SALAD DAYS RING MODULATOR

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The Salad Days ring modulator is a great sounding ring modulator that has a very bell-like timbre. It modulates both the phase and the amplitude of the signal split in two signal paths to produce a more pronounced effect compared to a regular passive ring modulator. It also has a choppy tremolo mode.

To get the most bell'ish sound from this circuit, turn the blend fully clockwise and turn up the gain a bit. When using the tremolo mode, try adjusting the blend for different waveshapes.

Have fun building and playing the Salad Days ring modulator!

Prototype build

Named after the song by Minor Threat

Power

Input voltage - 9V DC Current draw - 11mA

Controls

Potentiometers

- Level overall volume
- Drive/Gain the input gain of the ring modulated signal path
- Blend blends between the clean signal and the modulated signal
- Carrier threshold controls the threshold level of the input signal that gate the carrier signal. Useful to gate out the carrier signal if needed. It can also be used to turn the carrier off (when turned fully clockwise) so that the pedal can be used as a distortion pedal (with the blend turn clockwise aswell).
- Frequency tunes the carrier frequency
- Gate Hold (trimpot) Sets how long the oscillator stays on when the input signal drops below the threshold

Switch

 Mode (FM/AM) – FM (frequency modulation) is normal ring modulation mode, and AM (amplitude modulation) is the choppy tremolo mode.

The populated PCB

Here's a 3D render approximation of what the fully populated board should look like (except that the IC's should be in sockets).



The PCB measures 86mm wide x 66mm tall

General building tips

• Just follow the Bill of Materials and solder the low profile components first.

Recommended order: resistors and diodes, chip sockets, resistor ladders, trim pot, multilayer and ceramic capacitors, film box capacitors, electrolytic capacitors, pots and switches, offboard wiring (jacks and the 3PDT switch). Bend the legs of the components alittle bit to prevent them from falling out, or use tape to hold them in place while soldering.

- Pay special attention to the orientation of the LED's, diodes and the electrolytic capacitors.
- Always use sockets for IC chips to avoid heating them directly. It also makes it much easier to swap them out if needed.
- CMOS chips are very sensitive to static charges and can be easily damaged. It's a good idea to wear a anti-static wristband. Or at least don't wear a woolen jumper and pat your dog while building, and keep the circuit away from rugs... Put the chips in last, after everything else is soldered in place.
- Break off the small tap on the potentiometers, so they can sit flush against the top cover.
- Make sure that the backside of your pots are covered so they don't short anything on the PCB. If you not have pot covers I recommend pvc electrical tape.
- When it's time to solder the potentiometers, switches and buttons I recommend having the enclosure/lid prepared to make sure that they line up with the holes.

Before putting the PCB inside the enclosure I recommend that you solder only the middle pin of each potentiometer to the PCB (so that the placement matches the silkscreen on the PCB and the pot stays in place when you turn the PCB around but still has some wiggle room).

Then screw in the toggle switch in the enclosure. Put the LED's in the PCB and then put the PCB with the pots into the enclosure so that everything fits. Solder the rest of the pot pins, LED legs and the switches from the component side of the PCB.

Resistors				IC's		
R1	1M	R27	100K	U1	TL074	
R2	1M	R28	4.7K	U2	LM324	
R3	1K	R29	4.7K *	U3	CD4060	
R4	1K	R30	4.7K *	U4	J4 CD4013	
R5	10K					
R6	10K	Capacitors		Potentiometers		
R7	10K	C1	47nF	LEVEL		A100K
R8	10K	C2	100nF	GAIN/D	RIVE	A100K
R9	10K	C3	100nF	THRESHOLD		B10K
R10	10K	C4	100nF	BLEND		B25K
R11	10K	C5	100nF	FREQUENCY		B500K
R12	10K	C6	10nF			
R13	10K	C7	1nF	GATE HO	LD (trim)	100K
R14	10K	C8	1uF			
R15	10K	C9	100pF	Switches		
R16	100R	C10	22pF	MODE	SPDT or	n/on
R17	47K	C11	10uF			
R18	47K	C12	47uF			
R19	47K	C13	100uF			
R20	100K	C14 **	100nF			
R21	100K	C15 **	100nF			
R22	100K	Diodes				
R23	100K	D1	1N4148			
R24	470K	D2	1N4148			
R25	100K	D3	1N4148			
R26	100K	D4	1N4001			

Salad Days BOM (Bill of Materials)

BOM Notes

- * = current limiting resistors for LED's (threshold and bypass). These are driven from 5 volts. 4.7K resistors are good with diffused LED's, but for clear superbright LED's (especially blue) you might want to increase the value to 10K-22K.
- ** = should be a multilayer ceramic capacitor (yellow capacitors)
- Things that are not included in the BOM list: enclosure, input and output jacks, DC jack, 3PDT stomp switch, led bezel and knobs.

Drill Template (1590BB)



- Use at your own risk! This template is approximate.
- Make sure your printer isn't doing any scaling (100% print size).
- Jacks are measured from the edge at the front/top of the enclosure (as they were drilled on the prototype), but you can drill the positions for the footswitch, DC jack and input/output jacks to your own preference.
- Typical drill sizes are:
 - switches / LED bezel (for a 3mm LED) 6mm
 - potentiometers 7mm
 - DC jack / 3PDT footswitch 12mm (8mm for lumberg style DC jacks)
 - input/output jacks (Neutrik style) 9,5mm (9mm for Lumberg style jacks)

Measure and confirm before drilling!



The top row of connections on the 3DPT daughterboard connects directly across to the main PCB as shown.

Input jack sleeve \rightarrow "S" IN pad the lug that connects with the inner ring of the jack Input jack tip \rightarrow "T" IN pad the lug that connects to the tip bracket on the jack

Output jack sleeve \rightarrow "S" OUT pad the lug that connects to the inner ring of the jack Output jack tip \rightarrow "T" OUT pad the lug that connects to the tip bracket on the jack

DC jack negative \rightarrow "-" DC pad the widest lug, or the short lug (Lumberg style jack) DC jack positive \rightarrow "+" DC pad the outer lug if it's a 3 pin DC connector, or the long lug if using a Lumberg style jack

If you are not using the 3PDT daughterboard PCB, have a look at the offboard wiring diagram here (fig1/3): <u>wiringrev3.pdf (parasitstudio.se)</u>

Never use wires that are much longer than they need to be. Cut down the wire to just a bit longer than needed, then strip the ends and solder. Just be careful when cutting the wires so that you still have some slack.

Misc



Gutshot



Bare PCB

Troubleshooting

There's always a chance of running into trouble. To minimize error, follow the BOM and general building tips carefully. Take your time and don't rush. Take a break now and then. Use good solder, and it helps to have a decent soldering station insted of a cheap iron.

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Schematic



The Salad Days TSSOP-14 surface mount component comes included and presoldered with the PCB / kits