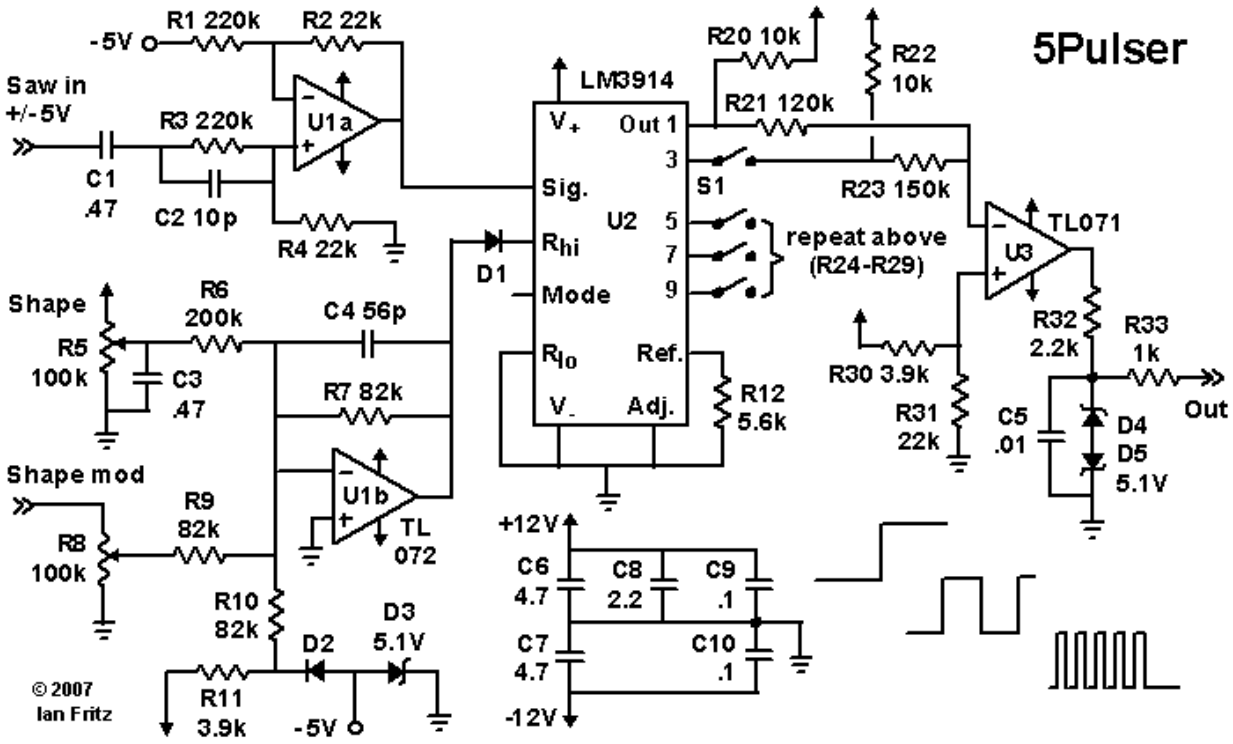
5Pulser Waveshaping Circuit

Ian Fritz, June 2007

This circuit is a voltage-controlled waveshaper that produces a train of output pulses that may be varied in number, width and position in response to a control voltage. When fed with a sawtooth waveform, the pulses evolve from a single square wave to a train of five pulses occupying half a period or less of the output waveform. The circuit is built around a LM3914 LED display driver chip, which simplifies the design of the pulse generation circuitry.

Schematic:



Component List:

ICs:

U1	TL072 (or similar) dual opamp
U2	LM3914 bar-graph driver
U3	TL071 (or similar) single opamp

Diodes:

D1, D2	1N4148 (or similar) switching diode
D3, D4, D5	1N751A (or equivalent) 5.1 V Zener diode

Resistors (all metal film 5%):

R33	1 kOhm
R32	2.2 kOhm
R11, R30	3.9 kOhm
R12	5.6 kOhm
R20, R22, R24, R26	10 kOhm
R28	"

R2, R4, R31	22 kOhm
R7, R9, R10	82 kOhm
R21	120 kOhm
R23, R25, R27, R29	150 kOhm
R6	200 kOhm
R1, R3	220 kOhm

Pots:

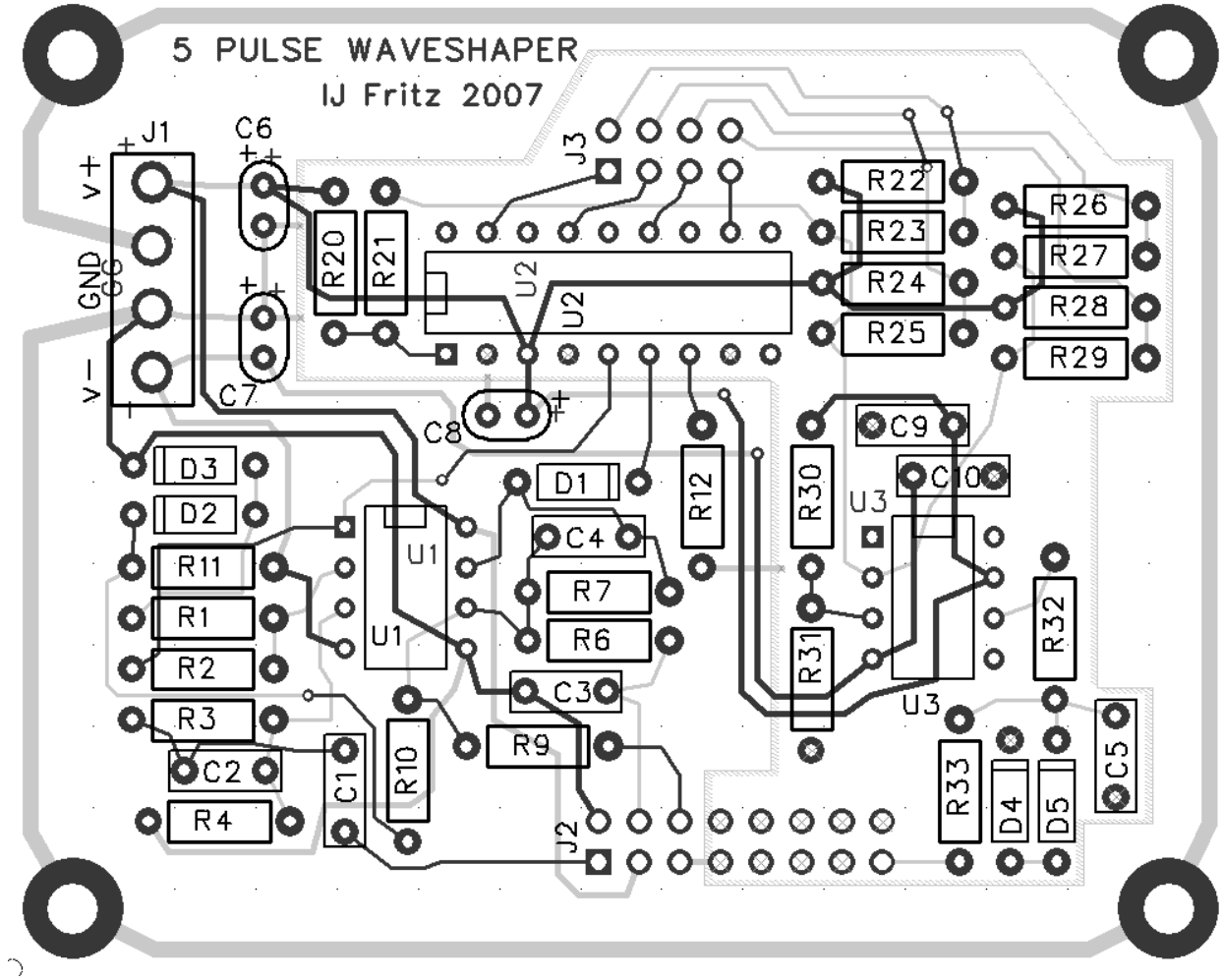
R5, R8	100 kOhm

Caps:

C2	10 pF 10% ceramic
C4	56 pF 10% ceramic
C5	.01 uF 10% ceramic or poly
C9, C10	.1 uF ceramic or poly bypass
C1, C3	.47 uF poly
C8	2.2 uF electrolytic bypass
C6, C7	4.7 uF electrolytic bypass

Circuit Board:

The board is double sided with overall dimensions of 3.0" x 2.4". The mounting holes are spaced by 2.7" and 2.1". Component placement is indicated on the following drawing:



I/O Connector J2 Pinout:

Pin#	Connection	Pin#	Connection
1	Sig. in (+/- 5 V)	2	Gnd (Twist with Sig. in)
3	+12 V: R5(1)	4	Shape: R5(2)
5	Gnd: R5(3), R8(3)	6	Mod: R8(2)
7	Gnd	8	Gnd
9	Gnd	10	Gnd
11	Gnd	12	Gnd
13	Gnd	14	Gnd
15	Sig. out	16	Gnd (Twist with Sig. out)

Note: On pots, (1) is CW, (2) is slider, (3) is CCW

Switch/Jumper J3 Pinout:

Pin#	Connection	Pin#	Connection	
1	S1 send	2	S1 retn.	(Or jumper1-2)
3	S2 send	4	S2 retn.	(Or jumper 3-4)
5	S3 send	6	S3 retn.	(Or jumper 5-6)
7	S4 send	8	S4 retn.	(Or jumper 7-8)

Notes:

1.) Power: The circuit was developed with +/-12 V supplies. +/-15 V should work fine also, and in this case R6 should be increased to 220 k.

2.) The input and output leads to the panel should be twisted pairs (sig. and gnd.), as indicated in the J1 pinout chart.

3.) The switches S1-S4 allow different combinations of pulses to be used. These may be replaced with fixed jumper wires for operation with all five pulses.