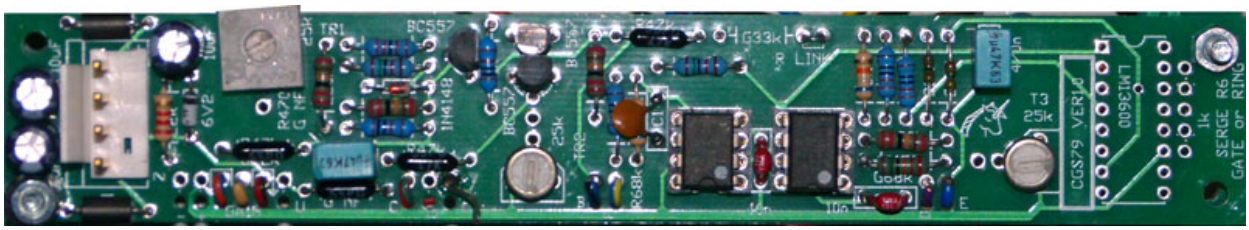


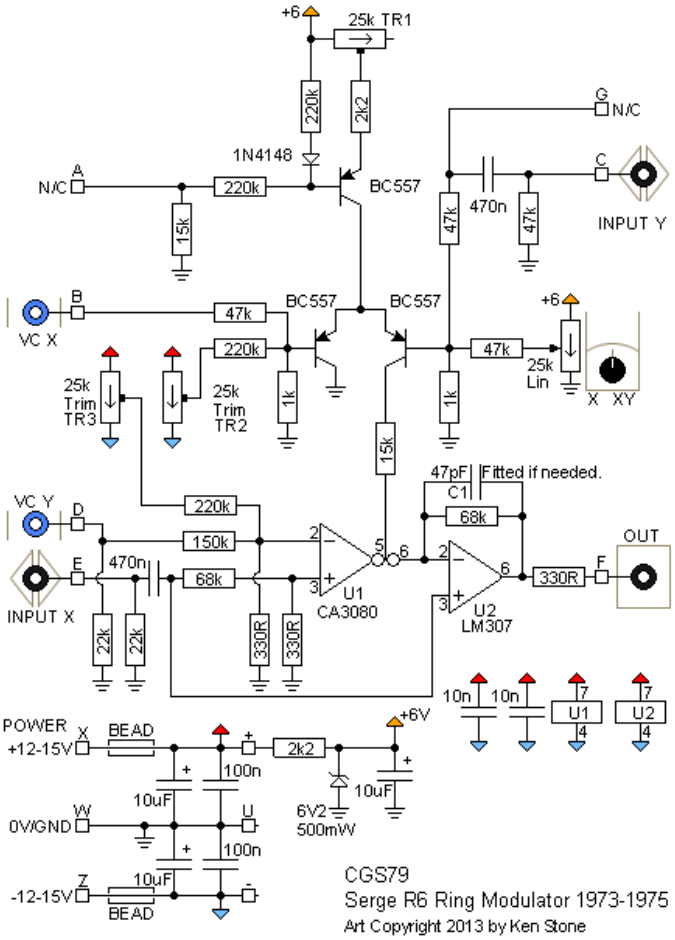
Ring Modulator

for music synthesizers.

This module is a variation on the 1973 Classic Serge R6 Ring Modulator.

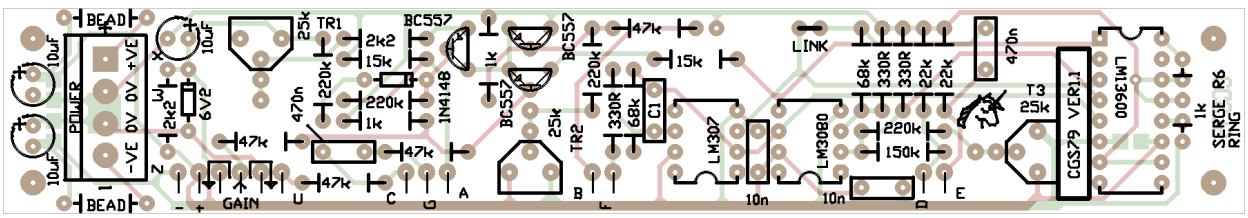
From the catalog (abridged): The RING MODULATOR (MOD) is an AC or DC coupled Ring Modulator featuring superior audio processing capabilities. The Ring Modulator offers two VC inputs in addition to the two signal inputs which may be used to perform voltage controlled transitions between full ring modulation and amplitude modulation.

A little on how it works:



The schematic of the Ring Modulator module.

Construction



The component overlay for the VER1.1 PCB. On the VER1.0 PCB the 22k resistor nearest to the power connector should be a 2k2, as shown above (next to "W"). Click here for an enlarged, printable version. Print at 300dpi.

Before you start assembly, check the board for etching faults. Look for any shorts between tracks, or open circuits due to over etching. Take this opportunity to sand the edges of the board if needed, removing any splinters or rough edges.

When you are happy with the printed circuit board, construction can proceed as normal, starting with the resistors and diodes first, followed by the taller components.

Take particular care with the orientation of the polarized components, such as electrolytics, diodes, ICs and transistors.

If you are planning to use it with 6.3mm or 3.5mm jacks, the common of these jacks should be wired to 0V/GND as usual. Just solder the return wire to the (unused) center pins of the power connector.

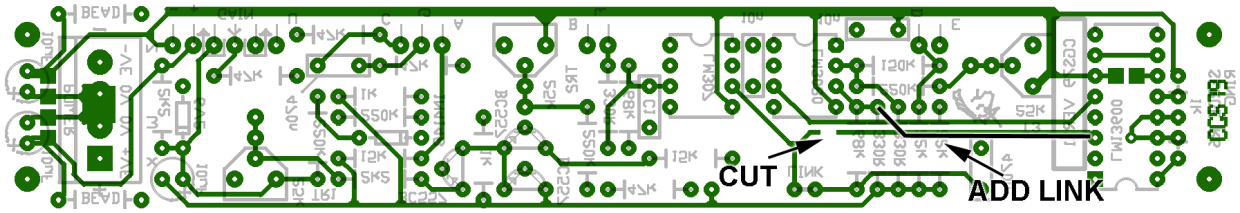
Transistor types are not critical. BC557 has been substituted for the original types used. 2N3906 can be used if installed backwards with respect to the outline on the overlay.

A TL071 or similar can be used in place of the LM307.

There are three sets of pads for 1206 100n capacitors on the rear of the PCB. The one near the LM31700 is only needed if that chip is used. The other two are optional.

If you are unable to purchase CA3080 or LM3080 variants, there is provision on the PCB for a LM13700/LM13600 variant to be used in its place. The 1k resistor next to this chip is only required if this type of chip is used, otherwise leave both the chip location and resistor location empty. **Do not install chips in both the LM3080 and LM13600 locations.** See the following note if you are using a LM13700/LM13600:

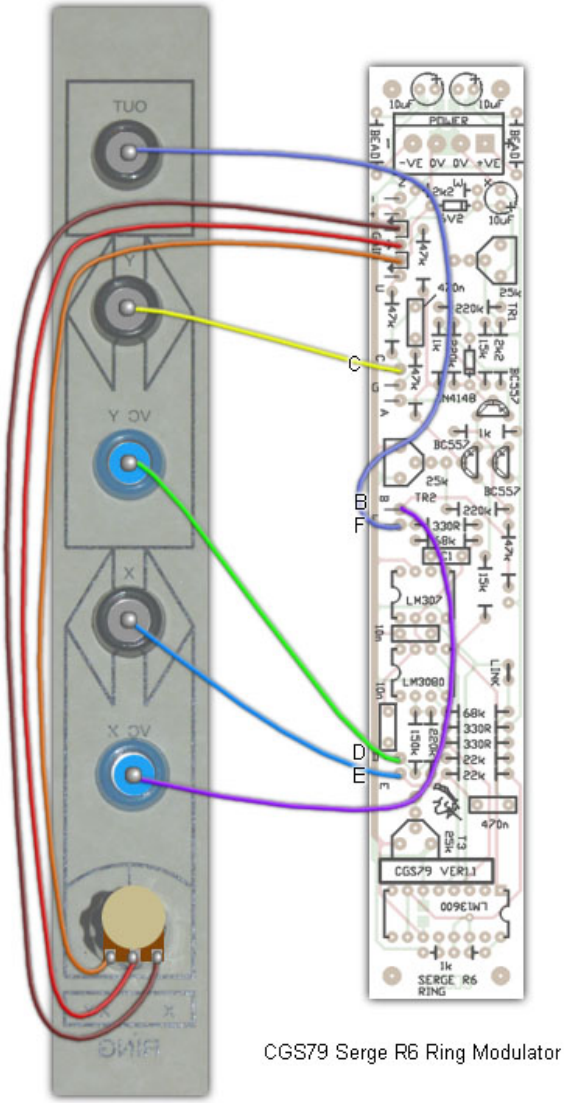
Ver 1.0 corrections



On the VER1.0 PCB, Pin 3 of the LM13700 has been routed to the wrong chip. It needs to be isolated, and then jumpered to pin 3 of the LM3080. The 22k resistor nearest to the power connector should be a 2k2, as shown on the component overlay diagram above (next to "W"). Click here for an enlarged, printable version. Print at 300dpi.

Notes for the Ring Modulator.

As this is a dual purpose PCB, there are some variations between the build types. The Ring Modulator specific components and values start with "R". Do not use any value staring with "G". The PCB stuffing diagram above has been modified to show all the parts required on the Ring Modulator. Install all parts as shown.



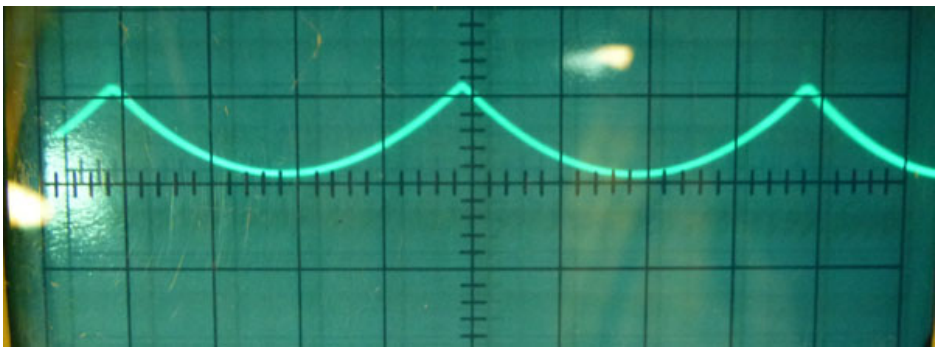
The wiring required to use the PCB as a Ring Modulator.

Set Up

Suggested setup procedure:

Preliminary adjustments -

Adjust the panel potentiometer all the way to ground (CW).
Adjust TR3 to center position
Adjust TR2 fully to +V position
Input 500 Hz 0/5V sawtooth into Input X AND pad A (no panel connection)
While looking at the output, adjust TR1 until the output waveform is perfectly symmetrical (and rectified), as below.



Note that the rectified sawtooth wave has a distinctly rounded bottom.

Now disconnect the sawtooth from Input X (keeping it connected to pad A).
Turn the scope sensitivity up. Adjust TR3 until the least feed through of the sawtooth is seen (or heard).

It would be good to repeat the initial adjustment of TR1 as above, mow that TR3 has been set.

Finally, with the sawtooth still connected to Input X, connect it to Input Y.
Now adjust TR2 to achieve as symmetrical an output at 1000 Hz as possible. Note that the waveform will be somewhat different to the previous one, due to the non linear characteristic of the transistor pair.

Alternative method:

Set X-XY pot to X (CCW).

Connect an audio frequency triangle wave to X input.

Adjust trimmers TR2 and TR3 for minimum breakthrough. This will require alternately adjusting the two trimmers until you get the desired result.

Move the audio frequency triangle wave to the Y input.

Connect a second triangle wave, this time at around 1Hz, to the X input.

Adjust TR1 for a balanced "throb".

For those interested, original Serge kit assembly and set-up instructions can be found here:
Ring Modulator

Info on the original Serge module can be found here:
Ring Modulator

Notes:

- 330R refers to 330 ohms. 100n = 0.1 UFO.
- The module will work on +/-12 volts or +/-15 volts.
- **PCB info:** 6" x 1" with 3mm mounting holes 0.15" in from the edges.
- Please e-mail me if you find any errors.

Parts list

This is a guide only. Parts needed will vary with individual constructor's needs.

If anyone is interested in buying these boards, please check the PCBs for Sale page to see if I have any in stock.

Can't find the parts? See the parts FAQ to see if I've already answered the question. Also see the CGS Synth discussion group.

Resistors (1% metal film)	
330Ω	3
1k	3
2k2	2
15k	2
22k	4
25k trimmer	3
25k lin pot	1
33k	1
47k	2
68k	2
220k	4
Capacitors	
100nF 1206 SMT (=0.1uF) see text.	3
10nF (=0.01uF)	2
470nF (=0.47uF)	2
10uF electrolytic	3
Semi's	
1N4148	1
6V2	1
BC557	3
LM307	1
LM3080	1
LM13600	See text
Misc.	
Ferrite Bead	2
MTA-156 header 4Pin	1
CGS79 PCB	1

Modular Synth Home

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