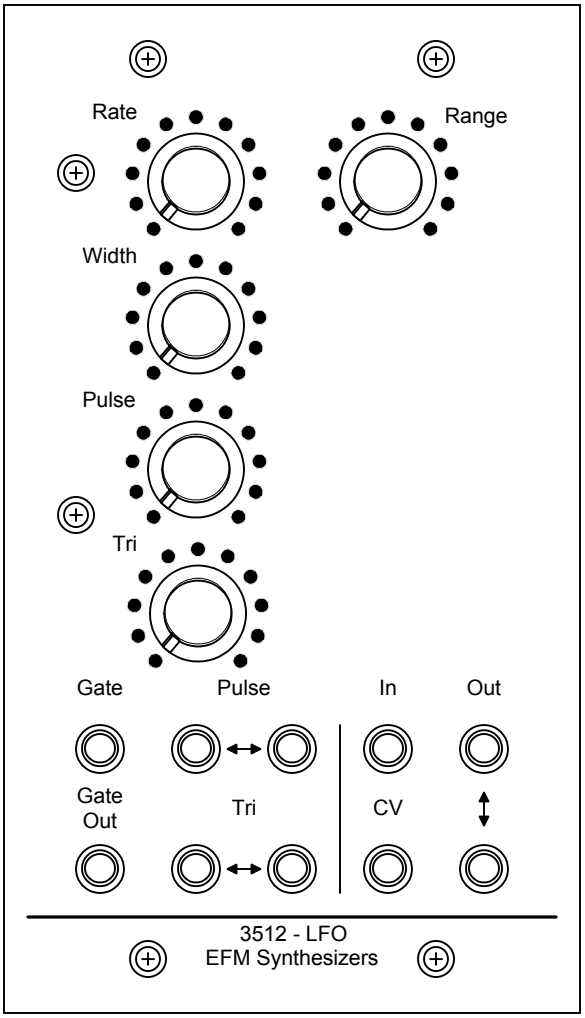
3512 LFO and VCA

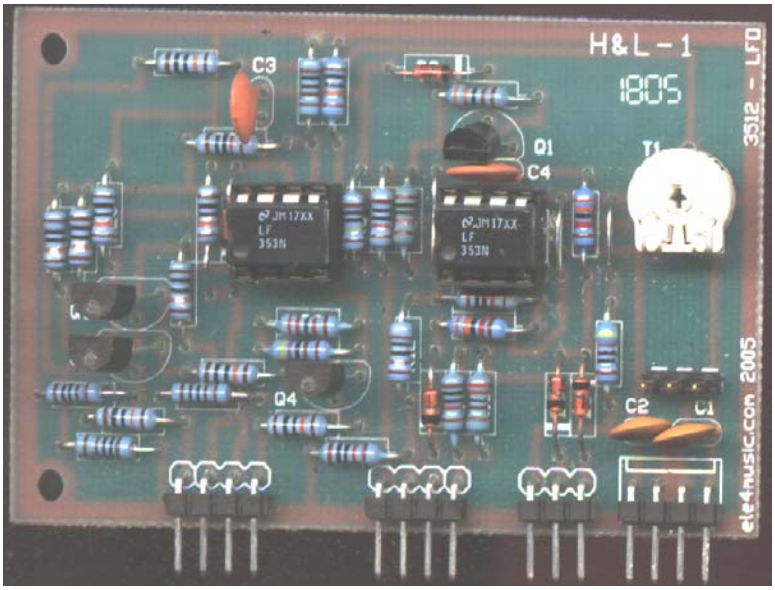
The 3512 LFO is a blend of the on the Korg MS10 and Arp Axxe LFOs. It's the basic Korg LFO with the ARP reset circut. I added a compairator that also supplies a good +10V gate out.



LFO section:

When power is applied current enters the noninverting input of U2a through R10. This positive voltage is amplified by U2a and coupled to it's input through feedback resistor R11. The feedback causes the output of U2a to go maximum positive almost instantaneously. This voltage is applied to the inverting input of U2b through a series of resistance and non-linear devices (diodes). U2b is an integrator charging C4 with a linear negative going ramp voltage. This output is applied to back to the non-inverting input of U2a through R10. When the negative going signal is high enough to overcome the positive feedback the input on U2a starts to go negative.

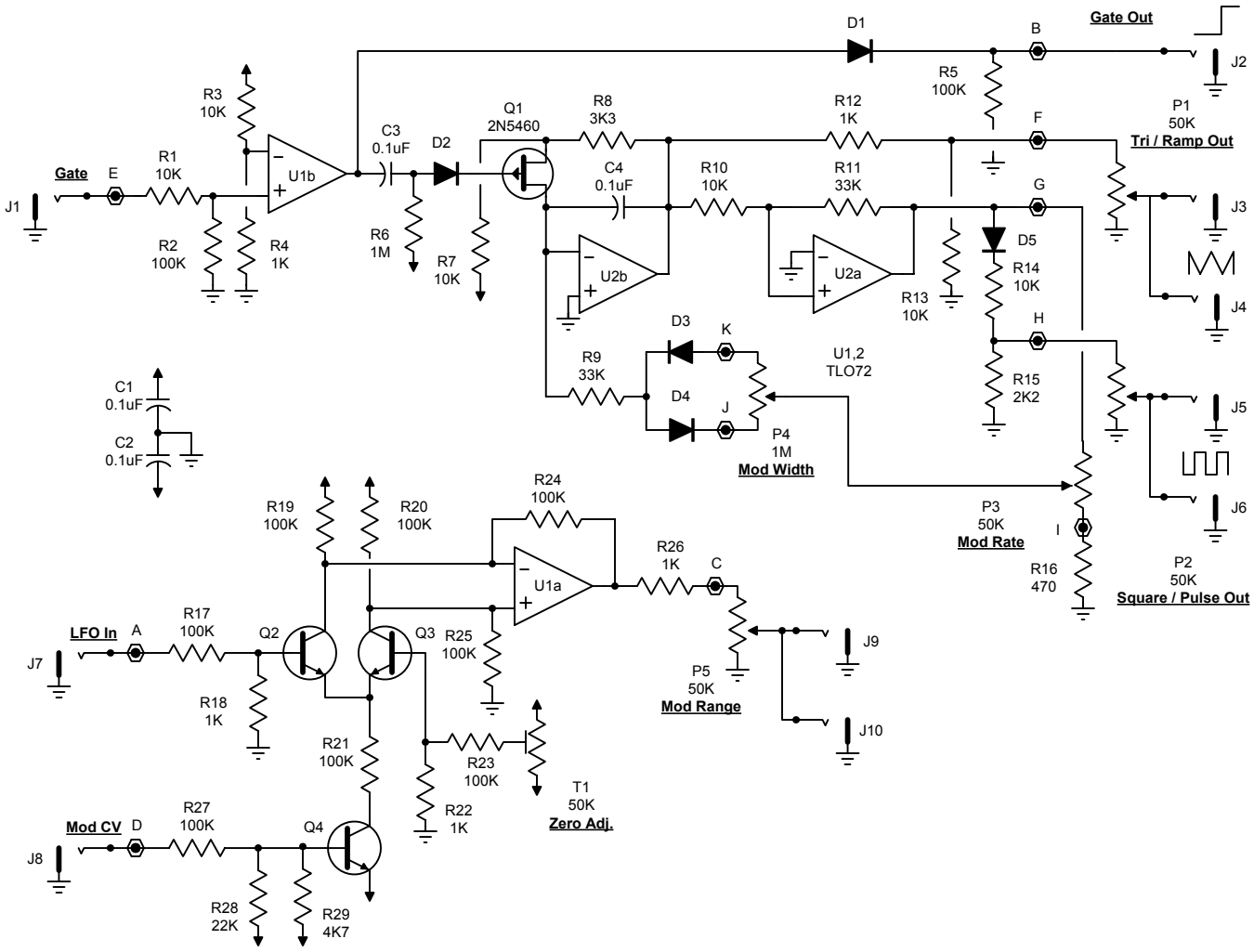
This negative voltage is amplified by U2a and coupled to it's input through feedback resistor R11. The feedback causes the output of U2a to go maximum negative almost instantaneously. This voltage is applied to the inverting input of U2b through a series of resistance and non-linear devices (diodes). U2b is an integrator charging C9 with a linear positive going ramp voltage. This output is applied to back to the non-inverting input of U2a through R10. When the positive going signal is high enough to overcome the negative feedback signal the input on U2a starts to go negative and one complete oscillation cycle is completed.



The output of U2a is normally square and the output of U2b is a triangle unless non-linear devices are placed in the signal path. As the more of the signal is passed through non-linear devices the output waveforms get more narrow. The result is that the outputs are variable from positive pulse to square to negative pulse on the U2a output and negative ramp to triangle to positive ramp on the U2b output. D5 and R14,15 pad the output to match the U2b output and keep the U2a output from going to a negative voltage.

By putting a FET across C4 we can reset the oscillator at any point in the cycle. A gate voltage over +1.5V on the input of comparitor U1b causes the voltage at it's output to go maximum positive. C3 charges and quickly discharges. This pulse is used to turn on Q1 and short C4. This causes the voltage at U2a's output to drop to maximum negative and the charge cycle starts again.

We take the output of U1b and build a better gate. Through D1 the output at J3 is zero to about +10V.



Small Kit		
PCB	PC Board	1
C1,2,3,4	0.1uF Ceramic	4
R1,3,7,10,13,14	10K	6
R2,5,17,19,20,21,23,24,25,27	100K	10
R4,12,18,22,26	1K	5
R6	1M	1
R8	3K3	1
R9,11	33K	2
R15	2K2	1
R16	470	1
R28	22K	1
R29	4.7K	1
D1,2,3,4,5	1N4148	5
Q1	2N5460	1
Q2,3,4	2N3904	3
U1,2	LF353/TLO72	2

Full Kit		
T1	50K	1
P1,2,3,5	50K Pot	4
P4	1M Pot	1
Knob		5
Jack	1/8"	10
L Bracket w/hardware		2
Header		1
Panel		1
Overlay		1

VCA

U1a and Q2,Q3 form a VCA that is used to control the amplitude of the LFO. Such as using modulation voltage from a midi to cv converter to control how much LFO is applied to the VCOs.

This clever VCA is based on the Roland System 100 mod amplifier. Also used in one form or another by PAIA, ARP and others.

The amplification produced by the Q2,3 differential pair is proportional to the current supplied by constant-current source Q4. Using a balanced opamp the in-phase collector voltages caused by the gain setting current on R19,20 are eleminated and the out-of-phase audio signal is amplified.

T1 is used to zero the VCA output. Eliminating the output offset voltage.