# LushOne Synth 203
# Contour Module –
# RM (Ring Modulator)

# What are we going to do?

The ring modulator makes really “space age” sounds

- Introduce the ring modulator
- Use in a simple (but not very useful patch)
  - Explain the mysterious “OSC” mode of OSC2 on the LushOne base
- Build a mega patch using most of the capabilities of the LushOne Contour and Base

# What is a Ring Modulator?


- Amplifier where:

  Output $\propto$ Input x Control Voltage
  (Like a VCA)

  BUT

  Control Voltage is signed (positive or negative)

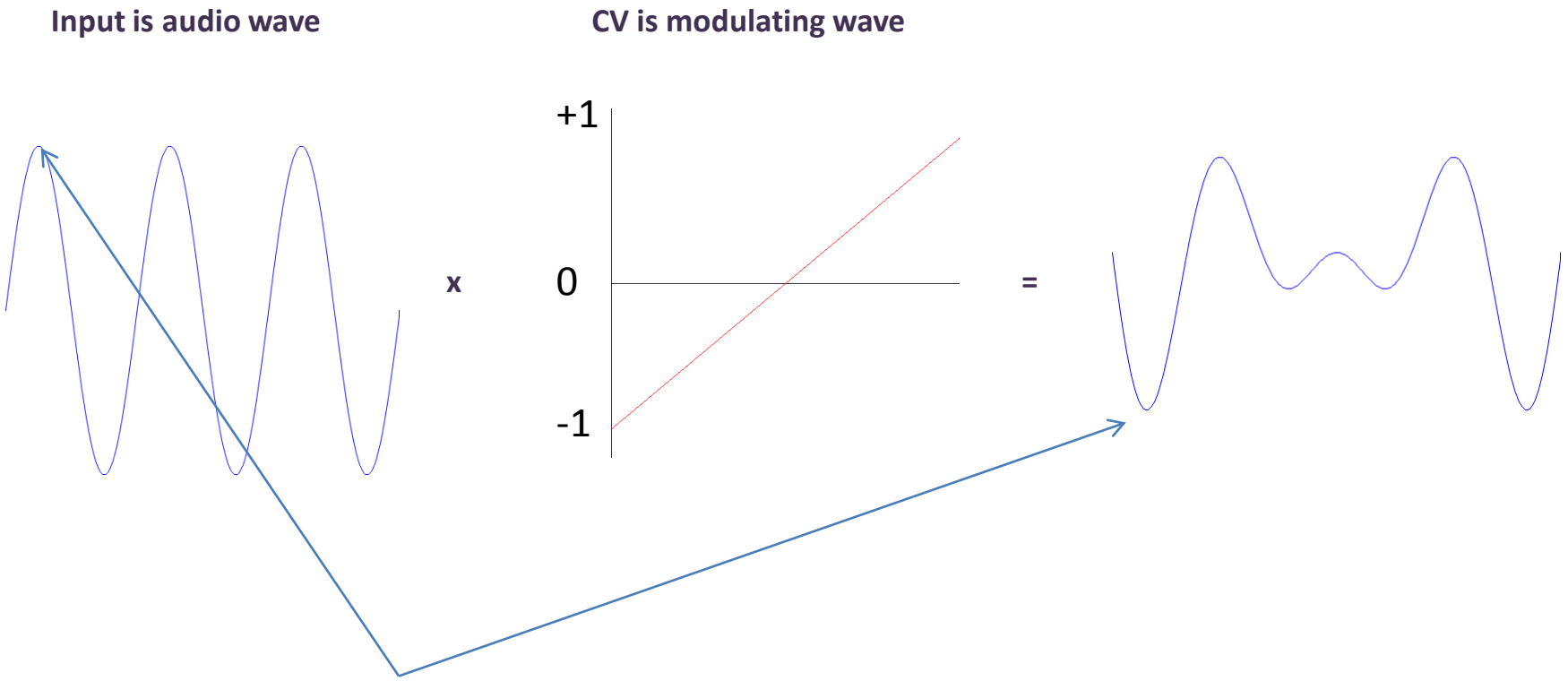
For LushOne, approximately

CV < 2.5V is treated as negative

CV = 2.5V is treated as zero

CV > 2.5V is treated as positive

# Practically

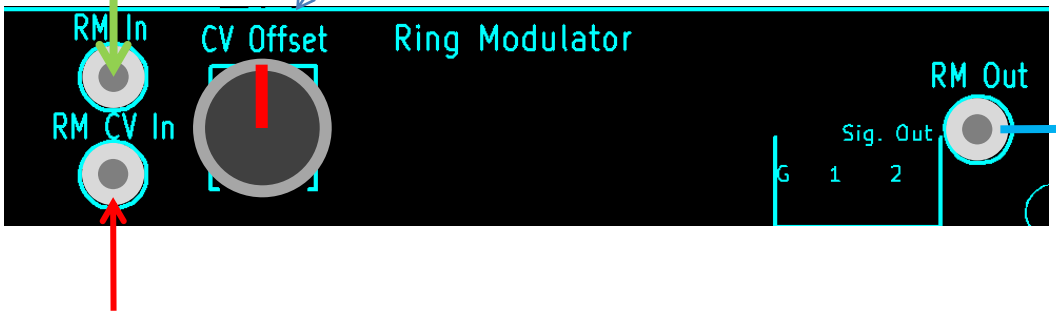



**Outputs are freaky complicated because modulation can change sign of input**

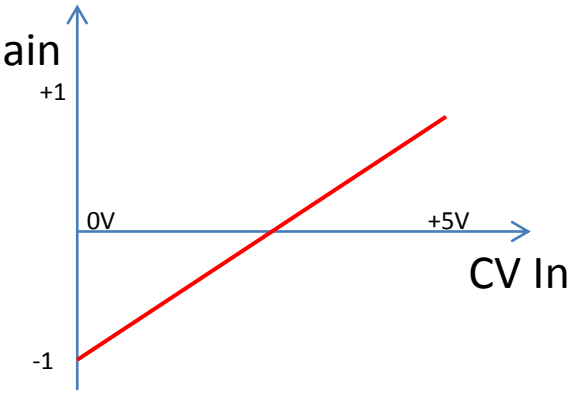
# Contour Ring Modulator

Audio In
(-1V to +1V)

Adjust what Control Voltage has zero gain
(Centre is approximately 2.5V CV = zero gain)



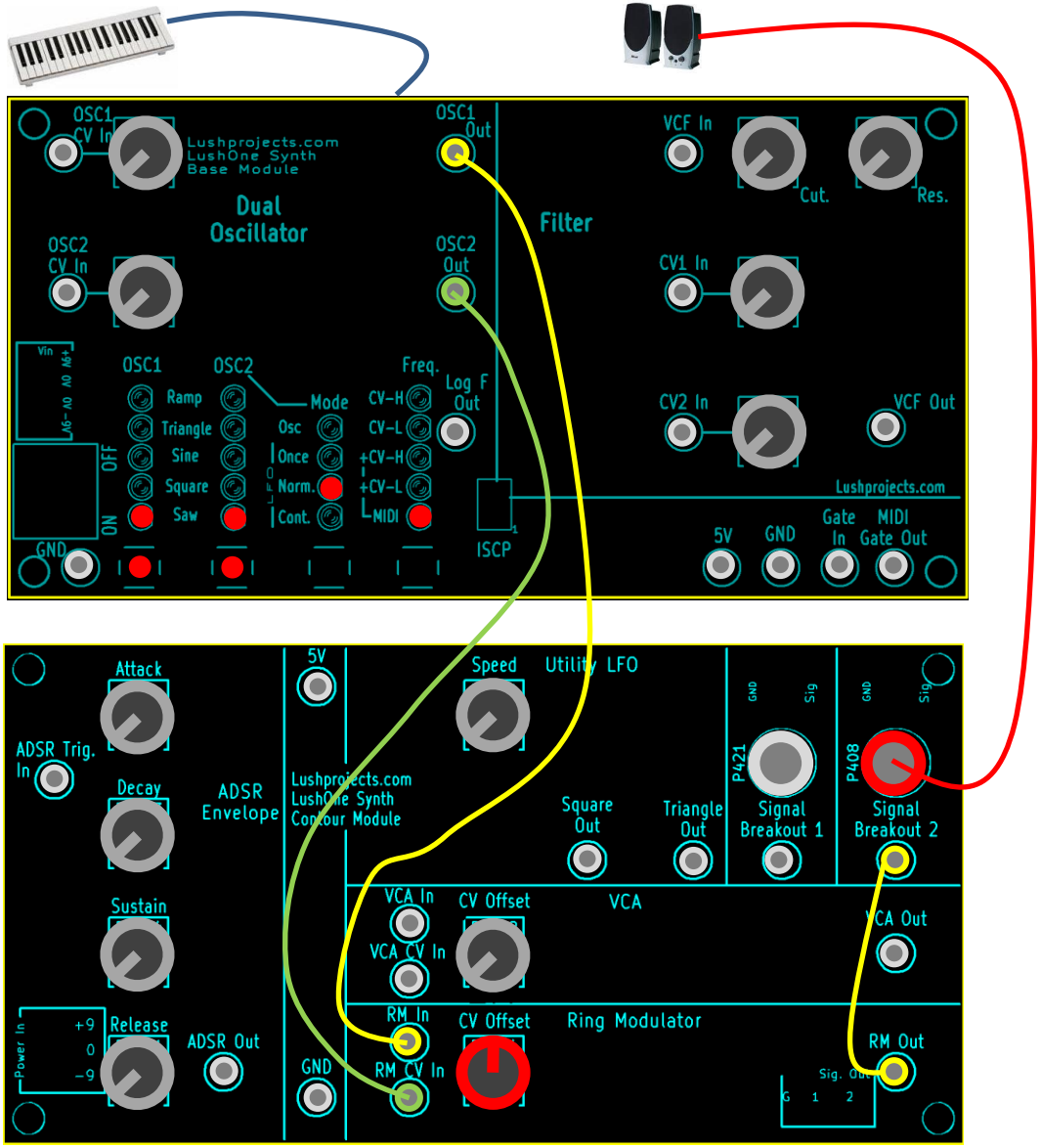

Audio Out (-1V to +1V)




Control Voltage In
(0V to +5V)

- With CV Offset central then:
  - CV of less than +2.5V are treated as increasingly negative and invert the input
  - CV of +2.5V sets the gain to zero with no output
  - CV of more than +2.5V are treated as increasingly positive and increase the output without inversion
- Turning CV offset to left raises the zero point on of the control voltage

# Basic Ring Modulator Patch




- Just to hear the effect of the ring modulator – not very musically useful
- Set mode of LushOne base as shown and play a few notes
- Try varying the speed of the LFO using the modulation wheel on your MIDI keyboard
- Controls in red will vary the sound – try them!
- Notice that the LFO frequency is very audible in the output of the ring modulator



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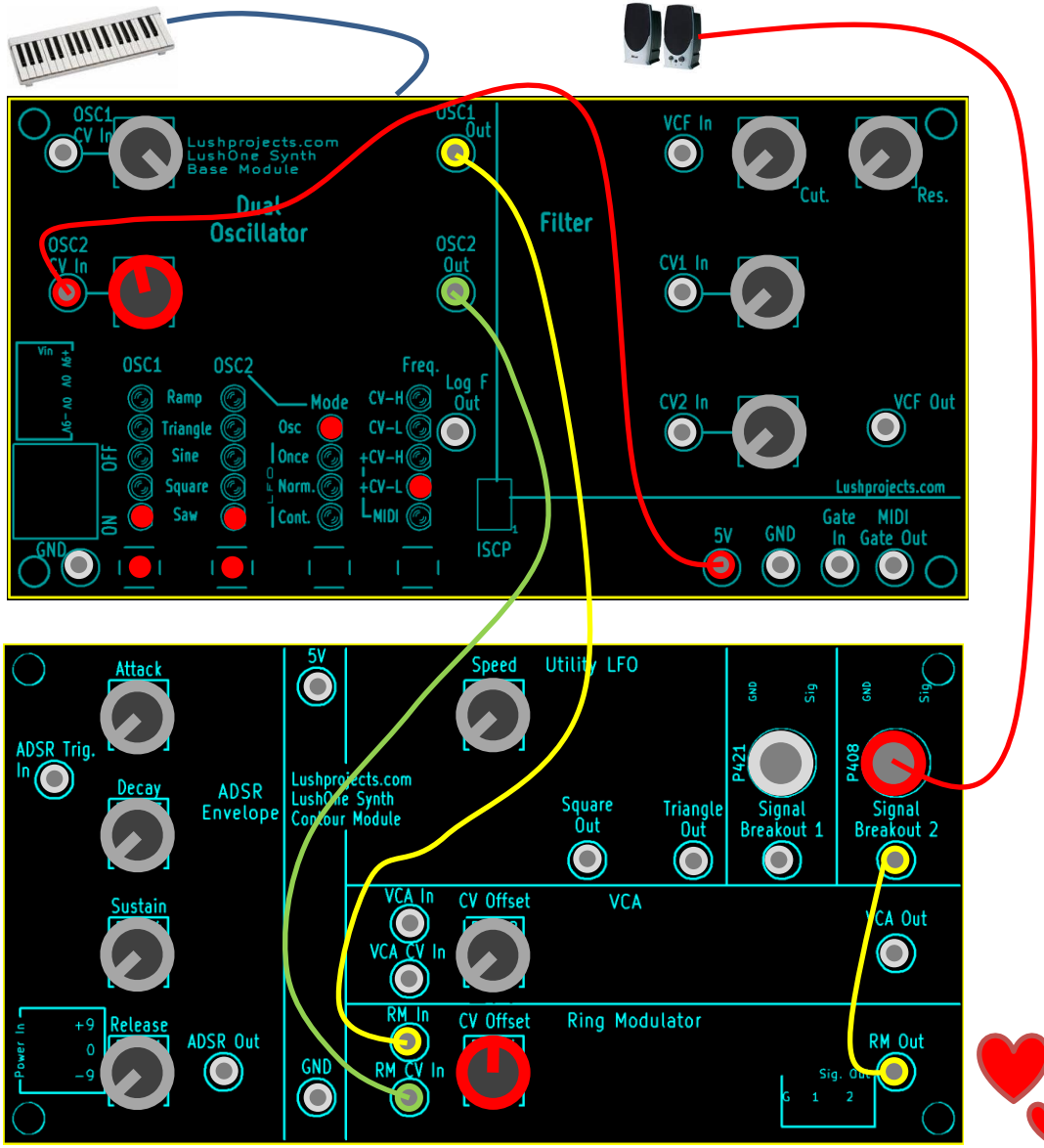
# OSC2 “OSC” Mode

- On the LushOne base the LFO (“OSC2”) has a mode labelled “OSC” which we haven’t explored so far
- In “OSC” mode the output of OSC2 is the same frequency as the main oscillator (“OSC1”)
- The MIDI Modulation wheel has no effect on OSC2 when in OSC mode
- OSC2 in OSC mode still responds to its own control voltage when “Freq.” is in a CV mode
- Why am I telling you this now?
  - Ring modulators are particularly interesting if the CV frequency is close (but not identical to) the audio frequency

# Ring Modulator Patch Using OSC Mode




- Set mode of LushOne base as shown and play a few notes
- Try varying the speed of the OSC2 using the OSC2 CV gain control
- Near the middle the of the range the frequencies of OSC1 and OSC2 are very close and you should hear a “beat” from the Ring Modulator
- Controls in red will vary the sound – try them!
- Notice that the LFO frequency is very audible in the output of the ring modulator

Some of my favourite sounds



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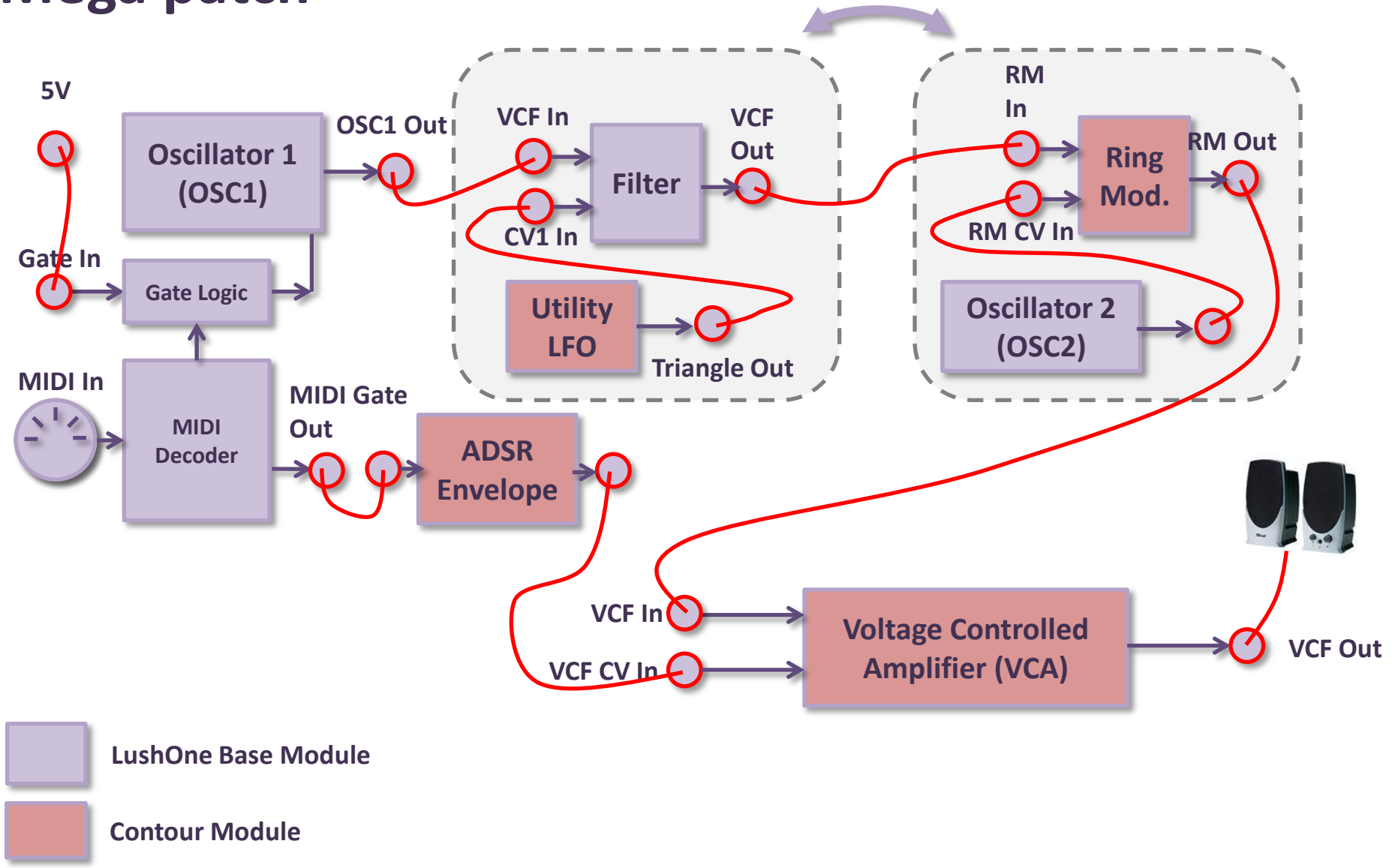
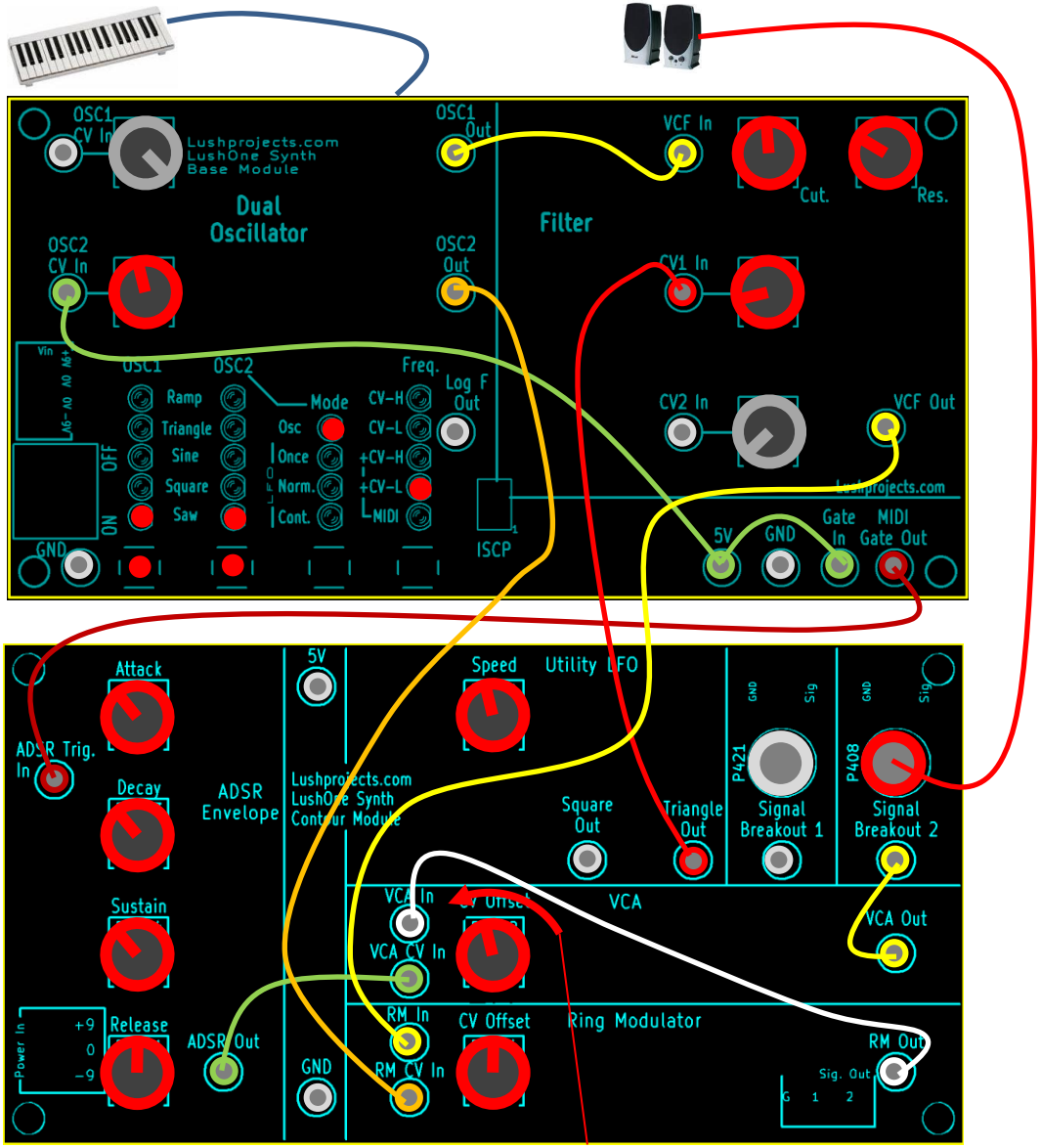
# Mega patch

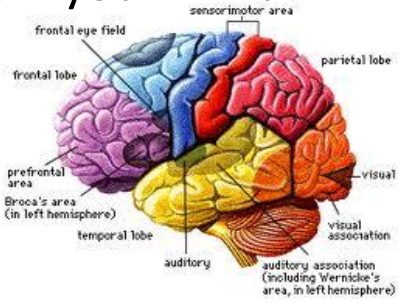


# Mega patch




Adjust so output is quiet when no note playing

- Set up approximate initial positions of controls and oscillator settings (LEDs)
- As always set the filter to hear some “bite”
- Set the CV Offset on the VCA so output is just quiet when no note plays
- Controls with red outlines will vary the sound – try them
- Blow your mind!



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