FREEKOUT

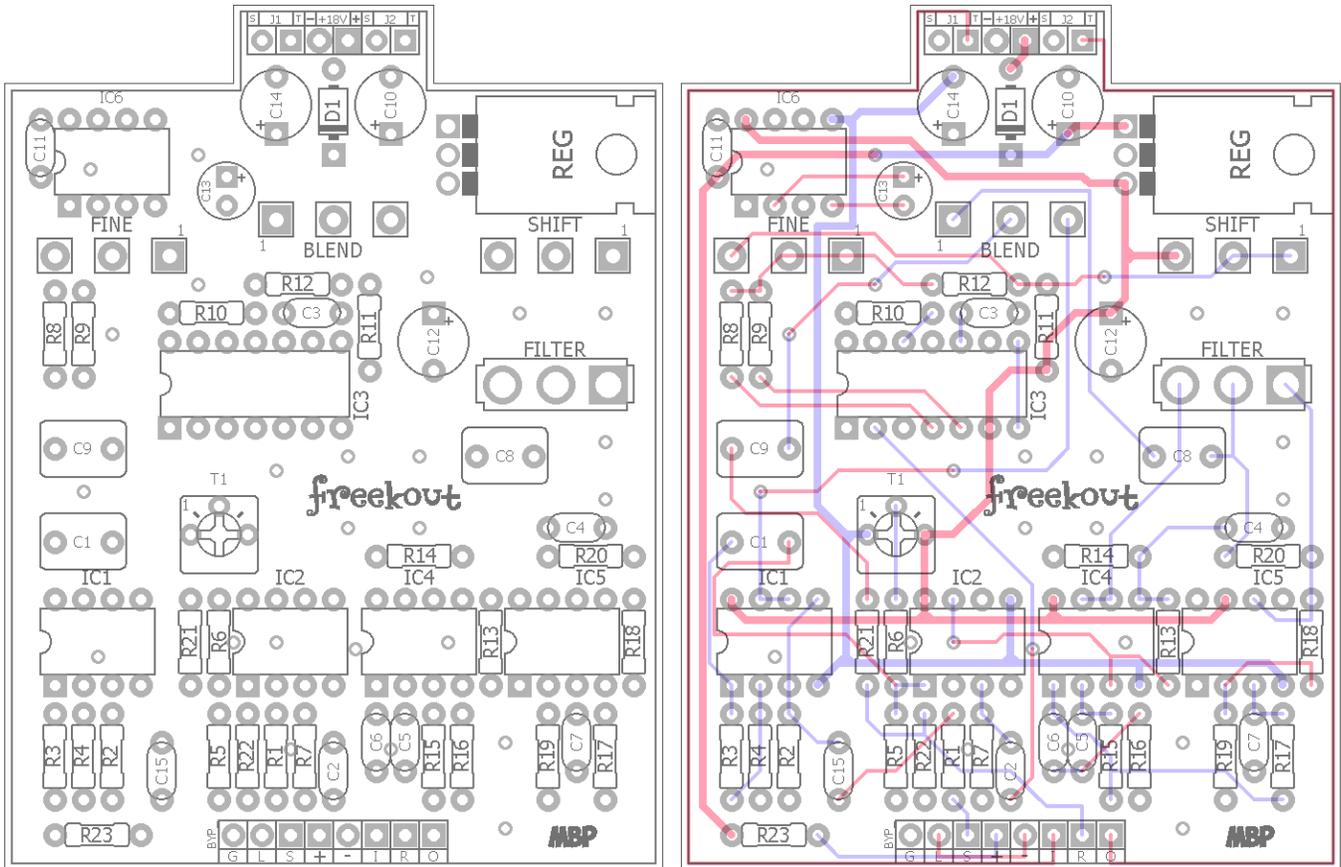**FX TYPE: Ring Modulator**
Based on the EHX® Frequency Analyzer™
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2.3" W x 3.025" H

**This project requires an 18v 200mA (or more) center tip negative power supply. I recommend the Dunlop 18v wall-wart.**

B.O.M.

Resistors		Caps		Diodes	
R1	1k	C1	1uF	D1	1N5817
R2	120k	C2	150n	**IC**	
R3	68k	C3	47n	IC1	4558
R4	3k6	C4	10n	IC2	AD633
R5	10k	C5	100n	IC3	ICL8038
R6	2M2	C6	100n	IC4	4558
R7	100k	C7	100n	IC5	741
R8	680R	C8	1uF	IC6	LT1054
R9	680R	C9	1uF	**Regulator**	
R10	82k	C10	220uF	REG	LM7815
R11	200k	C11	100n	**Switch**	
R12	5k1	C12	220uF	FILTER	On/On
R13	12k	C13	47uF	**Trimmer**	
R14	15k	C14	220uF	T1	1M
R15	33k	C15	220n	**Pots**	
R16	4k7			SHIFT	250kC
R17	36k			BLEND	25kB
R18	2k4			FINE	5kB
R19	10k				
R20	22k				
R21	150R				
R22	220k				
R23	10k				

The ICL8038 is no longer in production so you will need to find a source for it. I've had good luck on eBay at reasonable prices. It appears Mouser carries some AD633, but I have also had good luck with less expensive eBay chips for this.

If you cannot get a 250kC pot, use 100kC and omit R11 on your build. This will give you most of the same Shift range.

| Shopping List			
Value	**QTY**	**Type**	**Rating**
150R	1	Metal / Carbon Film	1/4W
680R	2	Metal / Carbon Film	1/4W
1k	1	Metal / Carbon Film	1/4W
2k4	1	Metal / Carbon Film	1/4W
3k6	1	Metal / Carbon Film	1/4W
4k7	1	Metal / Carbon Film	1/4W
5k1	1	Metal / Carbon Film	1/4W
10k	3	Metal / Carbon Film	1/4W
12k	1	Metal / Carbon Film	1/4W
15k	1	Metal / Carbon Film	1/4W
22k	1	Metal / Carbon Film	1/4W
33k	1	Metal / Carbon Film	1/4W
36k	1	Metal / Carbon Film	1/4W
68k	1	Metal / Carbon Film	1/4W
82k	1	Metal / Carbon Film	1/4W
100k	1	Metal / Carbon Film	1/4W
120k	1	Metal / Carbon Film	1/4W
220k	2	Metal / Carbon Film	1/4W
2M2	1	Metal / Carbon Film	1/4W
10n	1	Film	25v min.
47n	1	Film	25v min.
100n	4	Film	25v min.
150n	1	Film	25v min.
220n	1	Film	25v min.
1uF	3	Film	25v min.
47uF	1	Electrolytic	25v min.
220uF	3	Electrolytic	25v min.
1N5817	1		
4558	2		
AD633	1		
ICL8038	1		
741	1		
LT1054	1		
LM7815	1	T0-220 style	
On/On	1	Solder Lug	
1M	1	Bourns 3362p	
250kC	1	PCB Right Angle	16mm
25kB	1	PCB Right Angle	16mm
5kB	1	PCB Right Angle	16mm
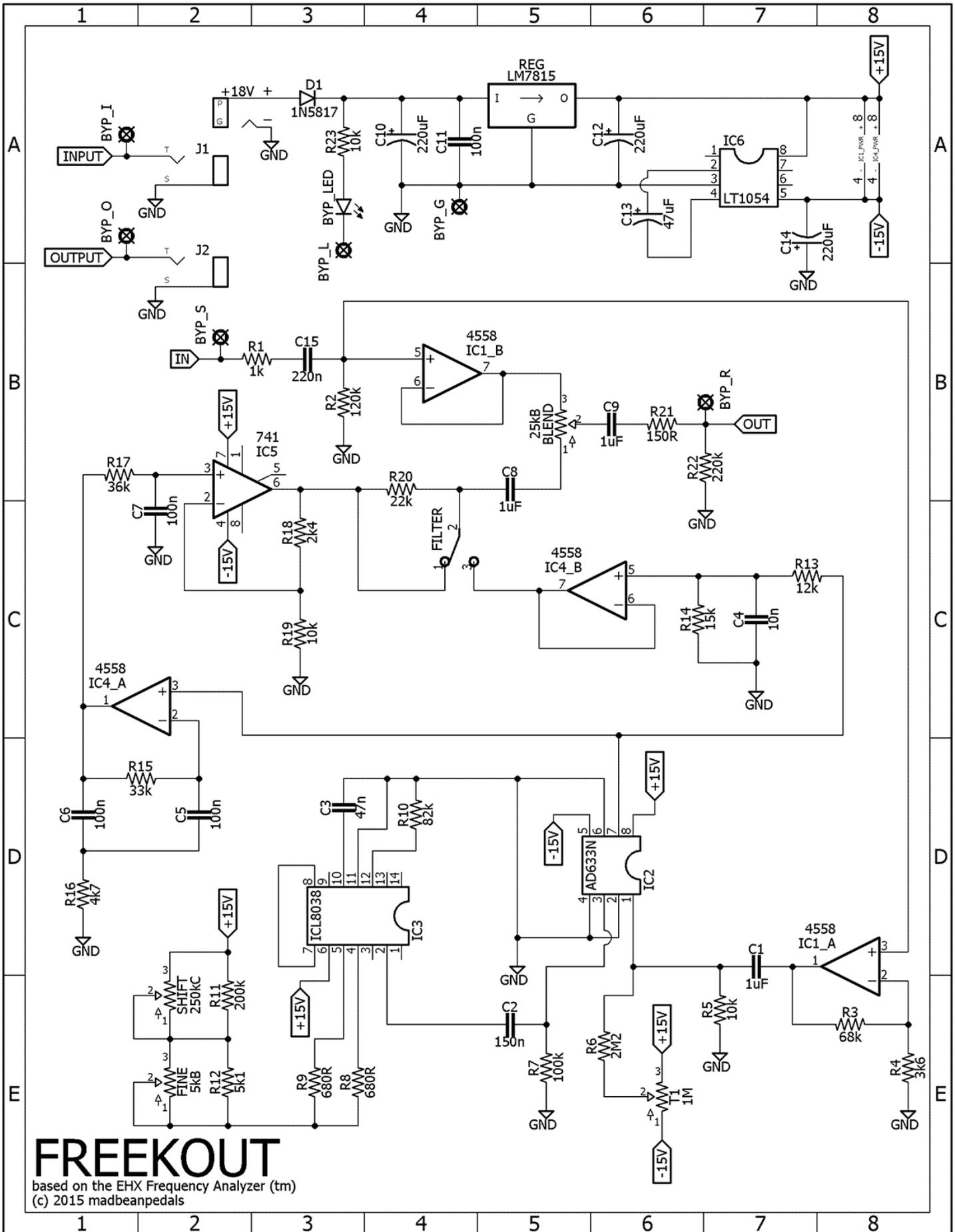
FREEKOUT
based on the EHX Frequency Analyzer (tm)
(c) 2015 madbeanpedals
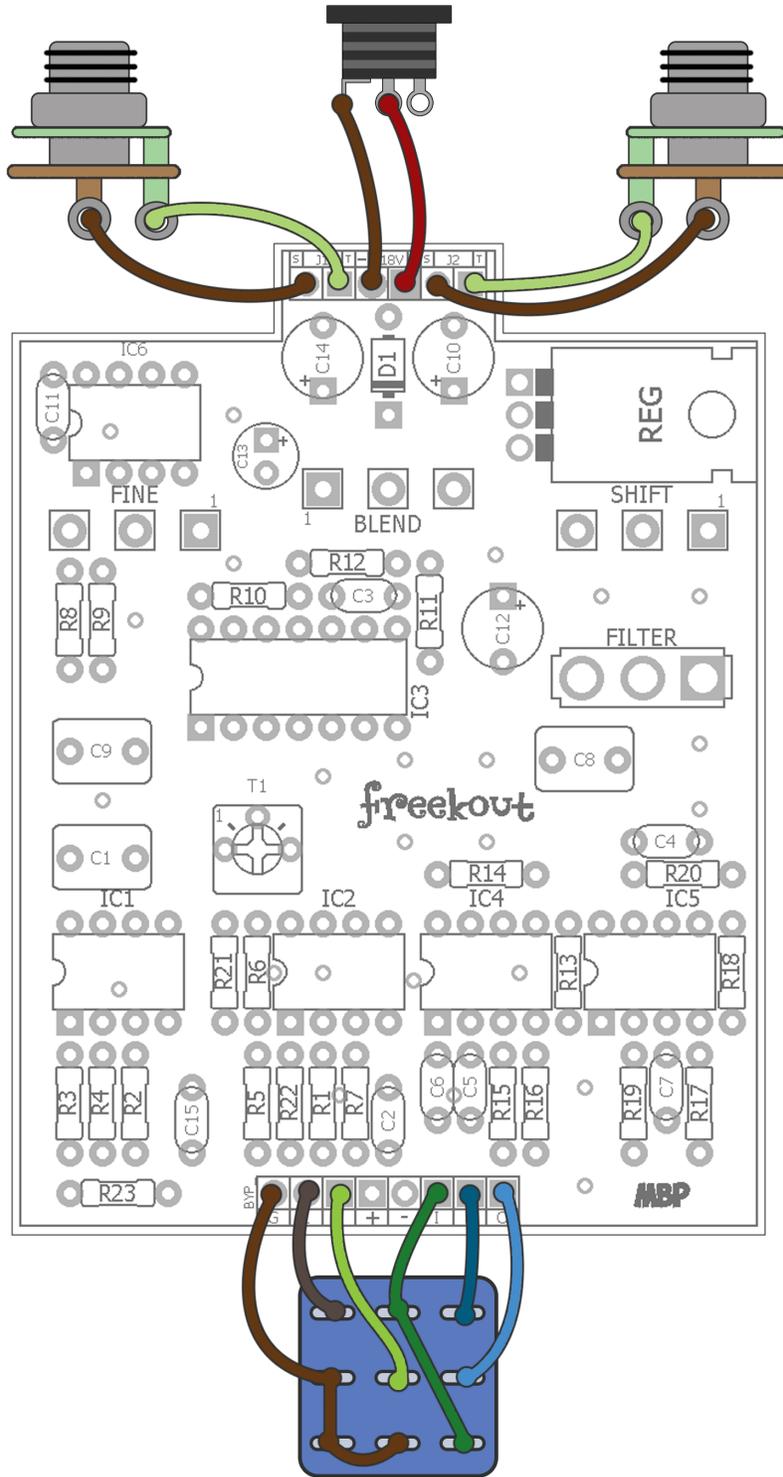
125B Drill Guide

5.5" W 7.6" H
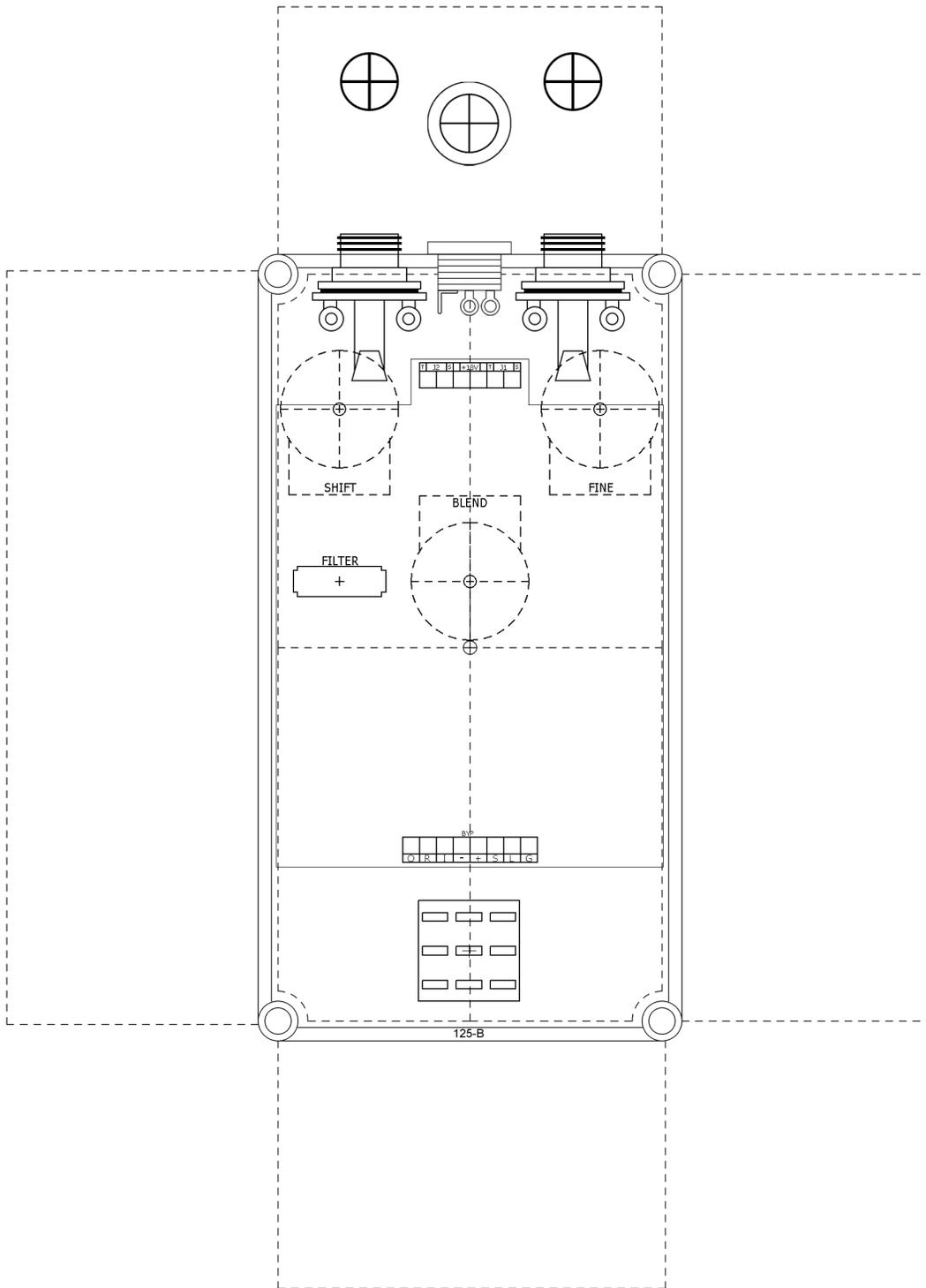
This template is approximate. Be sure to measure carefully before drilling.

Download this Photoshop template here:
www.madbeanpedals.com/projects/Freekout/Freekout_DRILL.zip

The indicator LED can be mounted directly to the PCB (+ and – pads on the bottom row).

The **Freekout** is a (near) clone of the EHX® Frequency Analyzer™, an excellent sounding ring modulator. With its easy control layout and relatively small part count you can achieve very musical or very jarring ring modulation. The modulation can be dialed to support or oppose fundamentals which will either harmonically enhance notes or create eerie dissonance. To get a better idea of what this means, check out some YouTube videos of the Frequency Analyzer.

Since I cannot describe it better than EHX, here is the [ad copy for the F.A.](#) from their website: "Adds moving harmonies to the note or chords being played. Unlike other Ring Modulators, the Frequency Analyzer has controllable high order filters that reduce cross distortions and enhance the variations. The course and fine control let the user set a single frequency that will then be both added and subtracted from the original note or chord. Blend control lets you mix the new notes with the original. This is a must have pedal, especially for techno cats. Devo had their biggest hit using the Frequency Analyzer."

The Freekout only differs from the stock circuit in minor ways. The Frequency Analyzer used a 40v DC power supply to create a bipolar 15v supply. The Freekout instead uses a more conventional 18v supply, regulator and charge pump to supply the +/-15v rails required. This is much more palatable to DIY builders. Testing confirms that this method works well enough to supply the necessary voltage needed to operate. The second change employs some 1uF film caps instead of electrolytic used in the original design...something we all like in our audio circuits.

Controls

Shift: Sets the central resonant frequency of the ring modulation. Can be used in consonance or dissonance with a particular note.
Fine: Allows micro-tonal adjustments to the Shift setting.
Blend: Blends between dry and effected signals.
Filter: A darker and heavily filtered setting to emphasize the lower registry modulation.
T1: This adjusts the input offset of the AD633.

Notes

This should be a pretty simple build for most people. I do recommend testing your voltages before loading any ICs onto the PCB. You need to confirm that you are getting +/-15 from the charge pump before audio testing. After you have confirmed voltages and loaded the ICs, use an audio probe on pin1 of the AD633 to set T1. All you need to do here is set the timmer for the least amount of noise, and that should be pretty close to the middle position. You're done!

Voltages: Dunlop 18vDC 200mA supply					
IC1	**4558**	**IC2**	**AD633**	**IC3**	**ICL8038**
1	102mV	1	-9.8mV	1	8.69v
2	6.5mV	2	1.4mV	2	7.36v
3	6.3mV	3	-30mV	3	7.5v
4	-14.29v	4	1.4mV	4	11.61v
5	6.2mV	5	-14.29v	5	11.61v
6	6.4mV	6	1.3mV	6	14.7v
7	6.4mV	7	0v	7	11.57v
8	14.69v	8	14.89v	8	11.57v
				9	135mV
IC4	**4558**	**IC5**	**LM741**	10	7.55v
1	0v	1	-14.28v	11	1.9mV
2	0.6mV	2	-4mV	12	5.55v
3	0v	3	-4.9mV	13	ignore
4	-14.3v	4	-14.29v	14	297mV
5	0.5mV	5	-14.28v		
6	0.8mV	6	-4.4mV		
7	0.8mV	7	14.69v		
8	14.69v	8	ignore		

IC6	**LT1054**	**REG**	**LM7815**
1	1.51v	IN	17.82v
2	8.65v	GND	1.3mV
3	1.6mV	OUT	14.7v
4	-6.55v		
5	-14.3v		
6	2.54v		
7	1.35v		
8	14.69v		

Trimpot set at about 12 o'clock.