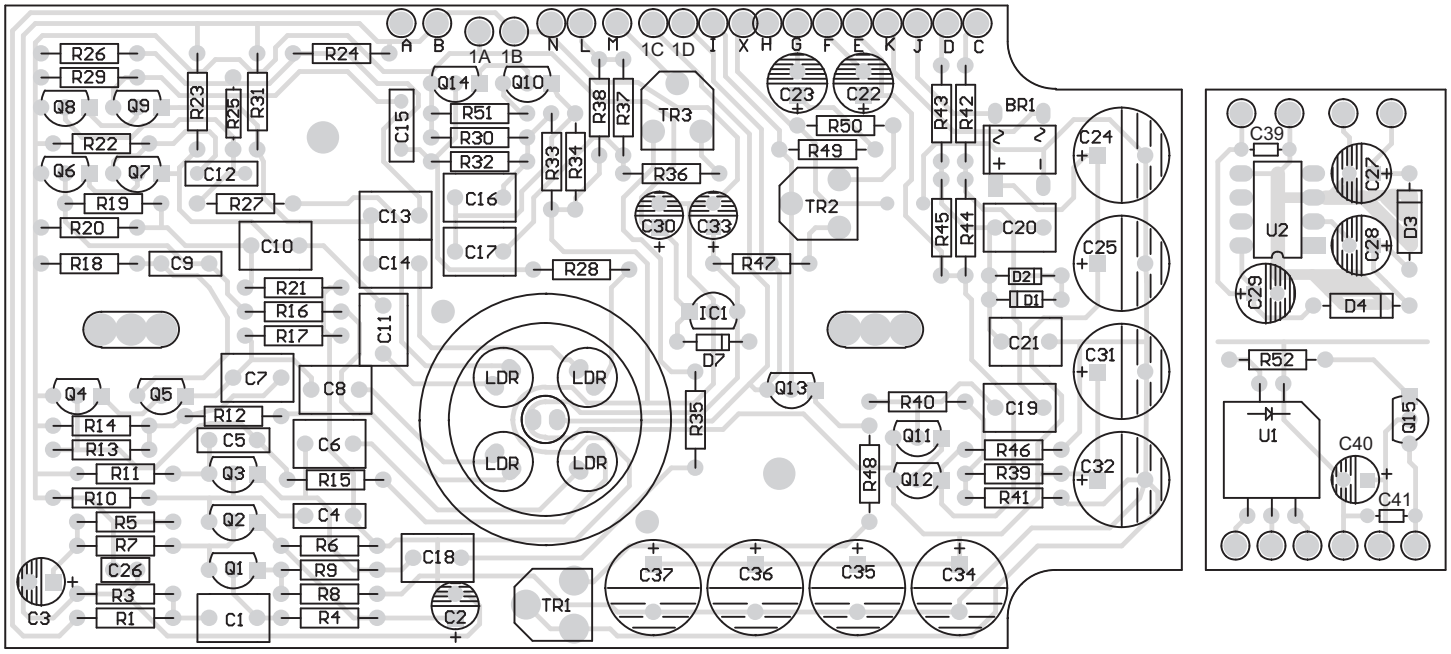
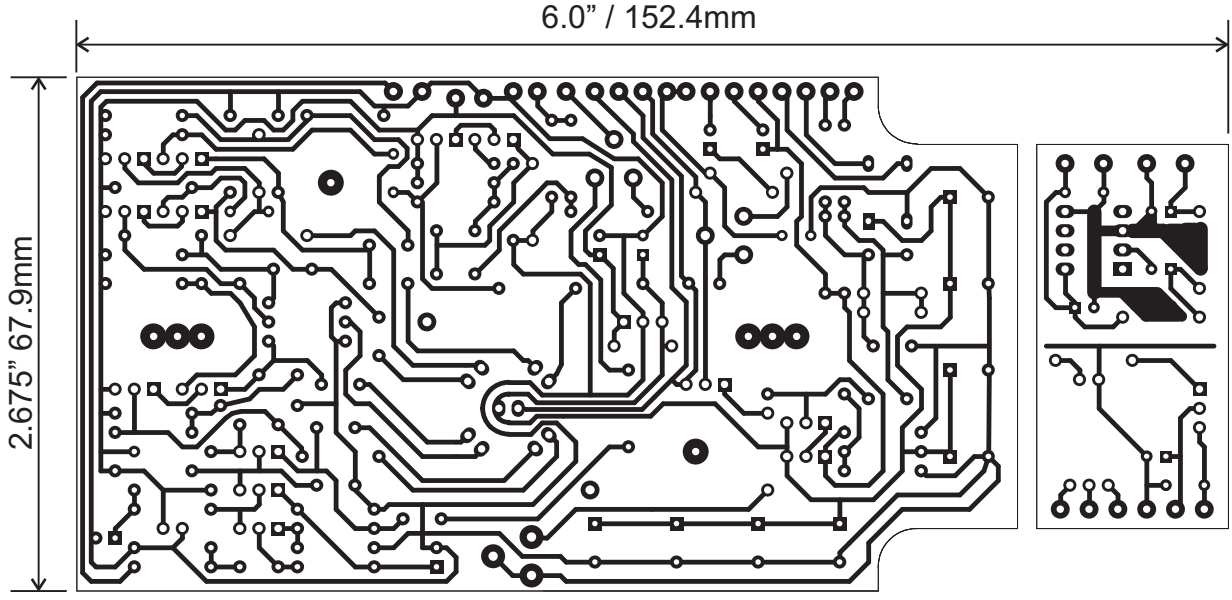
UVICS-3 - A UniVibe Circuit in a Crybaby Wah Shell



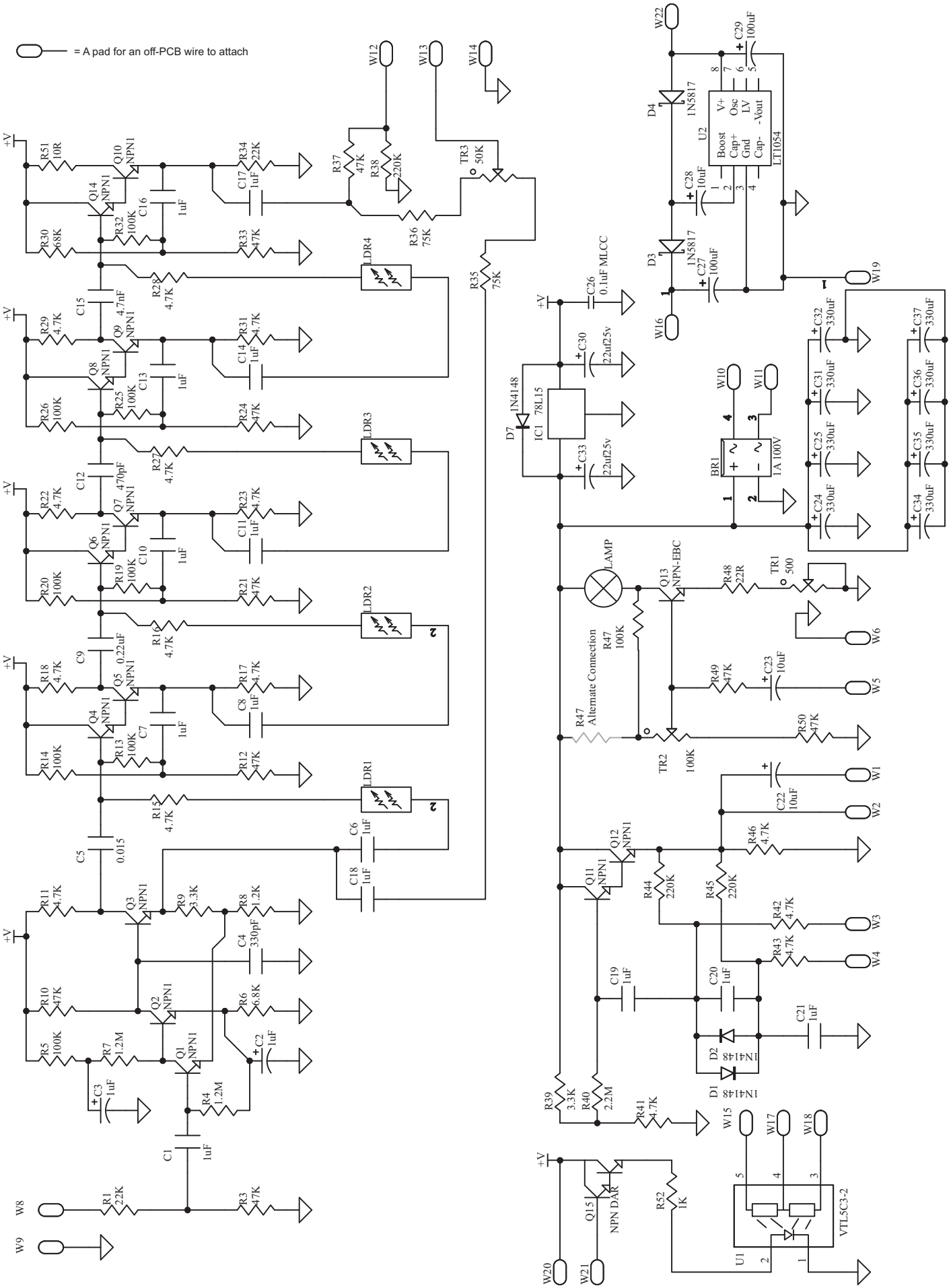
UVICS-3: A UniVibe In a Crybaby Shell is a clone of the original vintage Univibe adapted to fit the shell of many older Crybaby wah pedals. It adapts the old phase shift circuit to a new form factor which is convenient for the modern pedalboard. It also makes possible a number of modifications that improve it for modern tastes and uses. Above is the parts placement and “transparent traces” as seen from the component side of the PCB.

Below is the actual size PCB pattern, suitable for printing for direct toner transfer, along with the actual size of the board. Print this on paper and measure the size of the you get to ensure it comes out the correct size. When it’s right on paper, print on your transfer medium.

The “baby board” on the right side of the main PCB is intended to do a couple of things that the vintage circuit does not do, and to make it work inside a wah shell on a modern pedalboard more easily.



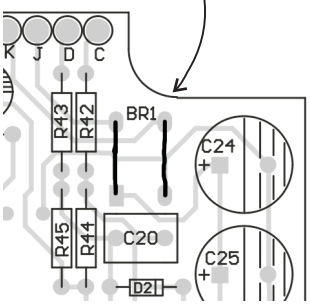
UVICS-3 Base Schematic

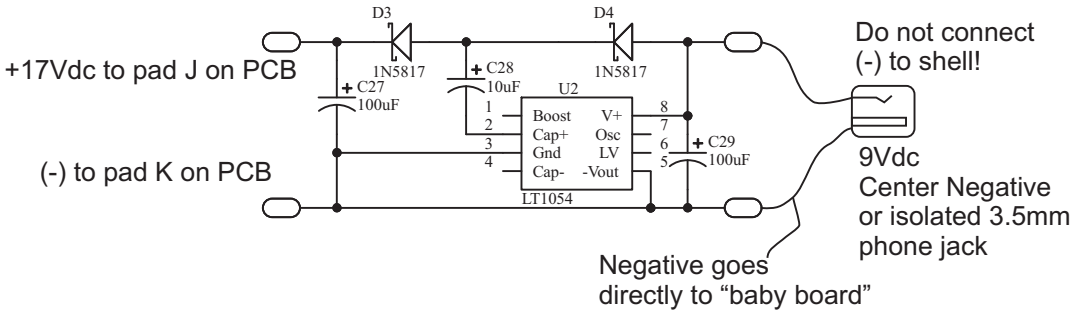


UVICS-3 Additions and Modifications Using the Baby Board

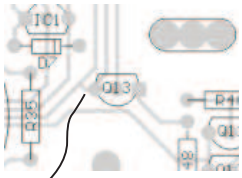
Run UVICS from +9Vdc adapter

Do not use Br1, and short across its pins like this:





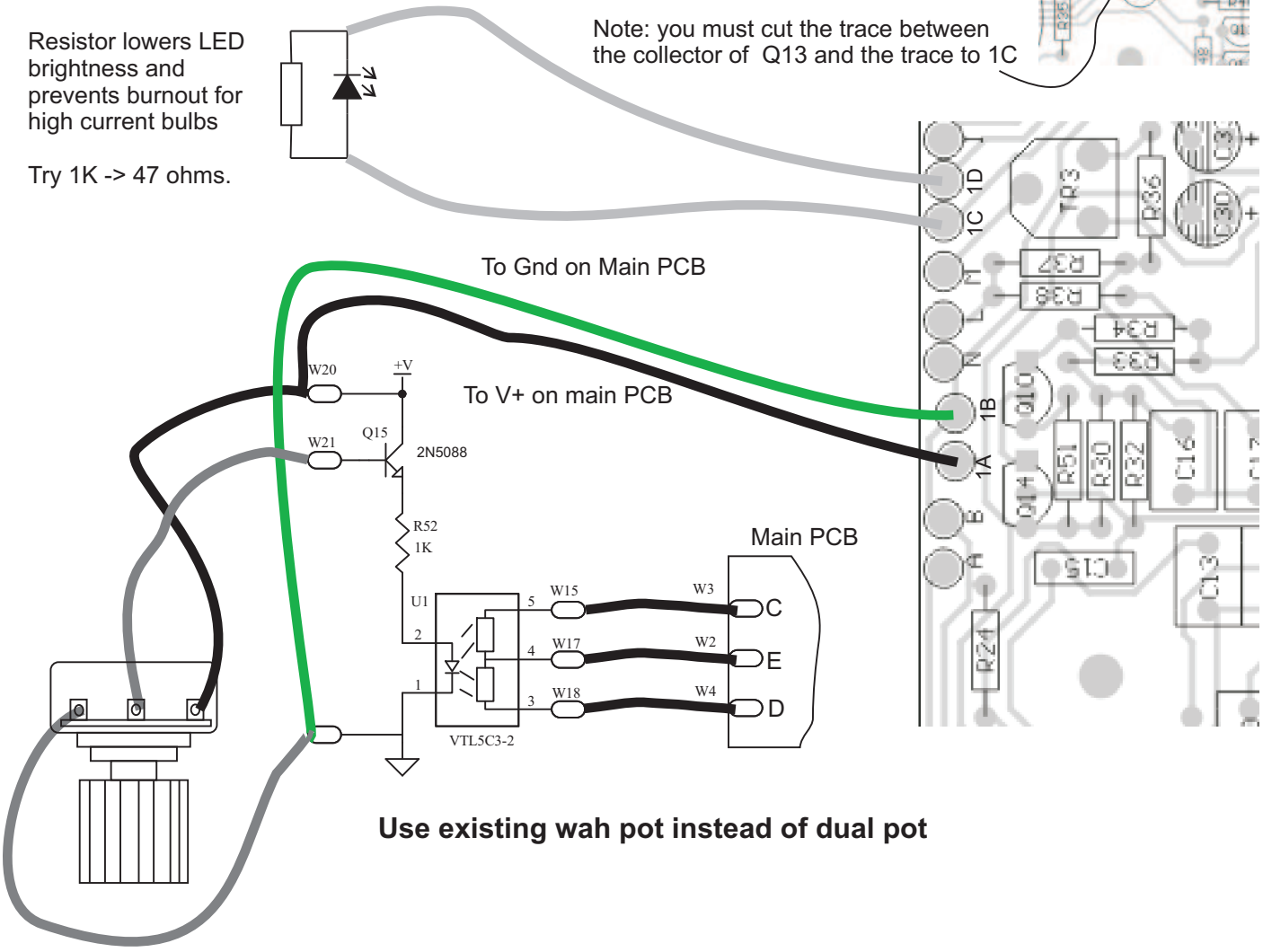
LED following LFO



Note: you must cut the trace between the collector of Q13 and the trace to 1C

Resistor lowers LED brightness and prevents burnout for high current bulbs

Try 1K -> 47 ohms.



Use existing wah pot instead of dual pot

UVICS-3 BOM

Basic Parts on main PCB

Value	Designator	Note/Description
0.1uF ceramic	C26	MLCC Epoxy dipped
330pF	C4	Ceramic type COG or NPO
470pF	C12	Ceramic type COG or NPO
4.7nF	C15	Box film
0.015uF	C5	Box film
0.22uF	C9	Box film
1uF NP	C1, 6, 7, 8, 10, 11, 13, 14, 16, 17, 18, 19, 20, 21	Box film, 1uF NP, or 1uF polar
1uF Electr	C2,3	Aluminum Electrolytic
10uF	C22,23	Aluminum Electrolytic
22uf25v	C30,33	Aluminum Electrolytic
330uF	C24,25,31,32,...	Al Electro; the size is important - get 10mm/0.4” diameter caps less than 13mm long. Wah shells vary, and caps are tall, so be prepared to tinker. See below.
10R	R51	1/4W carbon film- 0.4”lead spacing
22R	R48	1/4W carbon film- 0.4”lead spacing
1.2K	R8	1/4W carbon film- 0.4”lead spacing
3.3K	R9,39	1/4W carbon film- 0.4”lead spacing
4.7K	R11, 15, 16, 17, 18, 22, 23, 27, 28, 29, 31, 41, 42, 43, 46	1/4W carbon film- 0.4”lead spacing
6.8K	R6	1/4W carbon film- 0.4”lead spacing
22K	R1, 2, 34	1/4W carbon film- 0.4”lead spacing
47K	R3, R10, 12, 21, 24, 33, 37, 49, 50	1/4W carbon film- 0.4”lead spacing
68K	R30	1/4W carbon film- 0.4”lead spacing
75K	R35, 36	1/4W carbon film- 0.4”lead spacing
100K	R5, 13, 14, 19, 20, 25, 26, 32, 47	1/4W carbon film- 0.4”lead spacing
220K	R38, 44, 45	1/4W carbon film- 0.4”lead spacing
1.2M	R4, 7	1/4W carbon film- 0.4”lead spacing
2.2M	R40	1/4W carbon film- 0.4”lead spacing
500R	TR1	Trimpot; Bourns type 3306
100K	TR2	Trimpot; Bourns type 3306
50K	TR3	Trimpot; Bourns type 3306
DISK LDR	LDR1...LDR4	
LAMP	DS1	12V/25ma or similar
NPN	Q1-Q12, Q14	2N3906, 2N5088, etc.
NPN-Darlington	Q13,	1W TO-92 package; example: MPSW45
1A 100V	BR-1,	1A or more 100V or more diode bridge in DIP-6 package
1N4148	D1,2,7	signal diode
78L15	IC1	voltage regulator in TO-92
Dual 100K-250K rocker pot with gear		this will be one of the harder ones to find and fit, most likely
50K linear	Depth Pot	
SPDT	Chorus/Vibrato Switch	
Wah shell, with jacks and SPDT switch		

Optional parts for baby board power by 9Vdc:

LT1054	U2	charge pump converter IC
1N5817	D3,4	Schottky diode, 1A
100uF	C27	Aluminum electro
10uF	C28	Solid Tantalum capacitor: WATCH THE POLARITY CAREFULLY
10uF	C29	Solid Tantalum capacitor: WATCH THE POLARITY CAREFULLY
0.1uF MLCC	C39	MLCC ceramic capacitor

Optional parts for using the single wah pot

2N5088	Q15	NPN high gain, EBC pinout
1K	R52	current scaling resistor; adjust to fit your transistor and LED/LDR
VTLC3/2	U1	LED/LDR with center tap VTLC2/2 may work too.
1uF	C40	Aluminum electro
0.1uF MLCC	C41	MLCC ceramic capacitor

This list is for the stock parts. Mods may change or extend the list.
- For C24/25/32..36, use a total capacitance which gives you appropriately little ripple, not necessarily to fill up all the capacitor positions. Select 10mm diameter, less than 13mm high. I picked 330uF/35V in case of a high AC voltage, but if you use a power supply which produces even less maximum voltage - say, 18-22Vdc at the caps - then you can use lower voltage but higher capacitance caps of the same physical size. There are 470uF/25V caps at Mouser that fit the 10mm wide by 12mm tall spacing. Another possibility is to get 1000uF capacitors with a diameter less than 12mm, but longer. These can be laid down in the space provided for the stand-up capacitors.
- If you can't get short enough caps, the further from the heel you go the more height you have, so the positions along the bottom are some help.
- If you an AC-output power adapter, you will need a lot of capacitance; 2000uF should be enough, and that's six 330uF caps. For an AC supply, be sure the incoming AC on the power jack does NOT contact the grounded shell.
- If you have a DC output supply that's not filtered, you still need a lot of capacitance. In this case, use lots of capacitors and put two jumpers between the pads for the bridge rectifier to let the DC directly through to the capacitors. A bridge rectifier just gets in your way if you have DC coming in already.
- If the DC supply is rectified and filtered, but not regulated, you may need less total amount of capacitance. If the supply is DC, filtered, and regulated, you'll only need one or two caps. Same comment about bridges.
- The signal capacitors are almost all laid out for 0.2" lead spacing 50V box style film caps. You can adapt other caps, but watch the sizes. The 0.22uF phase cap *is* available as a box cap less than 11mm tall. I have several hundred for other reasons.

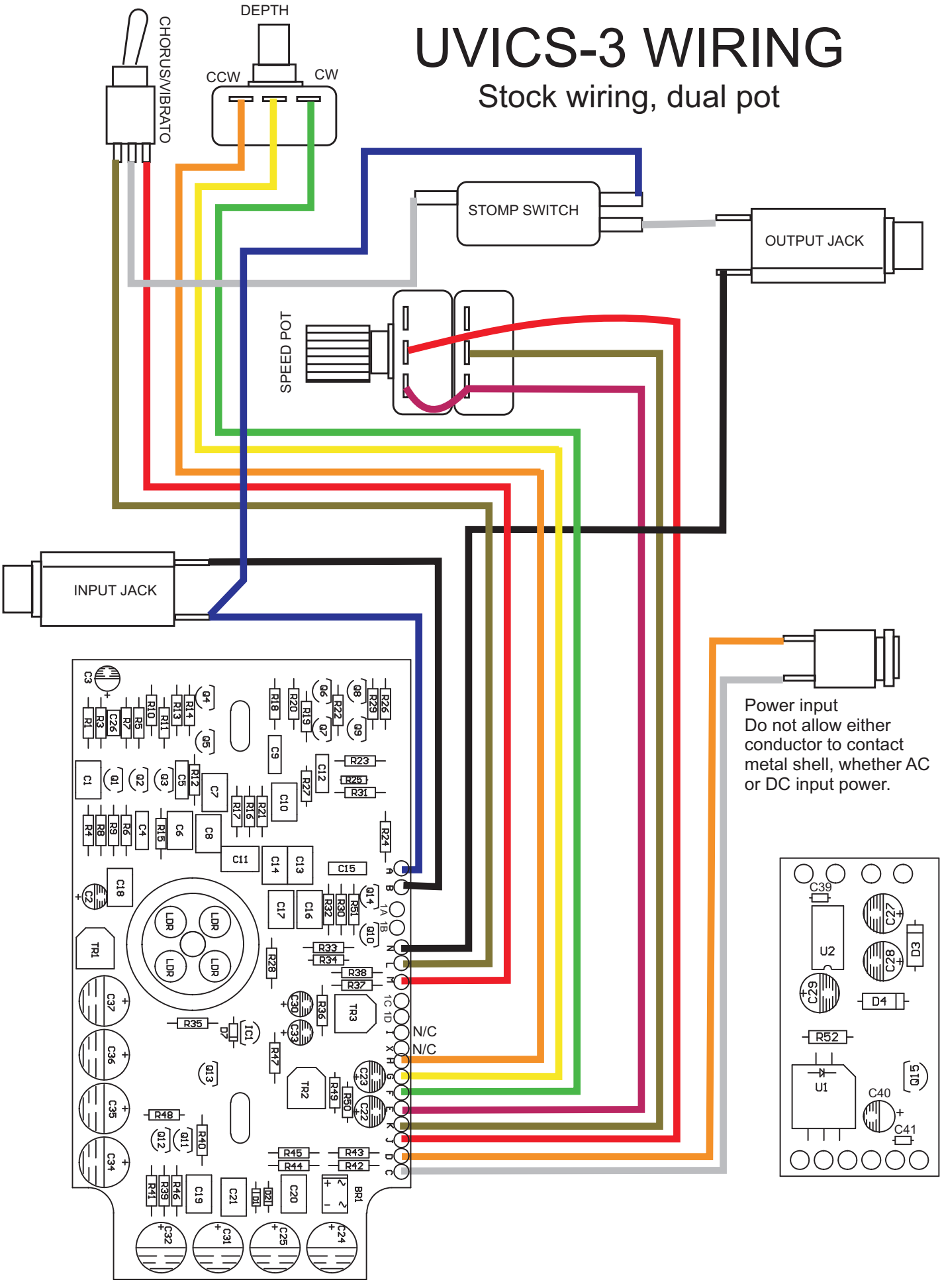
The board itself lets you have a number of options.
- You can raise the input resistance to over 1M by changing the values of the first two resistors.
- There are the stock two inputs from the original univibe; you won't need both for use in a crybaby shell, so leave off the input resistor for either A or A1 inputs.
- Likewise, you probably won't need the "cancel" function, but the pads are there to do it if you want.
- You can go to darlingtons by shorting the base pad to emitter pads on the phase array transistors and the Q11/Q12 positions in the LFO.
- You can hack on a "stereo" output if you like because I put in the collector resistor position and second transistor position for the fourth phase stage position. You'll have to make a separate baby board to put on the stereo mixing, and I didn't think many people would do it, so I didn't put it on the PCB where it would have had to go.
- The 1uF film capacitors I used so profusely don't have to be film. They were polarized electros in the original. You can use polarized electros, or you can use NP electros, or you can use film. The board lets you put them in.

A DIY project is a bundle of raw potential, a chance to create something new.

Some tips on fitting the PCB into the shell:
- The mounting holes need to be about 0.137"
- The reference locations are the two single mounting pads which fit over the raised bosses in the shell. The other two three-in-a-row locations are for drilling three holes then cutting/filing the holes together into a slot to fit over the threaded ends of the tension adjuster screws. I put the center hole over the locations of my adjuster screws, but I understand that shells vary in the adjuster locations, so I put extra space there to make a slot for it to fit more shells.
- The tightest height restraint is at the heel end where the power filter caps are. The caps can't be any taller than about 13mm or they'll hit the cover. To avoid this, you want capacitors which are 10mm/0.4" diameter, with 5mm/0.2" lead spacing, and less than 13mm high. Mouser's part selection app lets you pick by size among other things, which is very handy. I did the search for parts before I did the layout, and they stock several 330uF/35V capacitors with a diameter of 10mm and height of 12mm. That was the reference cap I used.
- The light shield may need some ingenuity. Of course, anything that keeps light off it while it operates will work. In fact, just the shell itself, no light shield, will probably work fine in actual use. But for debugging with it open, you may need something; and an internally reflective shield does the best job of "mixing"the light so the LDRs are illuminated evenly. You can even tape down the aluminized baggie from potato chips over them. It does not need to be perfectly shaped and sized, just there. Aluminized cardboard works, as does thin metal folded into a box, whatever fits. My recent tinkering turned up PVC pipe. The nominal 3/4" pipe can be sliced into a short ring of less than 16-17mm height (that's about what you have at the heel end of the light shield) and glued onto the PCB. Then you can tape/glue/tie a reflective top onto it. Finding stuff that happens to work is one of the joys of DIY,. The world is practically **full** of things that happen to be shaped right for a purpose that wasn't what they were intended for. I give myelf extra points when I spot something that can be used for something the original designer never thought of when they made it.

UVICS-3 WIRING

Stock wiring, dual pot



UVICS-3 WIRING

Use of Baby Board