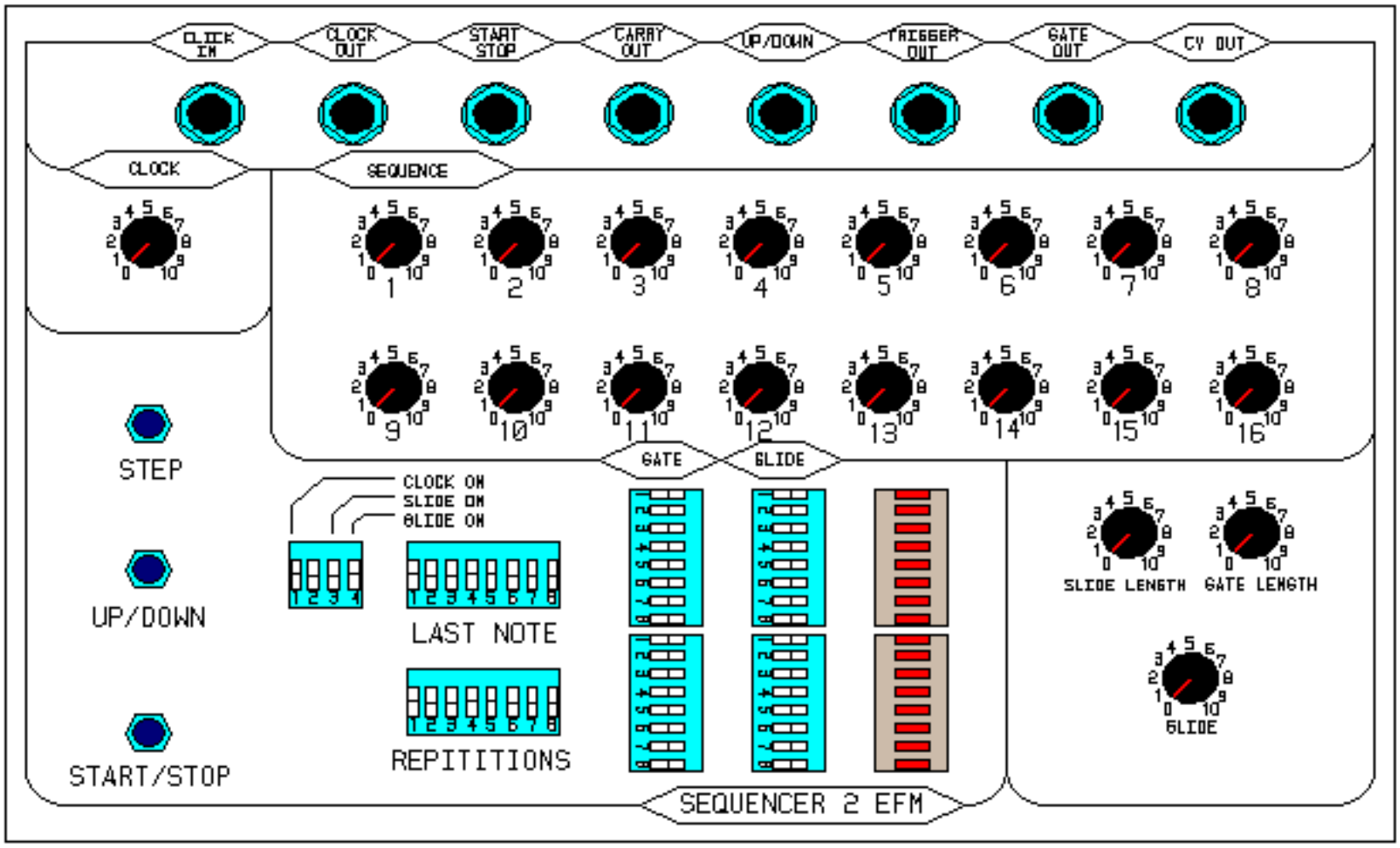
ELECTRONICS FOR MUSIC

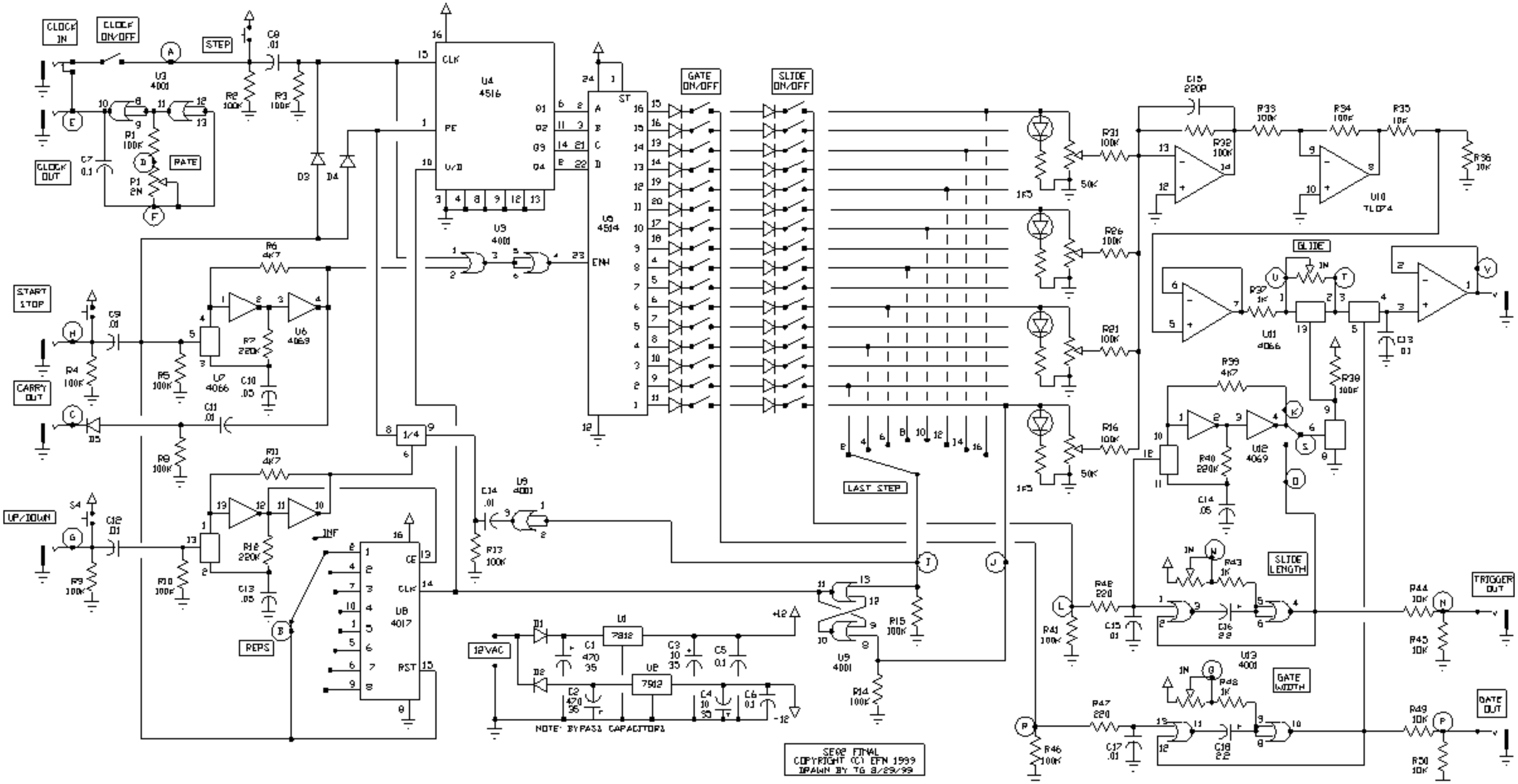
Sequencer 2



Parts

RESISTORS			**SIMIS**		
R1-5,8-10,13-34,38,41,46	100K 1/4 watt	33	U1	7812	1
R6,11,39	4.7K 1/4 watt	3	U2	7912	2
R7,12,40	220K 1/4 watt	3	U3,9	4001	2
R35,36,44,45,49,50	10K 1/4 watt	6	U4	4516	1
R37,43,48	1K 1/4 watt	3	U5	4514	1
R42,47	220 1/4 watt	2	U6,12	4069	2
LED Resistors	1.5K 1/4 watt	16	U7,11	4066	2
CAPACITORS			U8	4017	1
C1,2	470MF 35VDC	2	U10	TLO74	1
C3,4	10MF 35VDC	2	D1,2	1N4001	2
C5,6,7,16	0.1	4	D3,4,5 + Gate & Glide	1N914	35
C8,9,11,12,14,18,20	.01	7	Leds		20
C10,13,17	.05	3	**POTS**		
C15	220pf	1	P1	2M	1
C19,21	1MF 16VDC	2	P2,3,4	1M	3
			Pitch Controls	50K	16

Schematic Diagram



How It Works

It works by making a clock from pair of 4001 inverters (any inverter will do). This clock can be a master clock for several sequencers so we need a panel jack to connect it to other units. Because any sequencer may be a master or slave unit we also need a "clock in" jack and a way to remove it from the circuit so a "clock on/off" is also needed. The clock pulse can be entered manually by pressing the "step" switch.

While we are talking about the "step" switch lets talk about the actual momentary switches used. These need to have a very positive action to avoid multiple triggering. I like to use those large area calculator switches with a rubber foot glued to the switch surface. It works great and looks good too. Just avoid those crap r/s momentary things. R/S did start getting them from a new supplier and they are better now...but just say no and find something else.

The clock is sent off to the 4516 binary up/dn counter we are using to drive the 4514 4-bit latch/decoder. Each incoming clock advances the 4514 one output forming the basis of the sequencer.

To give us a way to start and stop I used inverters to from a logic switch that goes high on the first pulse then low on the next. You can start the seq manually, use the "carry-out" from another seq or any high going pulse. The output from this switch is used to control an or-gate made from another pair or 4001 nor-gates. The switch holds one input high to keep the output to the 4514s inhibit high. When the switch goes low the 4514s inhibit-pin is clocked at the same frequency as the 4516 this causes the 4514s outputs to pulse with the master clock frequency. Turning each output off before turning the next output on.

These 16 outputs are sent to 2 16-diode pairs and 16 pots/leds. The first set of diode are used to send pulses to the gate the next pulses to the slide/glide circuits. For fun these can also be used to supply trigger outs. More on that later.

I didn't want to pulse the outputs that's why the last version used two 4514s. Pulsing the outputs makes slide,gate and trigger for each note available but puts a crimp in the idea of using it to generate bazaar waveforms it still works but not as well as it did. I changed it because I was more interested in the sequencer functions working correctly and it solves a few problems I ran into.

The outputs are tapped to send every other output to a select switch connected to a 4001 S/R flip-flop. The first note sets the FF high advancing the 4017 repetition counter one. The notes are fired in sequence until it reaches the "last note" set. This resets the FF causing the 4017 to advance again this is the first 4017 output that we use calling it one-repetition. Last note also goes to an inverter/cap that resets the 4516 so we can count from 1 again. This continues until the 4017 reaches it's last-rep when this happens the 4017 resets itself, the start-stop switch and the 4516, stopping everything but the clock.

This way you can set the number or reps and the number of notes played. There needs to be a infinite setting on the rep-counter but I keep forgetting to add one. It's just an open going nowhere so the 4017 never times out.

The last-note can also be used to reverse the sequence or up/dn mode. Each time the FF changes state the u/d pin of the 4516 is toggled. The circuit is always in u/d mode and the 4514s outputs would reverse except that we are resetting the 4516 every time we get there. When the up/down switch is toggled the 4516s reset pin is isolated from the last-note position and the 4017s clock-in is disabled. This causes the seq to run up/dn until the u/d switch is reset. Then the 4017 resumes it's count until it's done.

Note that pressing the u/d button adds 1 to the count. So if you want 4 reps with a u/d part you will need to set the rep- counter to 5.

The pots are connected to each 4514 out and then summed before going through a s&h circuit built from a pair of buffers and a couple of 4066 analog switches.

The sample and hold section is controlled by the gate and slide diode-selectors. There are twin pulse-width controllers one for gate/note on-off and another for slide/trigger outs. These may be set from a fast spike for each note to several notes in length. So notes can be selected and slide to the next note adjusted. At the last minute I added a 4069 switch and changed the slide circuit to accommodate glide functions. This works by turning on glide at the first note set and leaving it on until the next. Turning glide on/off as the sequence is played.

Parts Placement