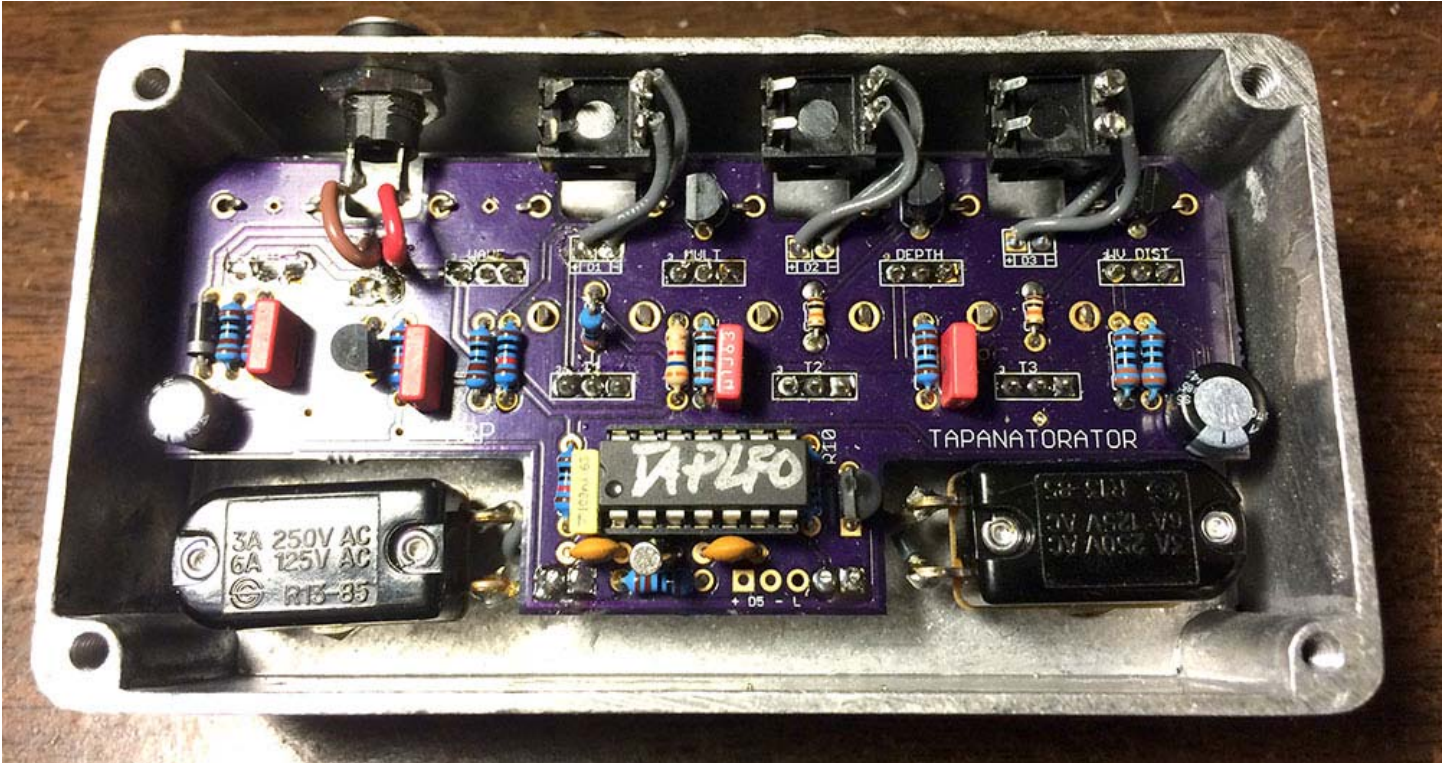
Wiring DC Jacks & Plugs

If you use DC jacks instead of 1/8" ones, simply wire the tip and sleeve as you would any other jack and use a DC plug to connect between the effects. Keep in mind that DC jacks are larger so if you are building the Wah and Trem effects into their 1590A enclosure size space will be tight.

Controlling other effects

You should be able to use the Tapanatorator to control other optical-based effects. However, the implementation of this will vary depending on the type of effect you are trying to control and how that circuit is designed. If you need help, simply start a thread in the Tech Help section of the MBP forum for assistance.

Prototype



Prototypes



Note – The prototype for the Wah effect had an additional switch for frequency selection. This was eliminated on the production model since you can get nearly the same effect by adjusting the brightness control (T3 in this pic).

