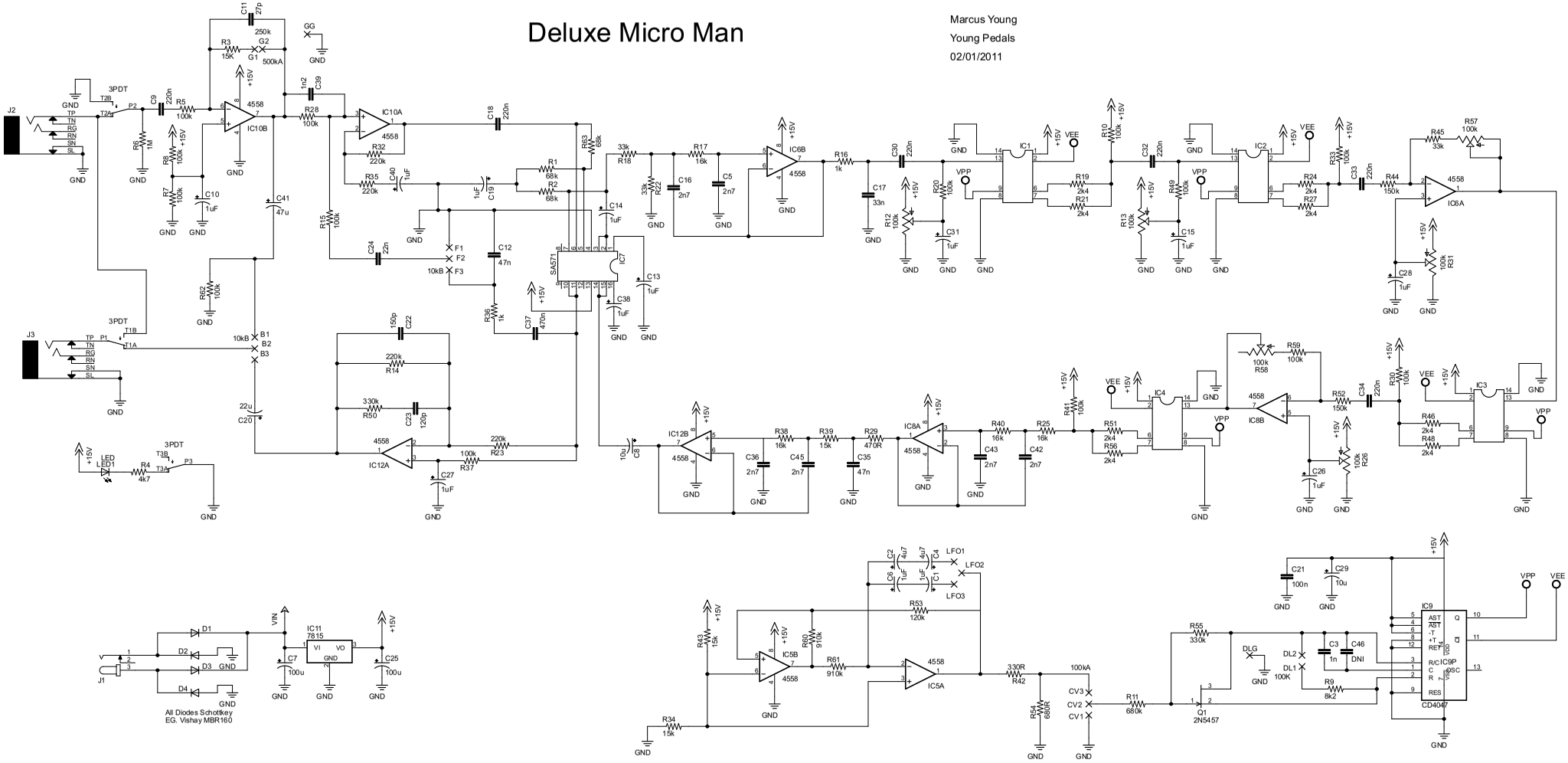
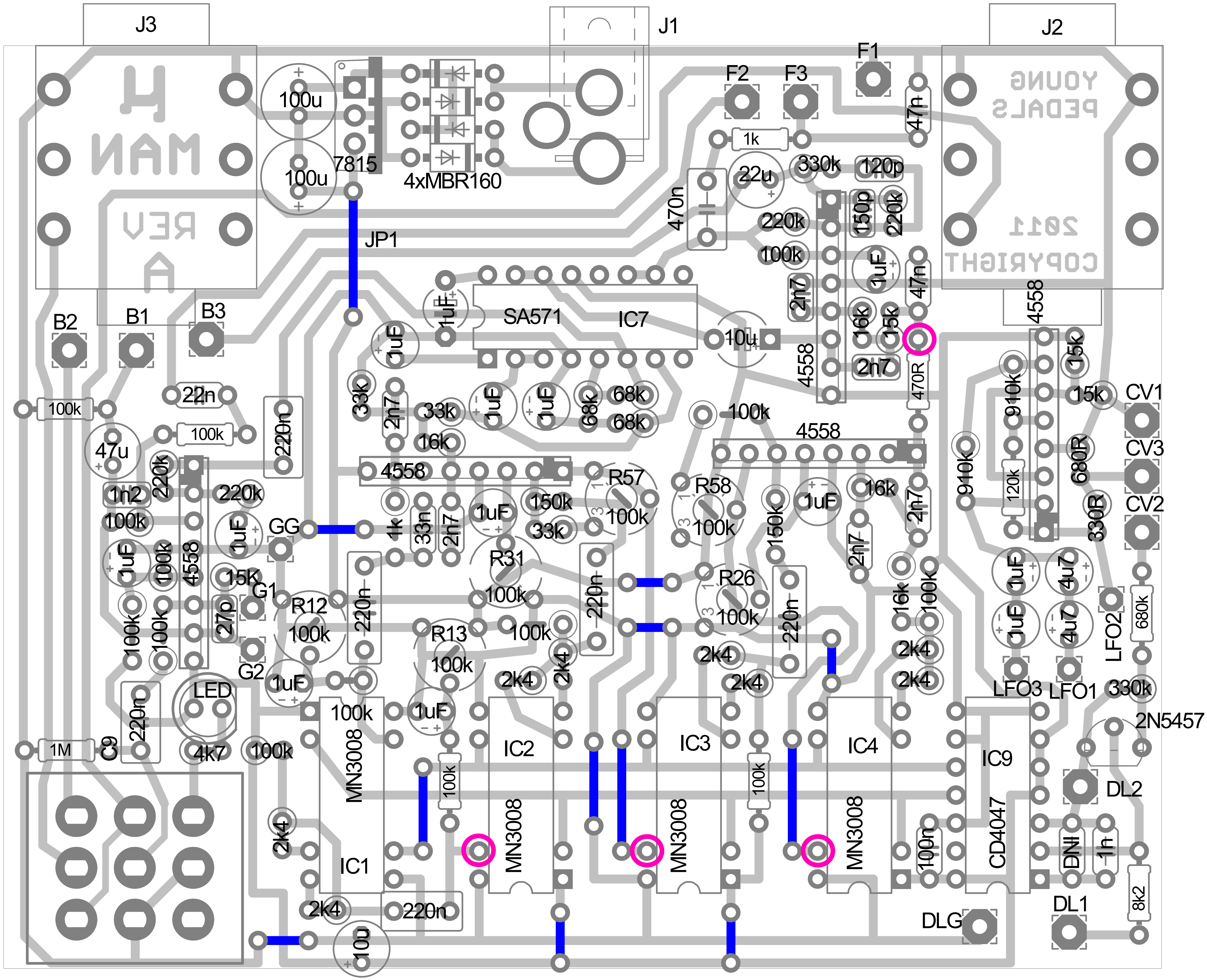
Deluxe Micro Man

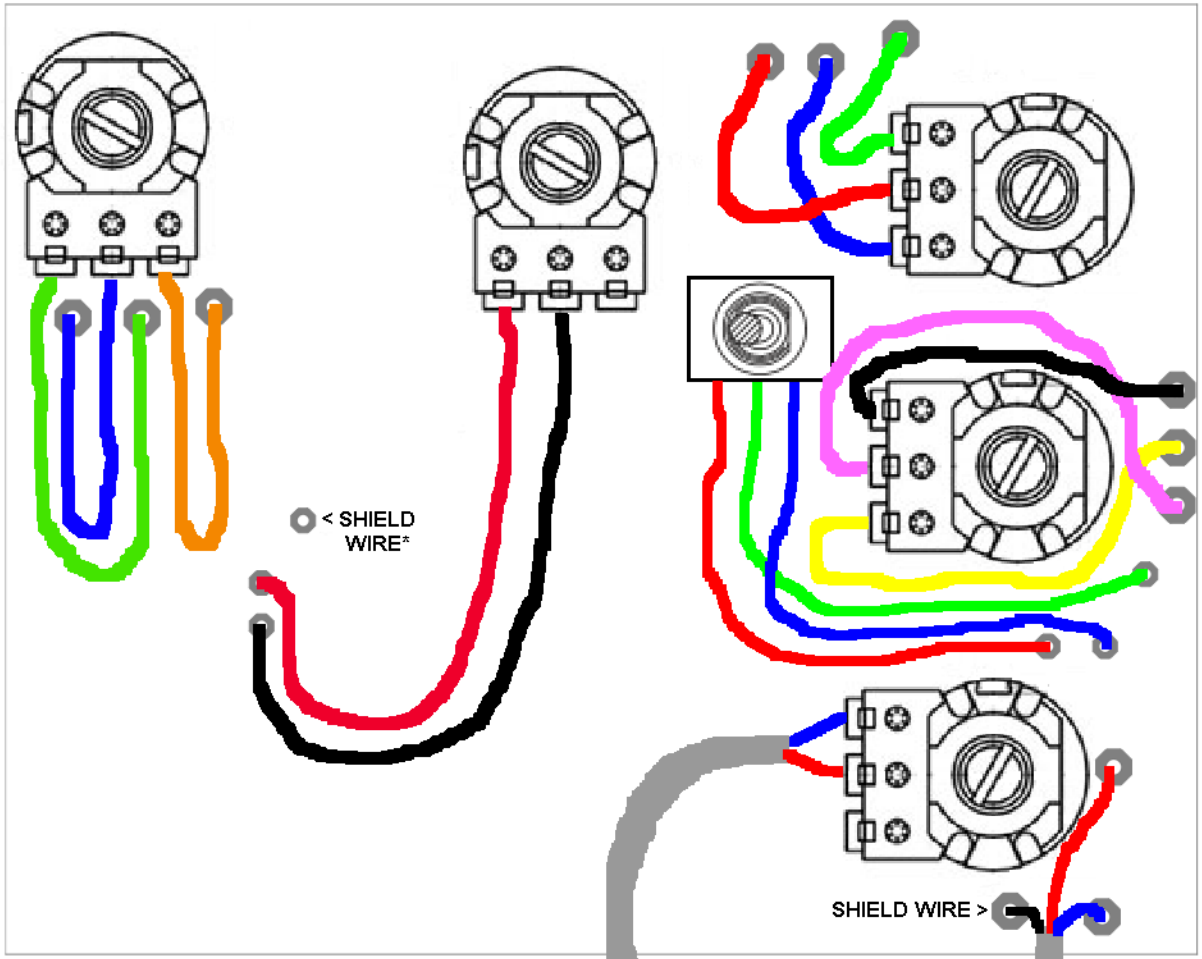
Marcus Young

Young Pedals

02/01/2011

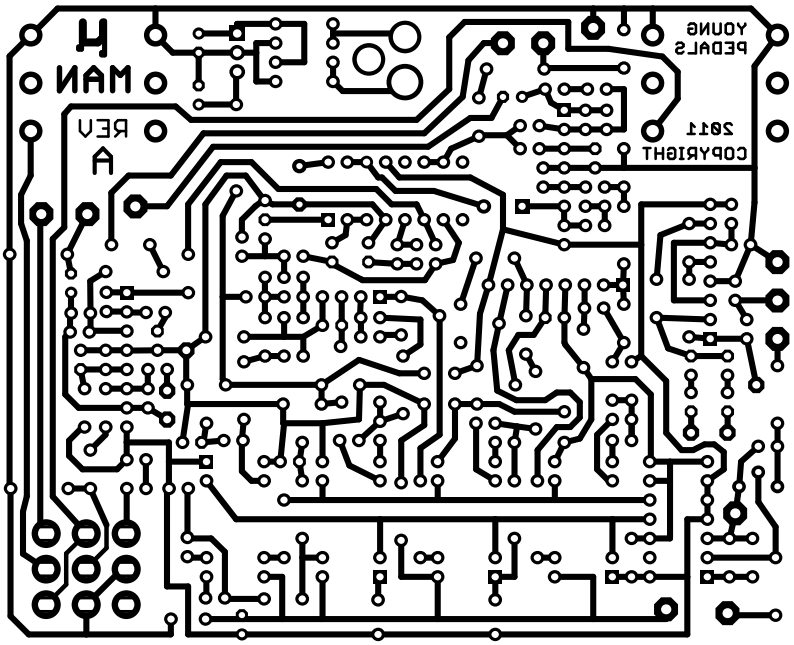



J3
J1
J2
F1
F2
F3
MAN
REV
A
YOUNG
PEDALS
2011
COPYRIGHT
100u
100u
7815
4xMBR160
JP1
1k
47n
22u
330k
120p
470n
220k
150p
220k
100k
1uF
47n
2n7
16k
15k
2n7
470R
4558
4558
SA571
IC7
10u
1uF
1uF
B2
B1
B3
22n
100k
100k
220n
33k
2n7
33k
16k
1uF
1uF
68k
68k
68k
100k
4558
15k
910k
15k
CV1
47u
220k
1n2
220k
100k
4558
4558
R57
100k
R58
100k
1uF
16k
910k
120k
680R
CV3
CV2
330R
GG
1k
33n
2n7
1uF
150k
33k
150k
2n7
2n7
1uF
100k
15K
G1
27p
R12
100k
220n
R31
100k
220n
R26
100k
220n
16k
100k
1uF
4u7
LFO2
680k
1uF
1uF
4u7
R13
100k
100k
2k4
2k4
2k4
2k4
2k4
2k4
G2
1uF
LED
220n
1M
C9
4k7
100k
100k
1uF
MN3008
IC2
IC3
IC4
LFO3
LFO1
330k
2N5457
IC9
100k
100k
DL2
2k4
MN3008
MN3008
MN3008
100n
CD4047
DNI
1n
IC1
2k4
220n
10u
DLG
DL1
8k2

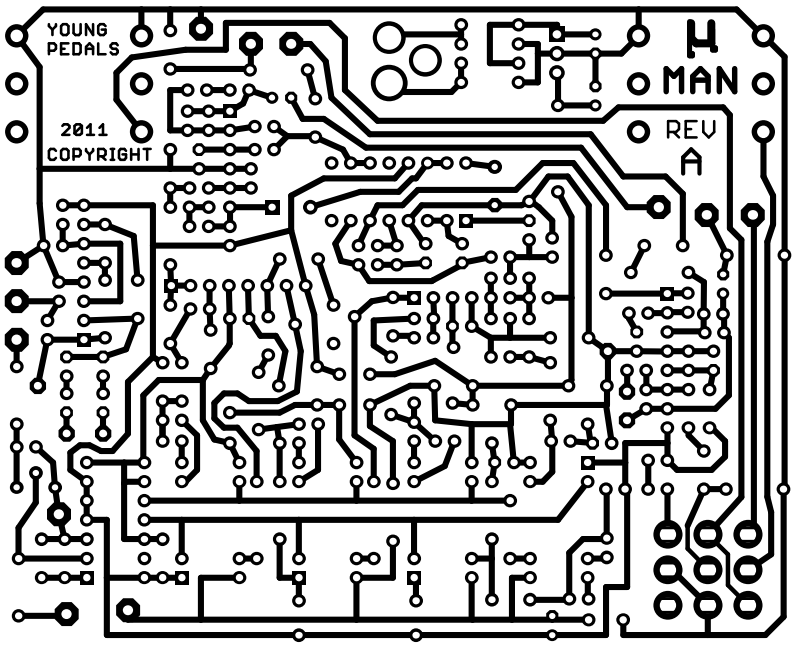


*SHIELDED WIRE FOR GAIN POTENTIOMETER IS OPTIONAL BUT HIGHLY RECOMMENDED DUE TO PROXIMITY TO DELAY POTENTIOMETER

PCB Bottom Side 1:1, mirrored (Print this to do etching transfers):

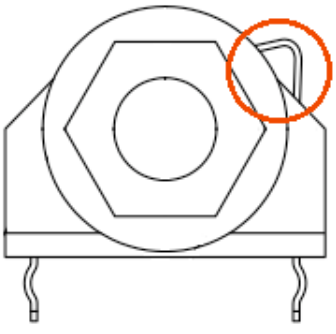


PCB Bottom Side, 1:1

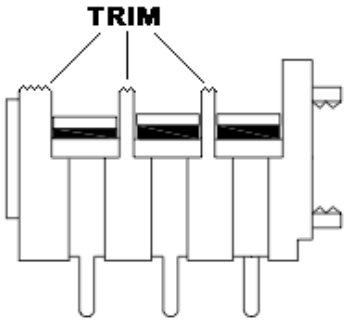


DESIGN NOTES:

1. This project is DIFFICULT. It's very dense; meaning it's hard to fabricate the PCB, hard to solder, tricky to calibrate, and tough to squeeze in a Hammond 1590BB size enclosure.
2. This design is largely based on the classic Electro-Harmonix Deluxe Memory Man with a few modifications to the circuit:
    - It uses 4xMN3008 BBD's instead of 2xMN3005, which are becoming impossible to get. The MN3008 is slightly easier to obtain at the writing of this document.
    - It uses POSITIVE 15VDC power, as opposed to –15VDC in the DMM.
    - The power uses a full bridge schottky rectifier, instead of a half bridge on the DMM. This allows for 18-24VDC or 12-18VAC at the input, which are power sources that are becoming more and more available on pedal-power supplies. This circuit uses ~80mA at 18VDC (for the fastest clock setting).
    - The modulation scheme uses a JFET to couple the LFO to the BBD clock driver.
    - The anti-aliasing (input to BBDs) and re-construction (output of BBDs) low-pass filters are unity gain, instead of gains >2 on the DMM (see Sallen-Key low-pass filter for clarity).
    - Vgg of the BBD's is referenced to the same potential as Vdd instead of ~1V away from Vdd like the datasheet recommends. The original application notes from Panasonic say that it's ok to do this. The original DMM uses a resistor drop from –15V to achieve the Vgg bias.
3. The 3PDT switch should be the usual solder lug type, but it's intended to mount on the PCB. Use a 1/16" drill hole for the lugs. These switches can be tedious to repair if they fail, so the bigger the hole, the easier it will be to remove the solder. 3PDT switches do exist with through-hole lugs, but they are not as common.
4. The jacks are PCB mount and must be low profile (eg. Cliff) to fit in the enclosure. One recommended source for these types are at www.tubesandmore.com, along with various bulk distributors (see Bill of Materials). Neutrik (and Chinese copies) make a similar jack, BUT the tip/ring/sleeve shorting terminals extend above the plastic mold, which will not fit with the 16mm potentiometers. Furthermore, the ribbed portions at the top of the Cliff style jack mold that insulate the tip, ring, and sleeve should be trimmed by 1/16". See below:

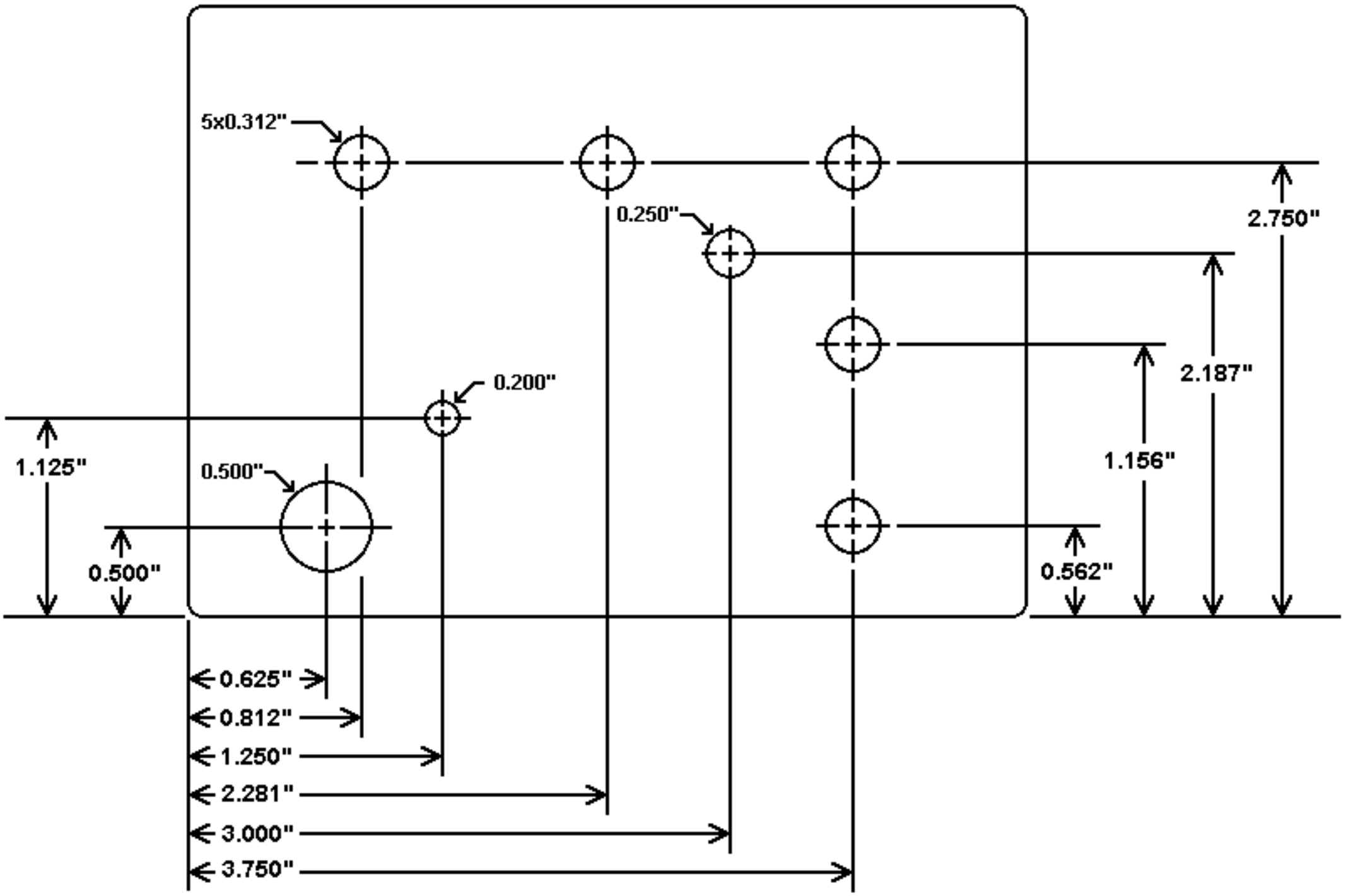


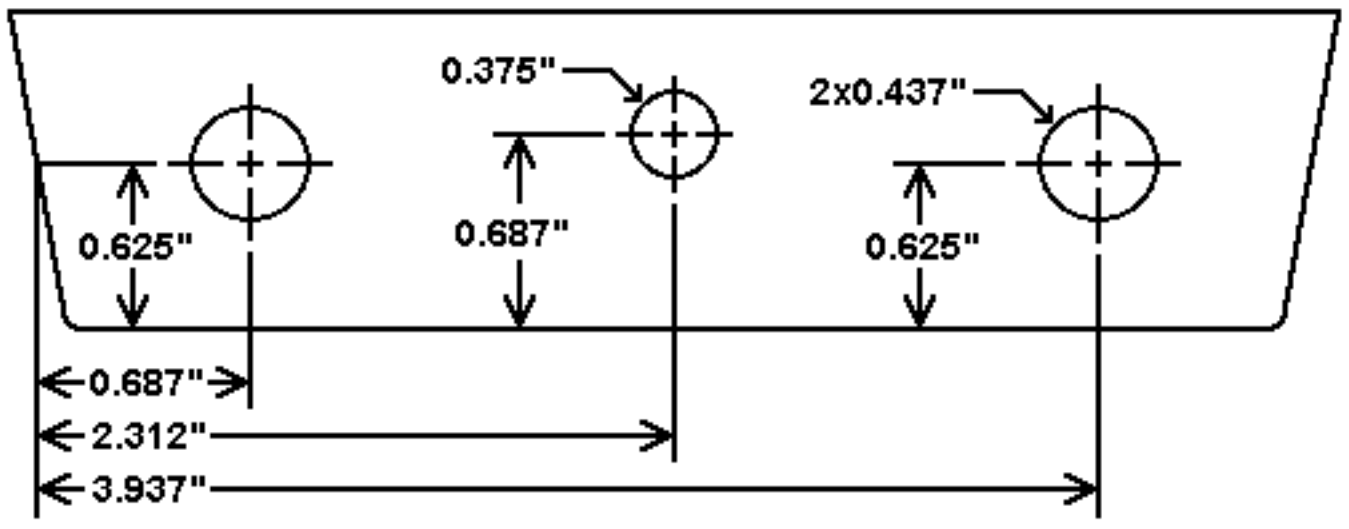
Unacceptable Neutrik Style PCB Jack



Acceptable Cliff Style with trim detail

5. If using the 1590BB hole placement in this document, you must insulate the back of the BLEND and FEEDBACK potentiometers by applying plastic or various types of tape.


5x0.312"
0.250"
0.200"
0.500"
1.125"
0.500"
2.750"
2.187"
1.156"
0.562"
0.625"
0.812"
1.250"
2.281"
3.000"
3.750"


0.375"
2x0.437"
0.625"
0.687"
0.625"
0.687"
2.312"
3.937"

Bill Of Materials

Reference Designator	Quantity	Value	Type
Resistors			
R42	1	330R	metal film
R29	1	470R	metal film
R54	1	680R	metal film
R16,R36	2	1K	metal film
R19, R21, R24, R27, R46, R48, R51, R56	8	2.4K, 1%	metal film
R4	1	4.7K	metal film
R9	1	8.2K	metal film
R3, R34, R39, R43	4	15K	metal film
R17, R25, R38, R40	4	16K	metal film
R18, R22, R45	3	33K	metal film
R1, R2, R63	3	68K	metal film
R5, R7, R8, R10, R15, R20, R28, R30, R33, R37, R41, R49, R59, R62	14	100K	metal film
R53	1	120K	metal film
R44, R52	2	150K	metal film
R14, R23, R32, R35	4	220K	metal film
R50, R55	2	330K	metal film
R11	1	680K	metal film
R60, R61	2	910K	metal film
R6	1	1M	metal film
Potentiometers			
Pads "Bx" and "Fx"	2	10KB	Alpha, 16mm, carbon
Pads "DLx"	1	100KB	Alpha, 16mm, carbon
Pads "CVx"	1	100KA	Alpha, 16mm, carbon
Pads "Gx"	1	500KA	Alpha, 16mm, carbon
R12, R13, R26, R31, R57, R58	6	100KB	Phier, 6mm, top adjust, potentiometer
Capacitors			
C11	1	27pF	ceramic, 50V
C23	1	120pF	ceramic, 50V
C22	1	150pF	ceramic, 50V
C3	1	1nF	ceramic, 50V
C39	1	1.2nF	polyester film, 50V
C5, C16, C36, C42, C43, C45	6	2.7nF	polyester film, 50V
C24	1	22nF	polyester film, 50V
C17	1	33nF	polyester film, 50V
C12, C35	2	47nF	polyester film, 50V
C21	1	100nF	multi-layer ceramic, 50V
C9, C18, C30, C32, C33, C34	6	220nF	metal film (Panasonic), 50V
C37	1	470nF	multi-layer ceramic, 50V

Capacitors, continued			
C1, C6, C10, C13, C14, C15, C19, C26, C27, C28, C31, C38, C40	13	1uF	Electrolytic, 4mm, 25V+
C2, C4	2	4.7uF	Electrolytic, 4mm, 25V+
C8, C29	2	10uF	Electrolytic, 5mm, 25V+
C20	1	22uF	Electrolytic, 5mm, 25V+
C41	1	47uF	Electrolytic, 5mm, 25V+
C7, C25	2	100uF	Electrolytic, 6.3mm, 50V
Semi-conductors			
Q1	1	2N5457	JFET
D1, D2, D3, D4	4	MBR160	Schottky Rectifier
IC2	1	7815	+15V Regulator
IC4	1	CD4047	BBD Clock
IC1, IC9, IC10, IC11	4	MN3008	BBD
IC7	1	SA571	Compander
IC3, IC5, IC6, IC8, IC12	5	4558L	Op-Amp, SIP
LED1	1	Red LED	T34, 5mm
Jacks and Switches			
-	1	3PDT Switch	Bypass foot switch
-	1	SPDT Switch	Mini toggle switch
J1	1	Kycon, KLDX-0202-A	Power jack: switched terminal on left side!!!
J2, J3	2	tubesandmore.com p/n S-H601A	PCB mount TS or TRS, switched jack, LOW profile

CALIBRATION:

The Deluxe Micro Man calibration must be performed directly on the PCB assembly prior to installing it into the enclosure.

1. With a digital multi-meter, ensure that 15VDC +/- 5% is present on JP1 and power pins of the IC's (Eg. IC9 pin4, IC1/2/3/4 pin1; IC7 pin12).
2. Set all trim potentiometers to 50% of their rotation.

If you have an oscilloscope and signal generator with triangle wave:

3. Probe IC9 pin10. Set Delay to 0% (fully counter clockwise, or CCW), measure ~80kHz, 15VDC square wave. Set Delay to 100% (fully clockwise, or CW) measure ~10kHz, 15VDC square wave.
4. Input a 100mV, 100Hz Triangle wave on J2. Ensure that the effect is on as illuminated by the LED after pressing the bypass switch.
5. Set Blend, Gain and Delay to 50%, and Feedback and Chorus/Vibrato to 0%.

Ensure minimum distortion of the input signal from BBD to BBD by checking the points with pink circles on the parts assembly and adjusting the following resistor(s):

6. R12; controls bias of BBD1/IC1 as measured at IC2 pin7.
7. R13; controls bias of IC2/BBD2 as measured at IC3 pin7.
8. R31; controls bias and R57 controls gain (turn **CCW** to increase) of IC3/BBD3 as measured at IC4 pin7.
9. R26; controls bias and R58 controls gain (turn **CW** to increase) of IC3/BBD3 as measured at IC4 pin7.