DIY Analog VC-LPF

ericarcher.net/devices/DIY-LPF

version 1.0

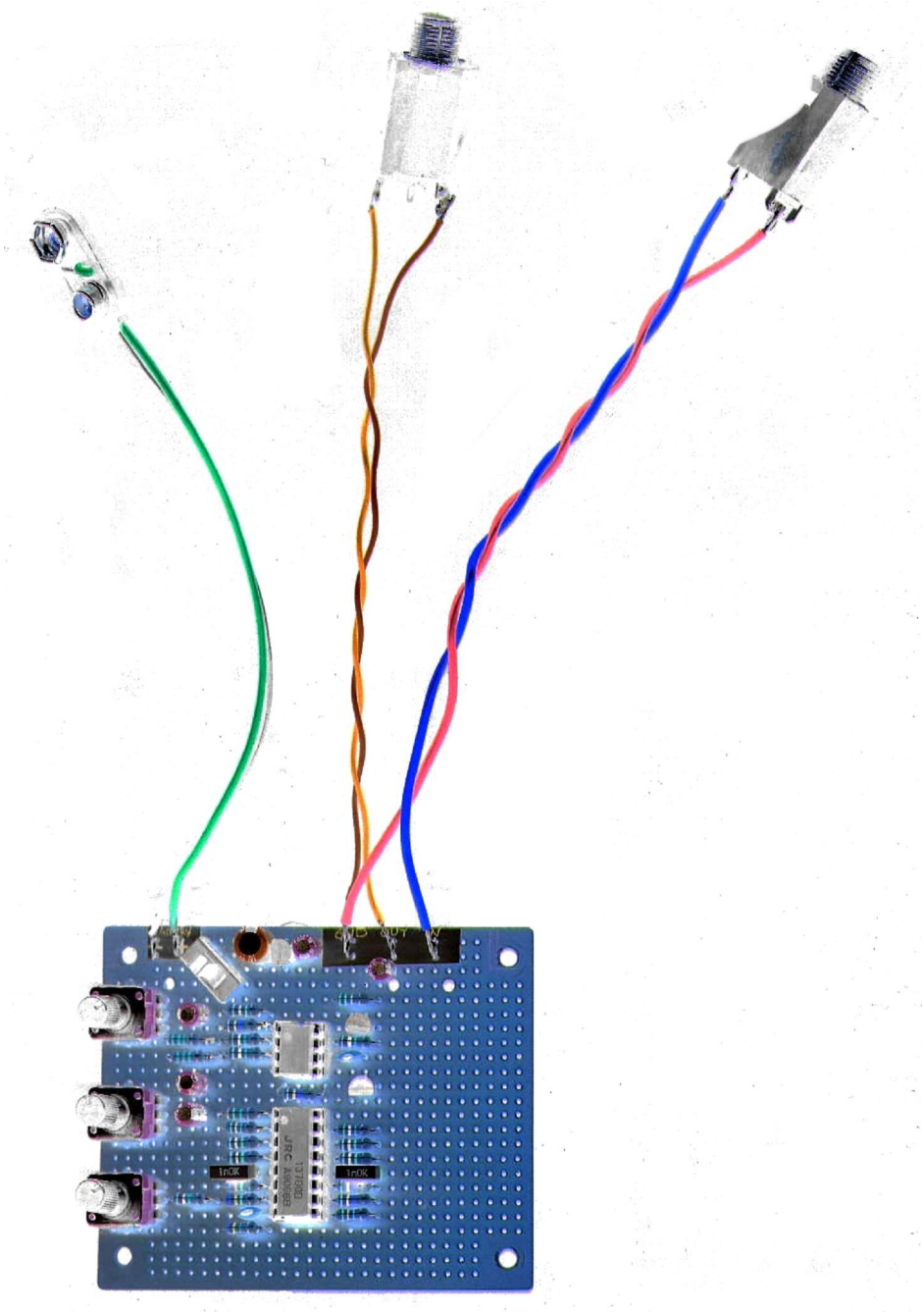
Build it yourself on perfboard. Use pad-per-hole “PC3” type

Basic voltage-controlled filter designed for 9V battery power.
5V max input level before distortion.

12dB / oct state variable LPF with LM13700-type OTA
Center frequency range 40Hz – 12kHz

MIX, **FREQ**, and **RESONANCE** controls

Can be converted for external CV input (0..+10V)
do not use with negative voltage

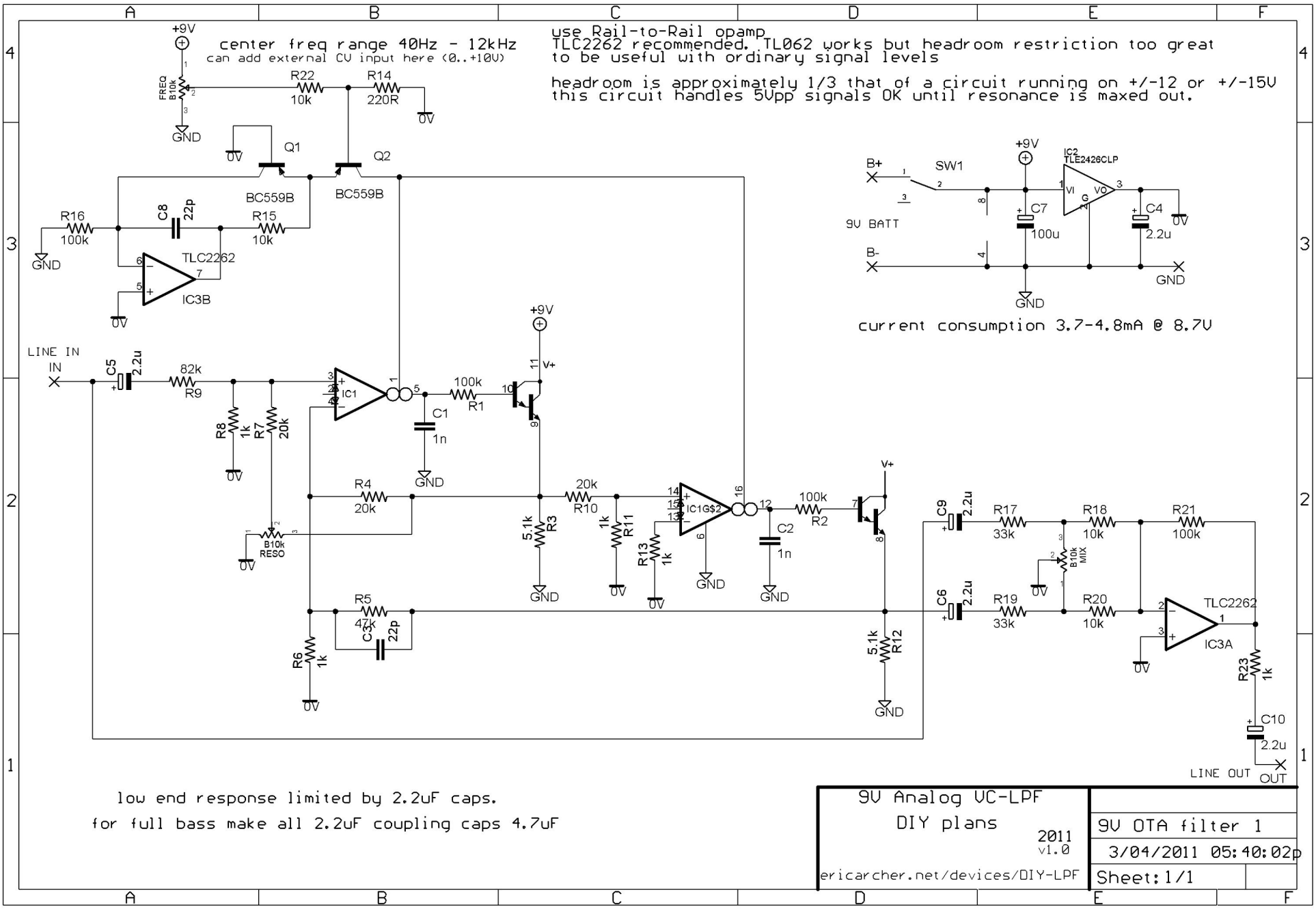


9V Analog VC-LPF
DIY plans
v1.0

ericarcher.net/devices/diy-lpf

2011

	qty	part	name
CONNECTORS	2	1/4" jack [NYS234-3]	1/4" JACK (IN, OUT)
	1	9V snap [123-5006-GR]	
CAPACITORS	2	1n polyester 5mm LS	C1, C2
	2	22p ceramic 5mm LS	C3, C8
	5	2.2u electrolytic 4x7 mm	C4, C5, C6, C9, C10
	1	100u electrolytic 7x7mm	C7
POTENTIOMETERS	3	B10k 9mm vertical [317-2090F-10k]	FREQ, RESO, MIX
ICs	1	NJM13700D / LM13700 / LM13600 / NE5517	IC1
	1	TLE2426CLP	IC2
	1	TLC2262CP	IC3
TRANSISTORS	2	BC559B	Q1, Q2
RESISTORS	4	100k	R1, R2, R16, R21
	1	220R	R14
	4	10k	R15, R18, R20, R22
	2	33k	R17, R19
	2	5.1k	R3, R12
	3	20k	R4, R7, R10
	1	47k	R5
	5	1k	R6, R8, R11, R13, R23
	1	82k	R9
SWITCH	1	SPST slide switch (POWER) [10SP003]	SW1


center freq range 40Hz - 12kHz
can add external CV input here (0..+10V)
use Rail-to-Rail opamp
TLC2262 recommended. TL062 works but headroom restriction too great
to be useful with ordinary signal levels
headroom is approximately 1/3 that of a circuit running on +/-12 or +/-15V
this circuit handles 5Vpp signals OK until resonance is maxed out.
+9V
FREQ B10k
R22 10k
R14 220R
GND
0V
Q1
Q2
BC559B
BC559B
R16 100k
C8 22p
R15 10k
TLC2262
IC3B
LINE IN
IN
C5 2.2u
82k R9
IC1
R8 1k
R7 20k
B10k RESO
R4 20k
100k R1
C1 1n
5.1k R3
20k R10
1k R11
R13 1k
IC1G$2
C2 1n
100k R2
V+
R5 47k
C3 22p
R6 1k
5.1k R12
C9 2.2u
R17 33k
R18 10k
R21 100k
B10k MIX
C6 2.2u
R19 33k
R20 10k
TLC2262
IC3A
R23 1k
C10 2.2u
LINE OUT
OUT
B+
SW1
9V BATT
B-
IC2 TLE2426CLP
C7 100u
C4 2.2u
current consumption 3.7-4.8mA @ 8.7V
low end response limited by 2.2uF caps.
for full bass make all 2.2uF coupling caps 4.7uF
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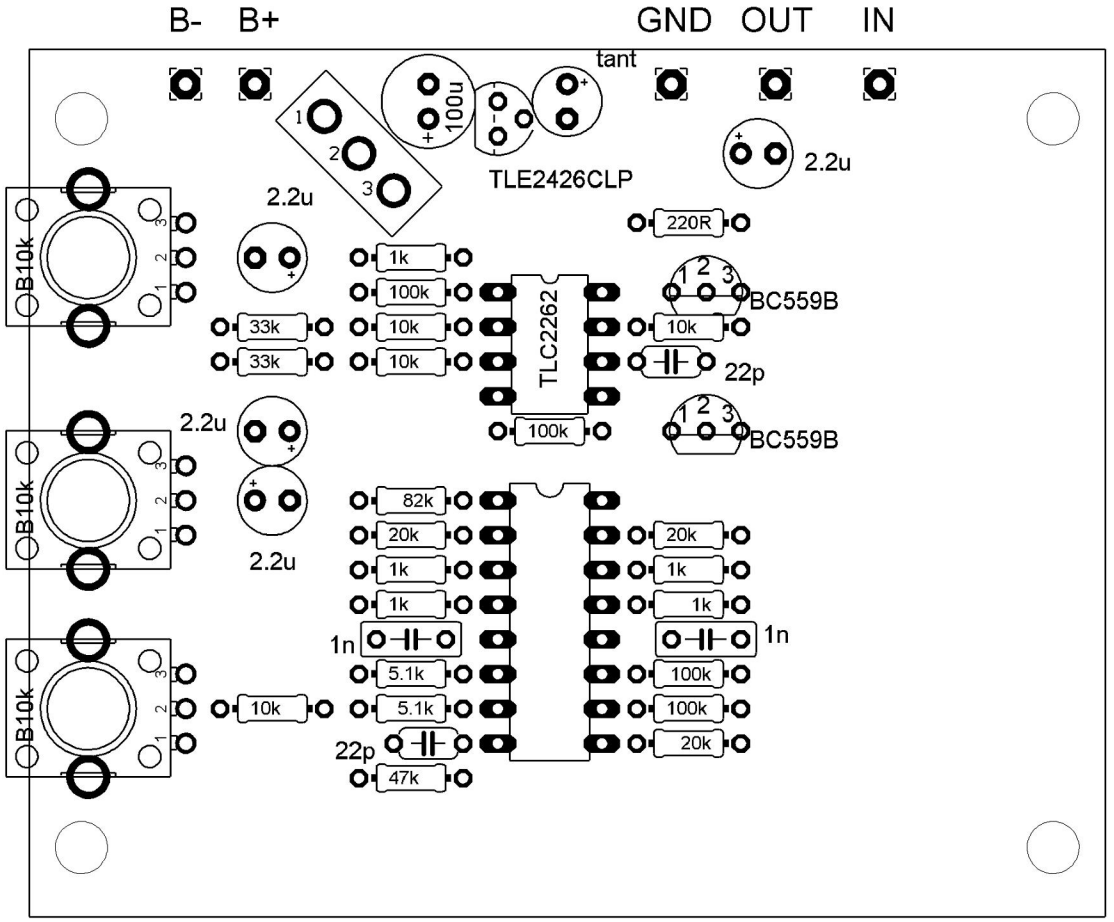
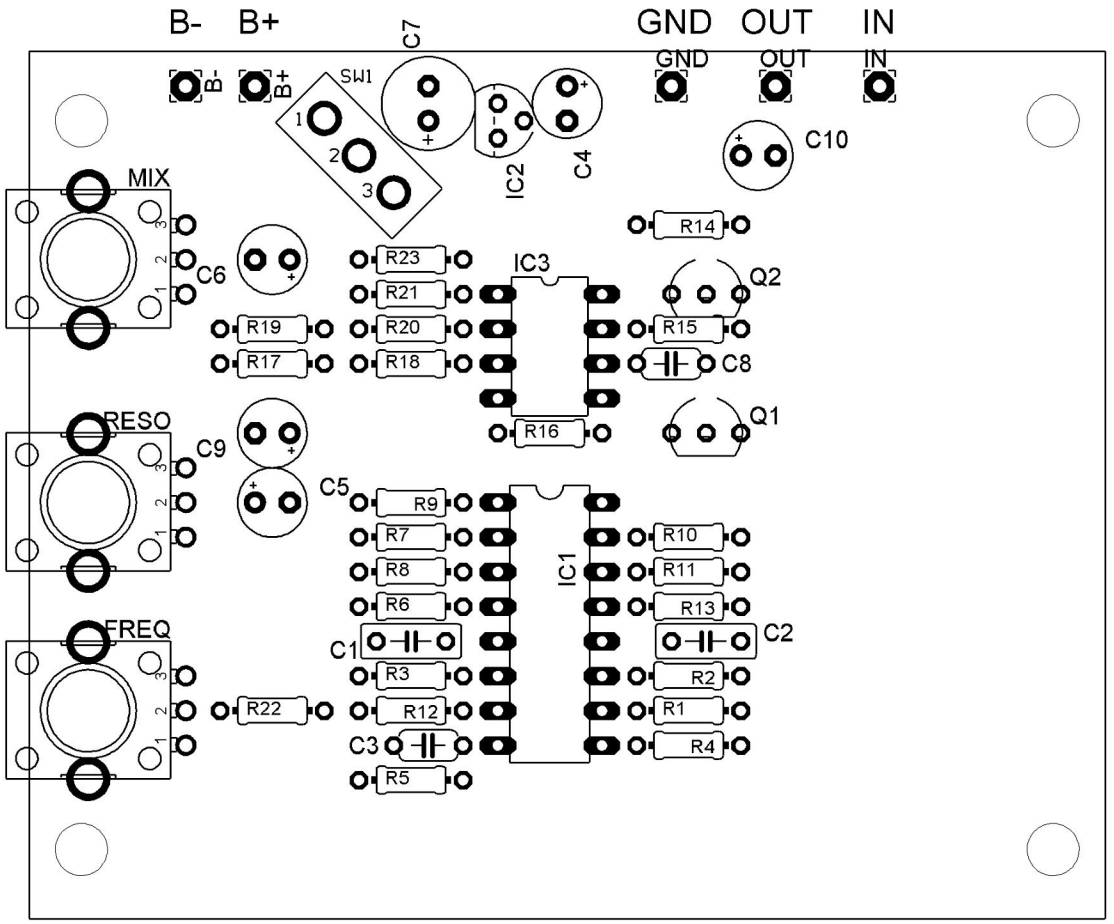
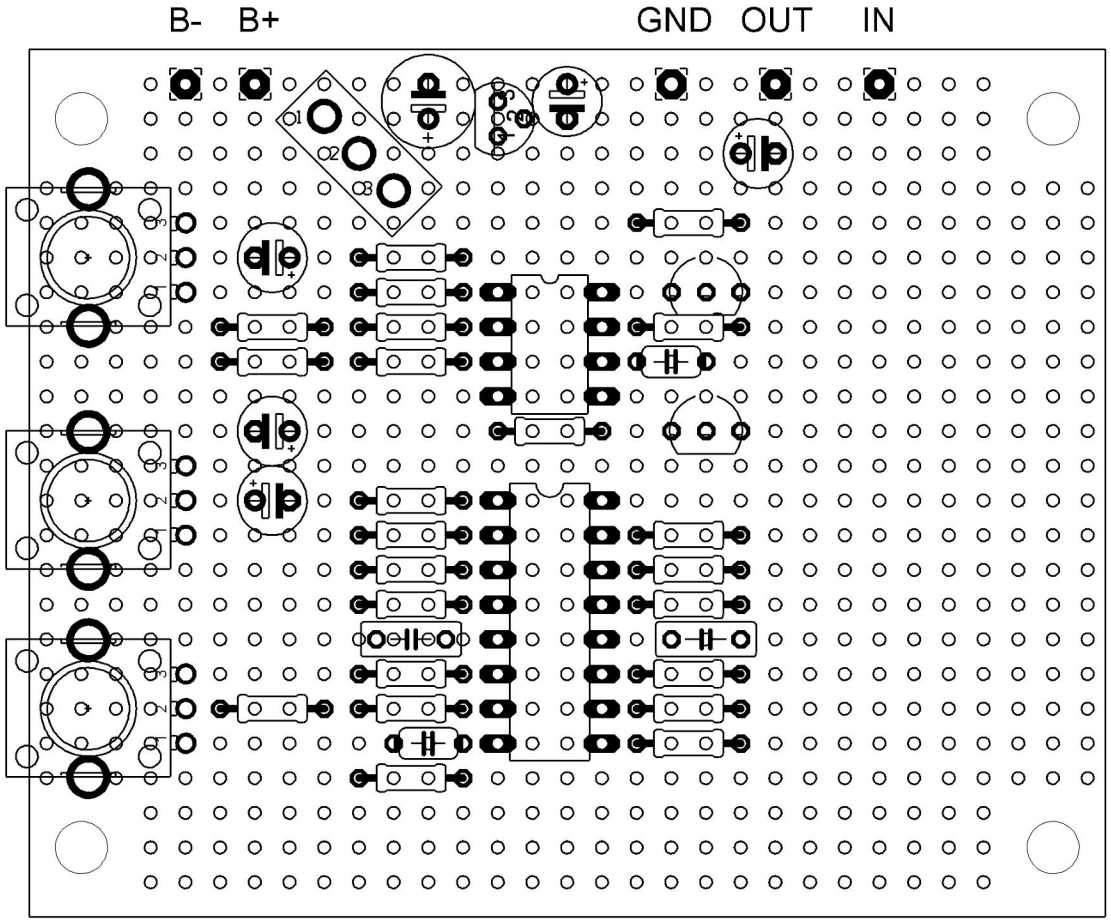
ericarcher.net/devices/DIY-LPF
9V OTA filter 1
3/04/2011 05:40:02p
Sheet: 1/1


B-
B+
GND
OUT
IN
tant
100u
TLE2426CLP
2.2u
2.2u
220R
1k
100k
33k
33k
10k
10k
TLC2262
BC559B
10k
22p
100k
BC559B
B10k
2.2u
2.2u
82k
20k
1k
1k
1n
5.1k
5.1k
22p
47k
20k
1k
1k
1n
100k
100k
20k
B10k
10k
B10k

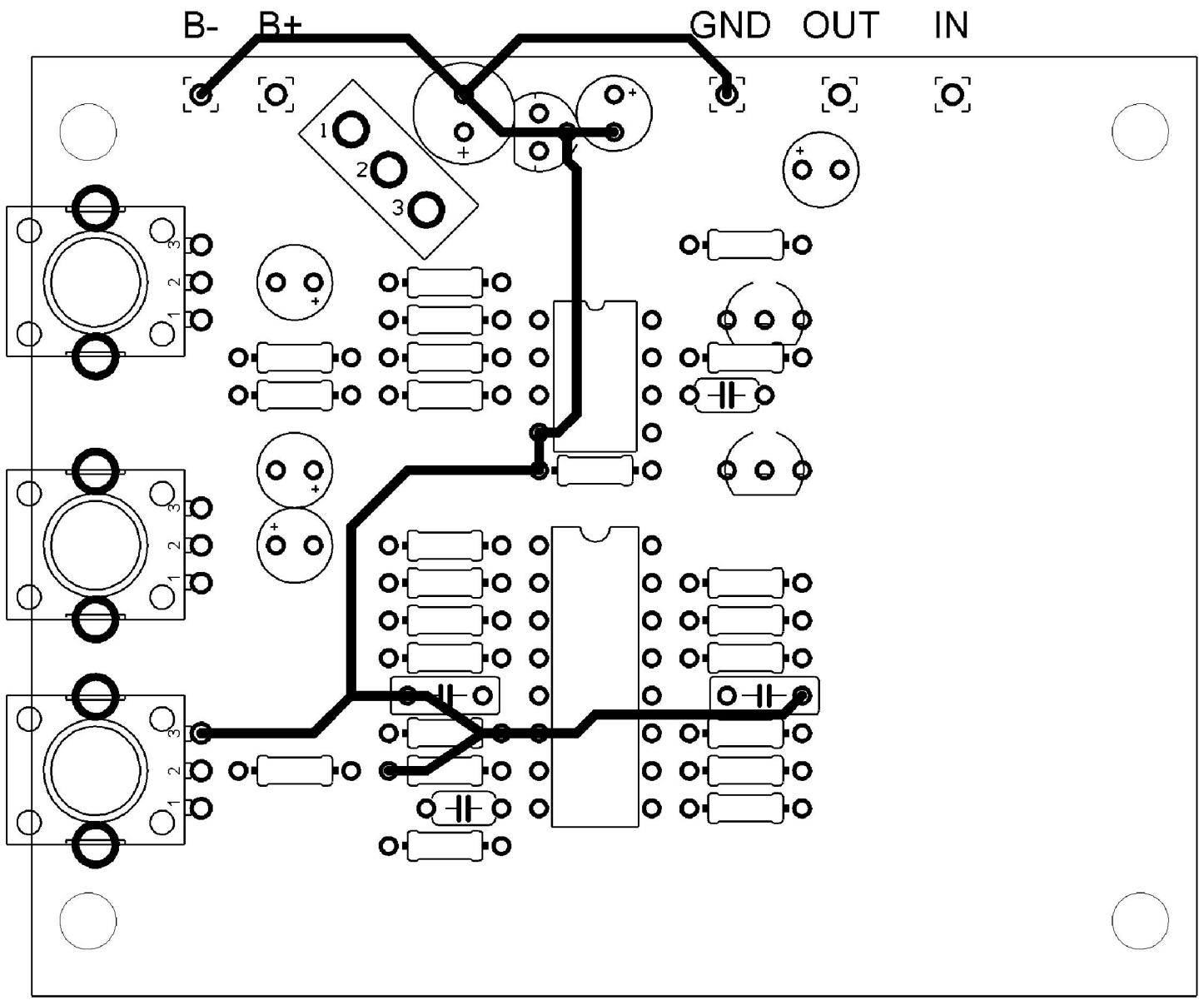
Values


B-
B+
C7
GND
OUT
IN
SW1
C10
IC2
C4
MIX
R14
C6
R23
IC3
Q2
R21
R19
R20
R15
R17
R18
C8
RESO
C9
R16
Q1
C5
R9
R7
R10
IC1
R8
R11
R6
R13
C2
C1
R3
R2
FREQ
R22
R12
R1
C3
R4
R5

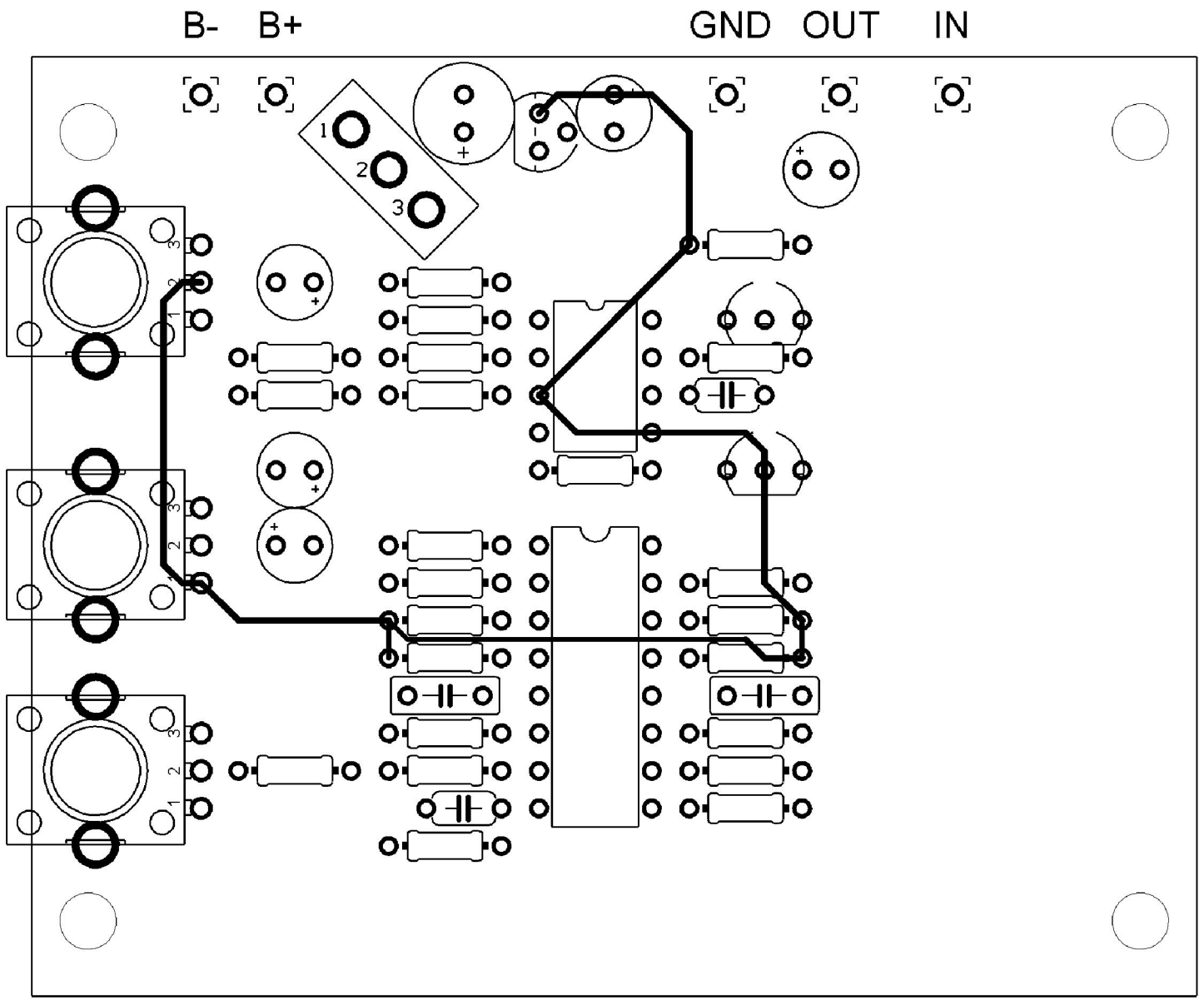
Names



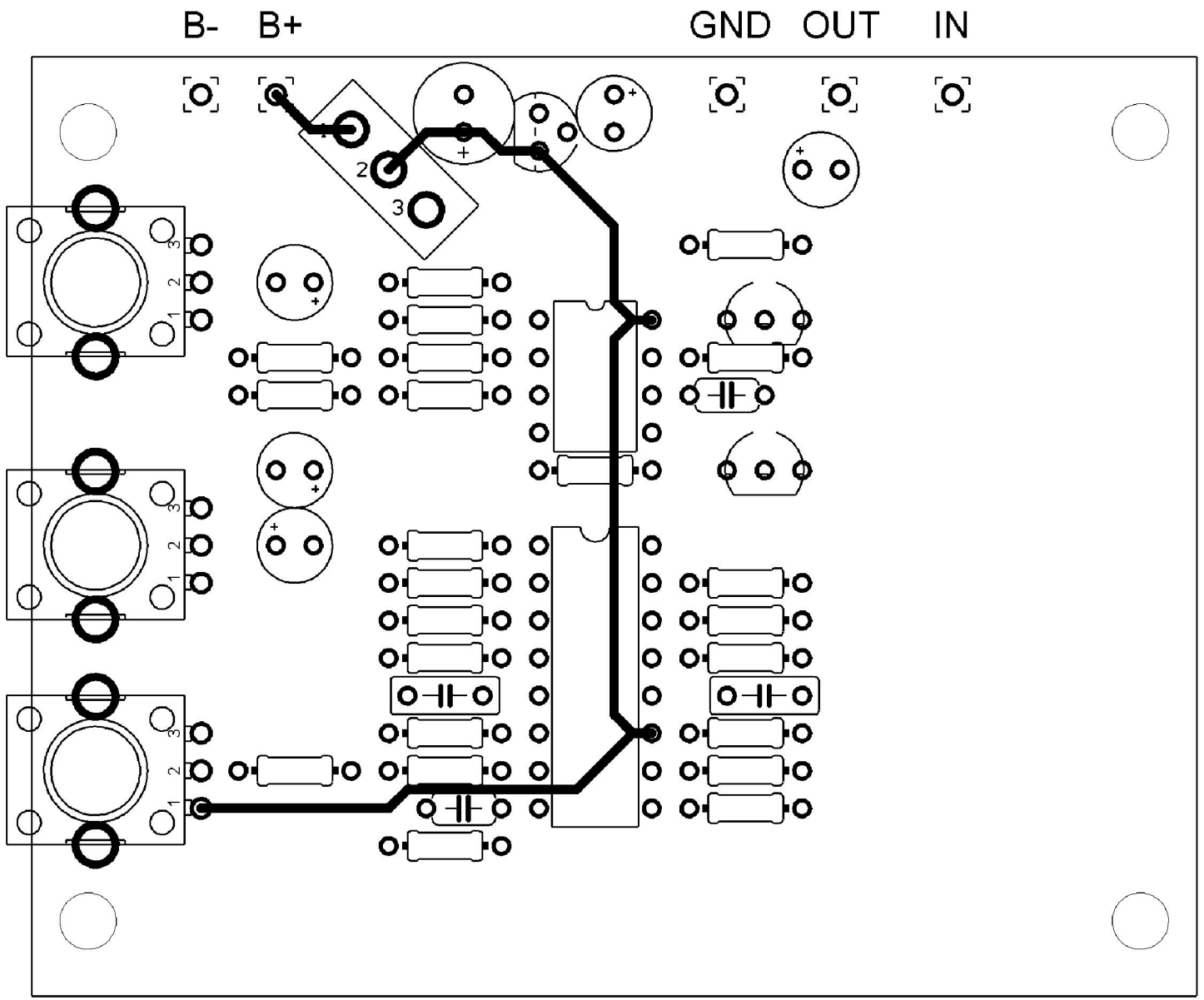
Placement

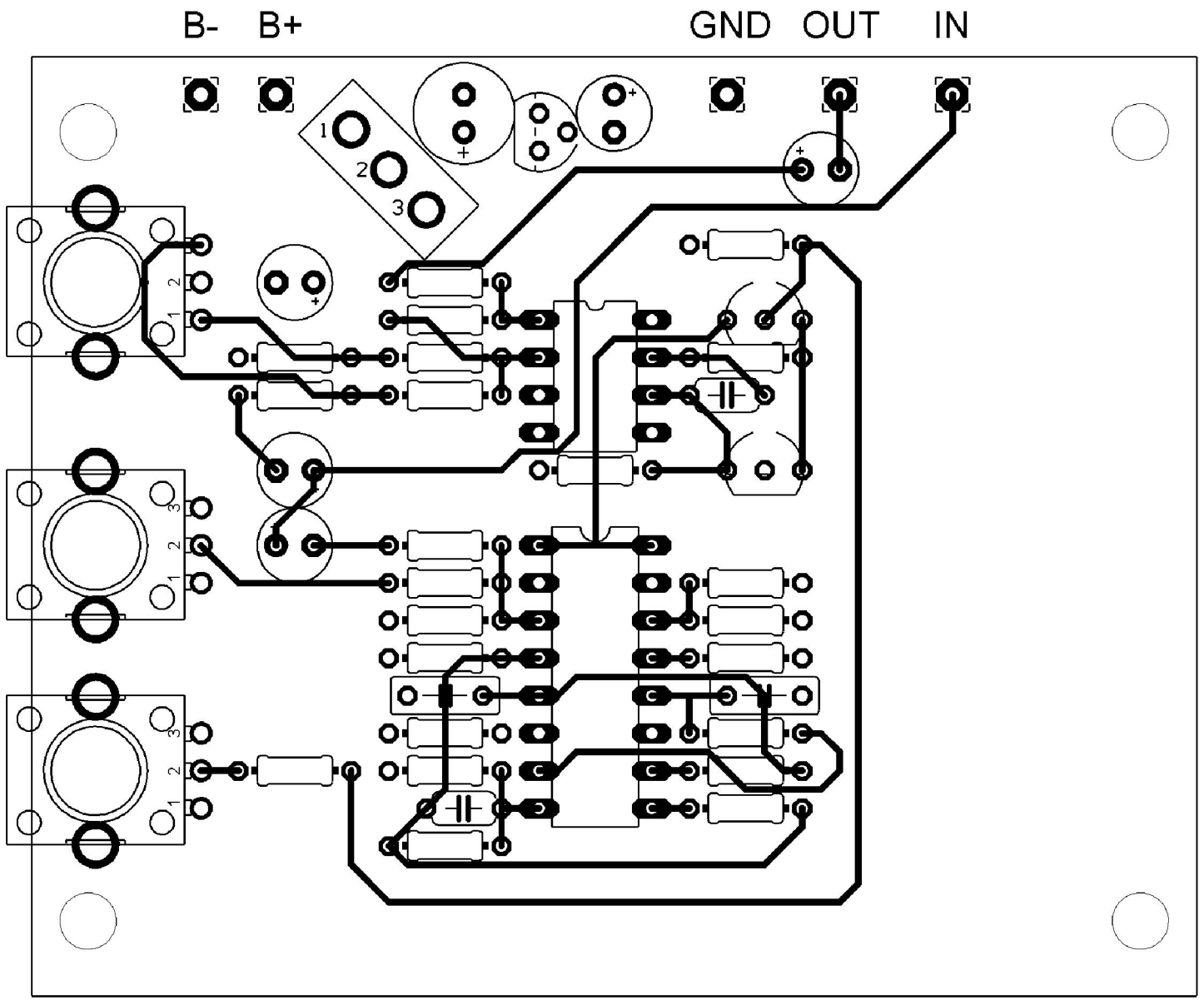


GND

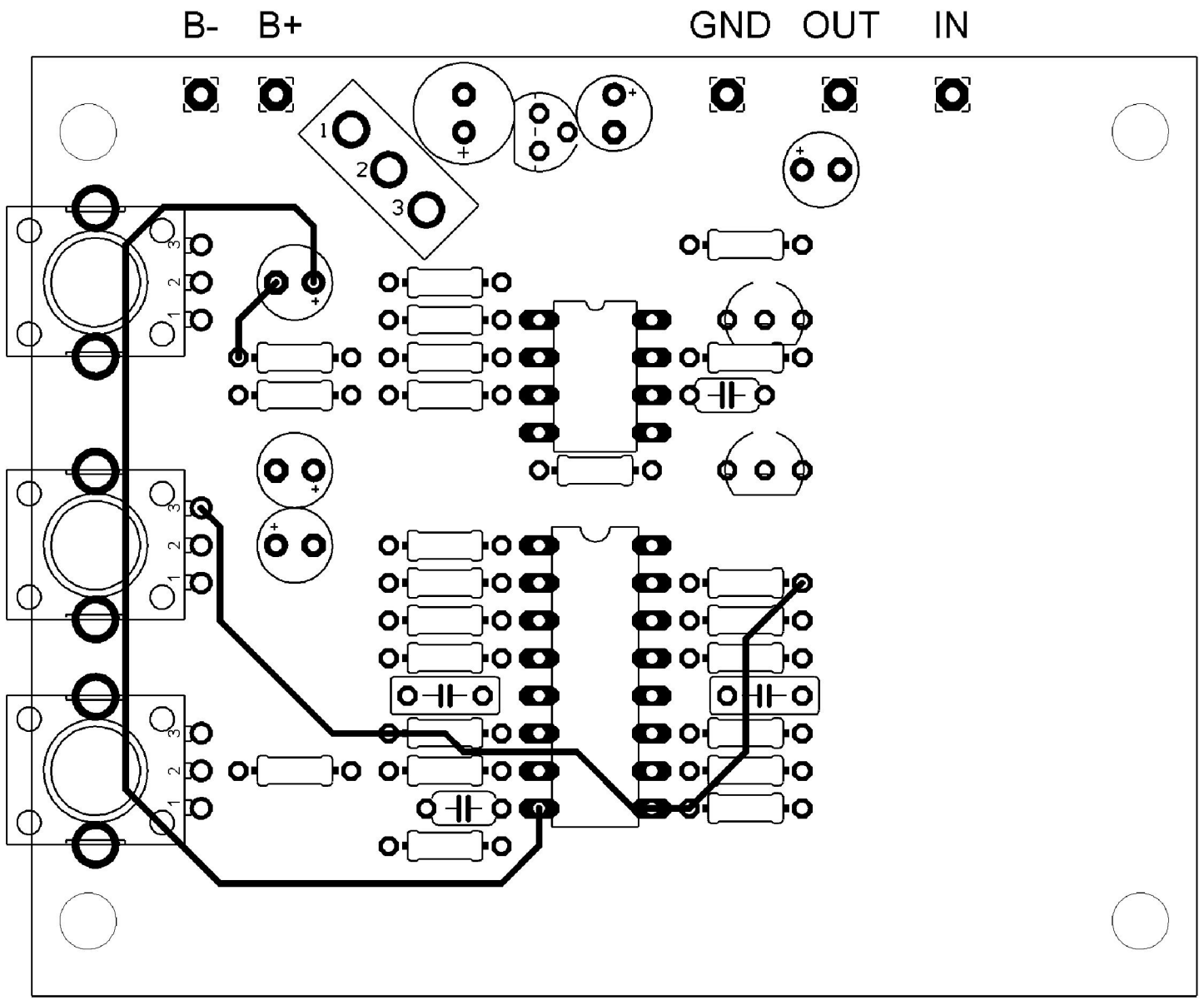


Virtual GND

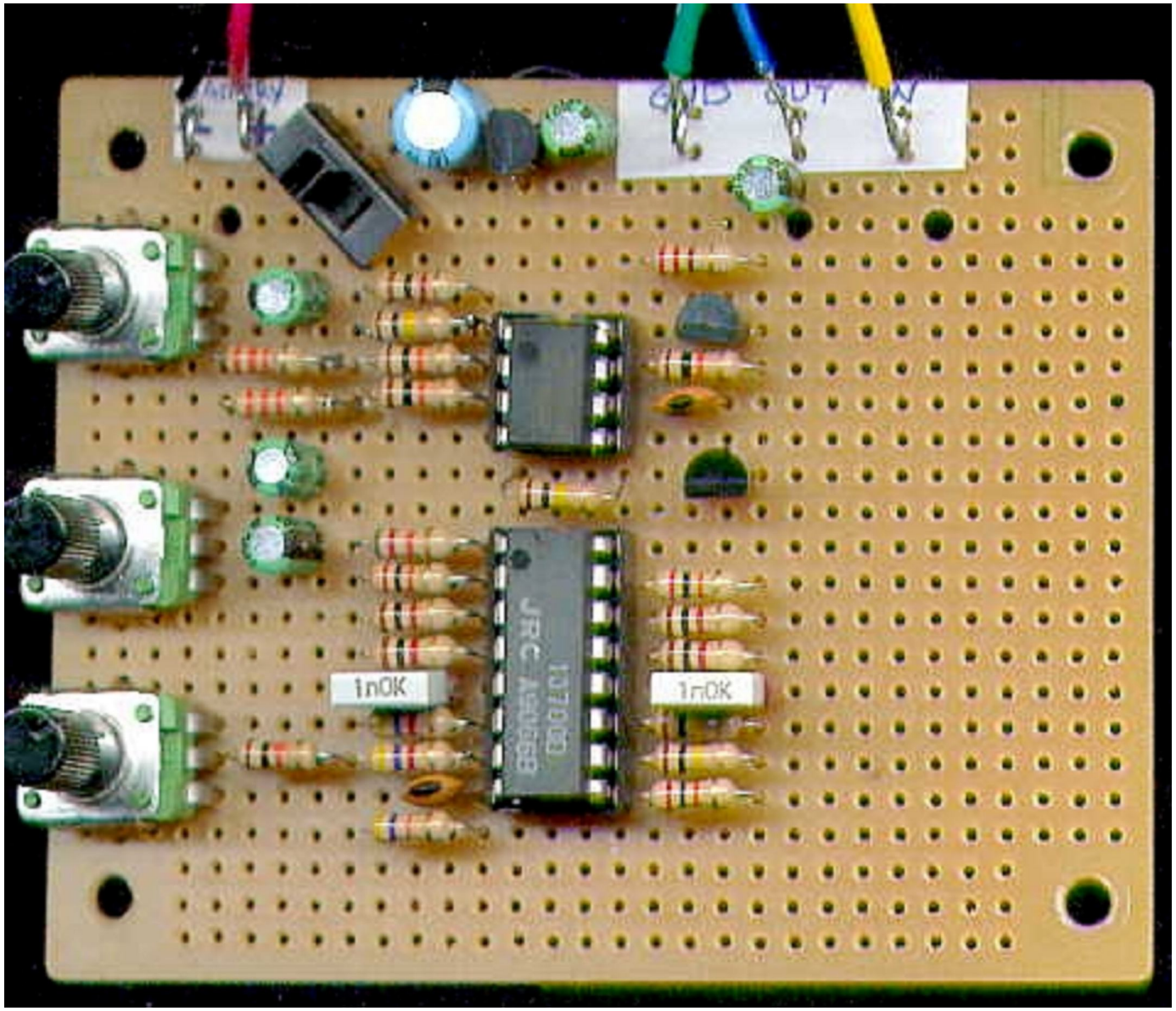

B-
B+
GND
OUT
IN
9V



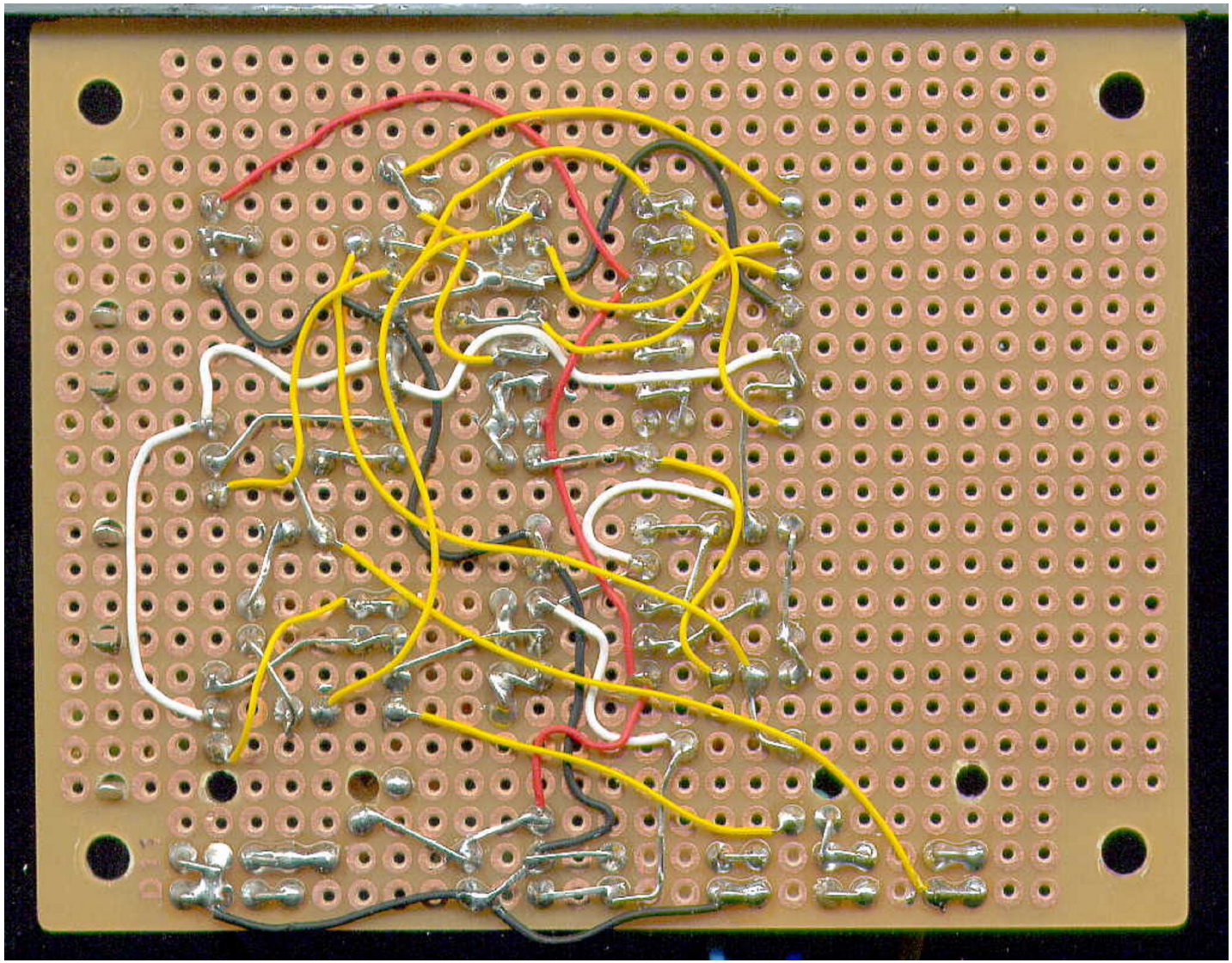
SIGNAL1



SIGNAL2



Top Side



(top edge)

Bottom Side