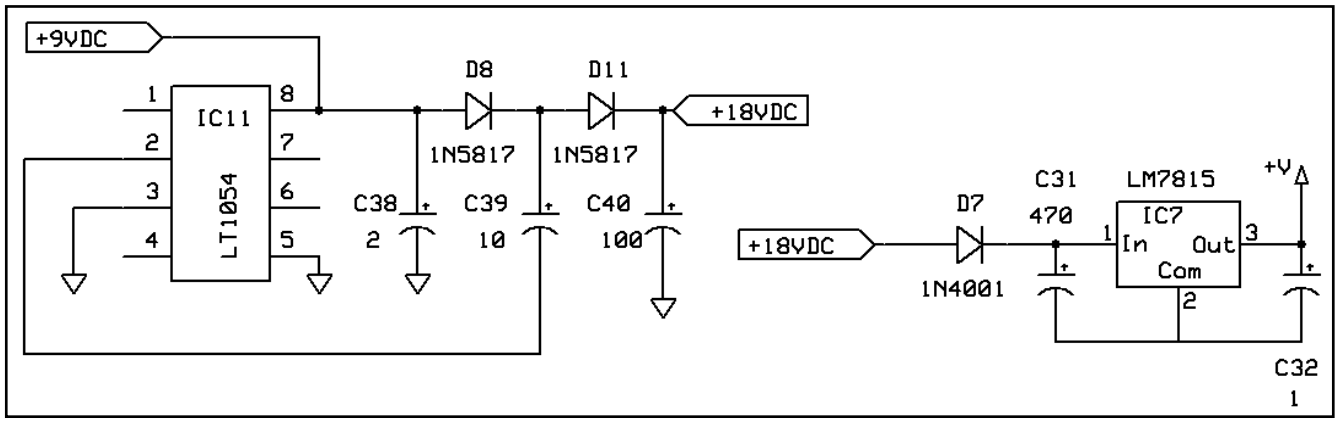
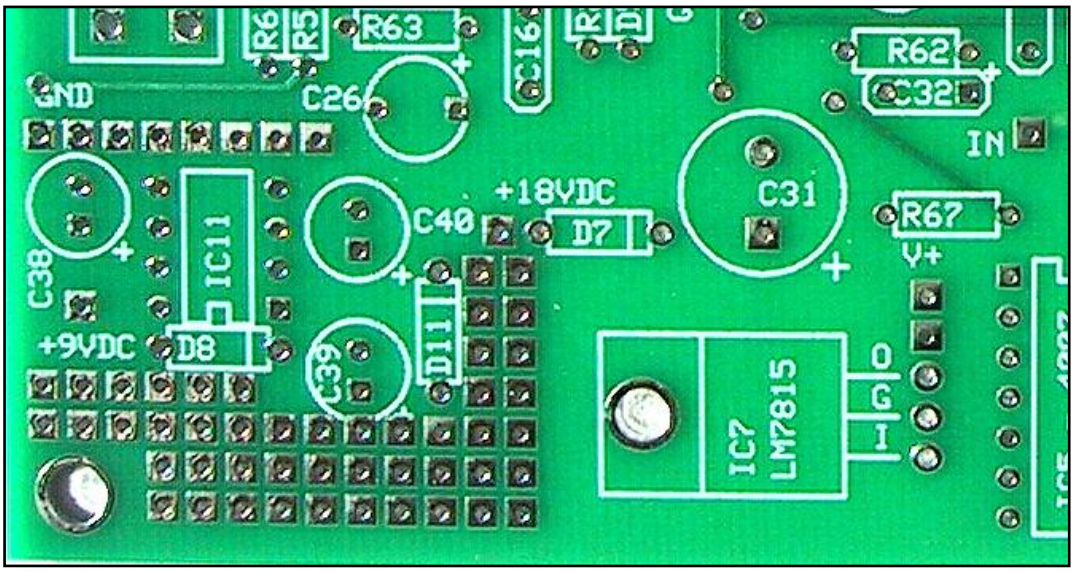
**ADA Flanger Clone Build Documentation**
**MN3007 version – PCB rev5 – January 2010**
(updated Feb 2012)

## Power supply

The power supply section of the circuit is located in the lower left corner of the PCB. Either a +9VDC wall wart or a +18VDC wall wart is recommend. Alternatively, one or two 9V batteries may be used as a temporary solution for startup, testing or debugging. Three options for supplying power to the PCB are described below.




**Option 1** – Use a 9VDC wall wart power supply

- Install all components shown in the power schematic, above.
- Apply +9VDC to the PCB from a 9VDC wall wart to the pad labeled '+9VDC', located below C38.

**Option 2** – Use an 18VDC wall wart power supply

- DO NOT install IC11 and associated components (C38, C39, C40, D8, D11).
- Install D7, C31, C32 and IC7.
- Apply +18VDC to the PCB from an 18VDC wall wart to the pad labeled '+18VDC', to the left of D7.

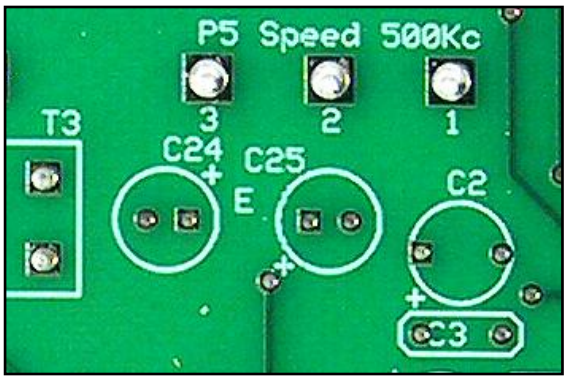
**NOTE** - Space is provided to allow for a heat sink to be installed on the 15VDC regulator, IC7 (LM7815), but the use of a heat sink is not critical and it can be omitted with little concern.

**Option 3** – Use two (2) 9V batteries connected in series

- Connect the (+) from the first battery to the (-) of the second battery.
- Connect the (-) from the first battery to ground.
- Connect the (+) from the second battery to +9VDC on the PCB.

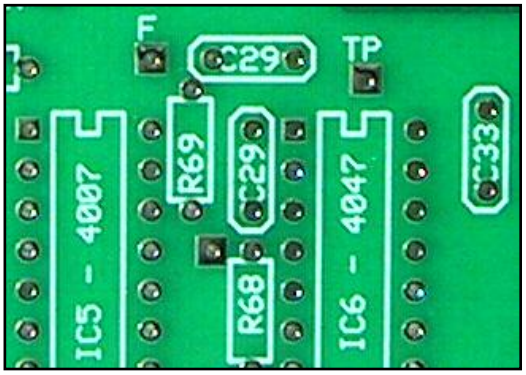
**NOTE** – This is a good option for troubleshooting things like unwanted noise or power problems, but it is not recommend as a permanent solution.

## LFO timing capacitors (C24 and C25)




- The stock ADA Rev.3 version used two electrolytic capacitors in this location.
- Be sure to note the orientation of C24/C25 – positive leads facing each other.
- Alternatively, if you wish to alter the speed range of the LFO, or configure the LFO as in other revisions of the circuit, you may use different capacitor values and/or install only C25 and install a jumper in place of C24.

## Clock timing capacitor (C29)



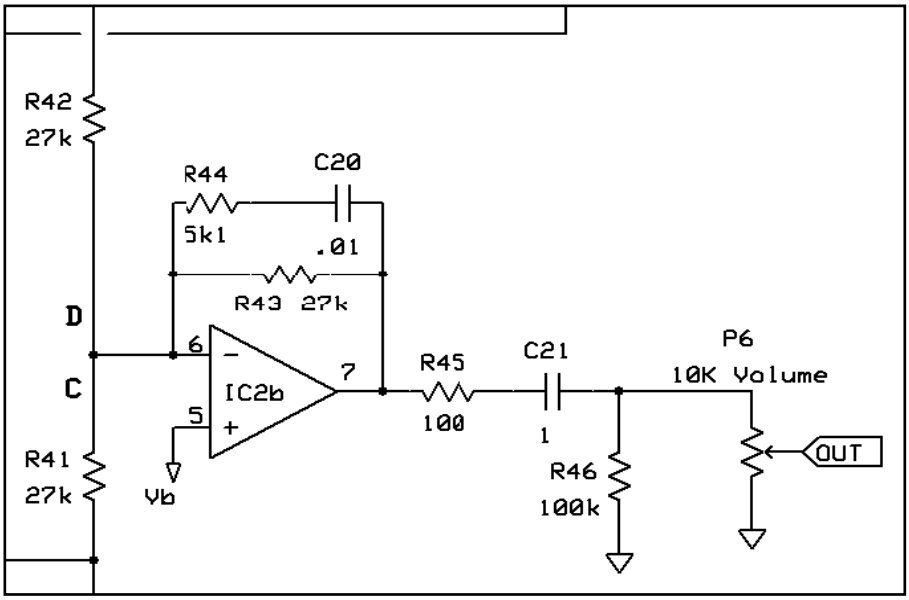

- C29 appears twice in the layout (to the left of IC6). Do not install the upper one that is oriented horizontally, and connects to Pad F (just leave it out).
- The additional footprint for C29 is included for builders who are interested in

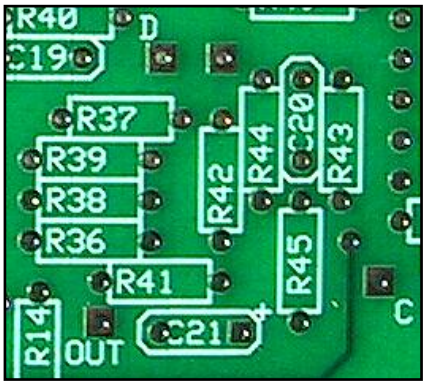
experimenting with switching between alternate timing capacitors in the clock section.

**Threshold potentiometer (P2)**

- The schematic and the silkscreen on the PCB both indicate the original factory value of 10K for the Threshold potentiometer. But, better gating action can be obtained by replacing this with a 100K potentiometer.

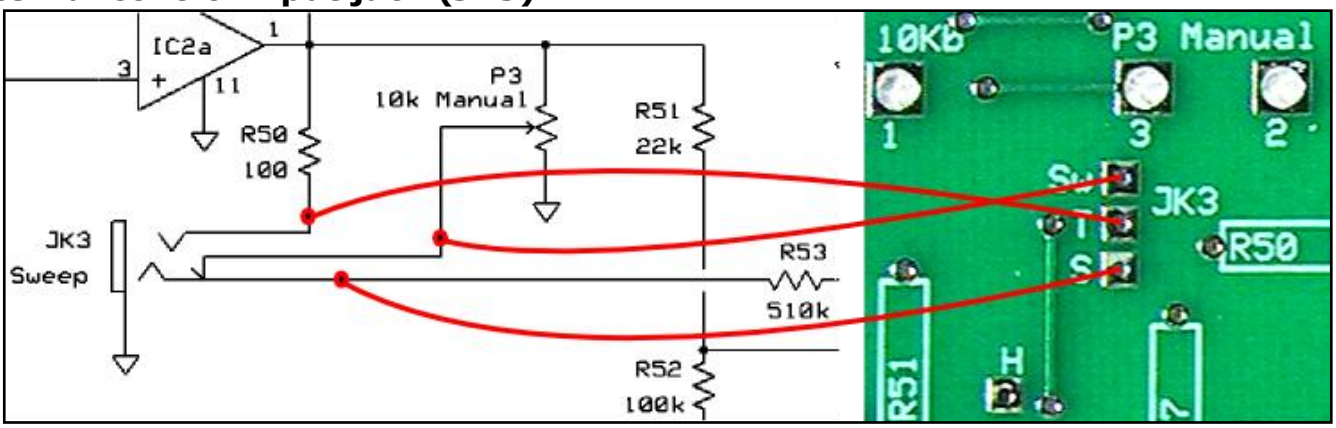
**Output mixing resistors (R41, R42)**




The value of the mixing resistors at the output buffer (R41, R42) has been reduced to allow higher than unity volume at the output, and a 10K output volume pot can be added as shown in the schematic, above. If a panel mounted volume control is not desired, a 10K trim pot can be installed in the perfboard area in the lower left corner of the PCB and connected to the circuit output with a flying lead to provide an internal level setting for the output volume.

**External control input jack (JK3)**



- Use a switching type jack for the manual sweep input jack (JK3). Something similar to Mouser pn 568-NYS218 should work well. The jack sleeve should be grounded, so the jack does not need to be isolated from the enclosure.

When nothing is plugged into JK3, the jack's switch will be closed and the wiper of P3 should connect to R53 through the jack's switch. When the stereo plug from a CV control pedal is plugged into JK3, the jack's switch will open and disconnect the wiper of P3, the plug's ring should connect to R53, and the plug's tip should connect to R50. The pads on the PCB are labeled as follows – Sw (switch contact), T (tip contact), S (ring contact).

Think twice before you decide to leave this feature out, because controlling the sweep of the effect with a foot pedal is really cool! But if you still do not want to install the external control jack, you do not need to install R50, but you must install a jumper between pads Sw and S for the effect to work properly.

**LED and Associated Current Limiting Resistor**

- These are not shown in the schematic or in the Bill of Materials.
- Pick the appropriate value resistor for your particular type of LED.
- The resistor may be installed in the perfboard area in the lower left corner of the PCB, near the power supply section of the circuit.
- Alternatively, if you want the LED to blink at the same rate as the LFO, a resistor/LED may be connected to the output of the LFO (node at lug 3 of the Range control). Additional power filtering may be required if this causes an audible pulse or ticking sound.

**Methodical building process**

Here is an approach to building this (or any circuit) that was outlined by Stephen Giles at diystompboxes.com.

Populate and test the different sections of the circuit as follows. Make sure each section is working as it should before moving on to the next section.

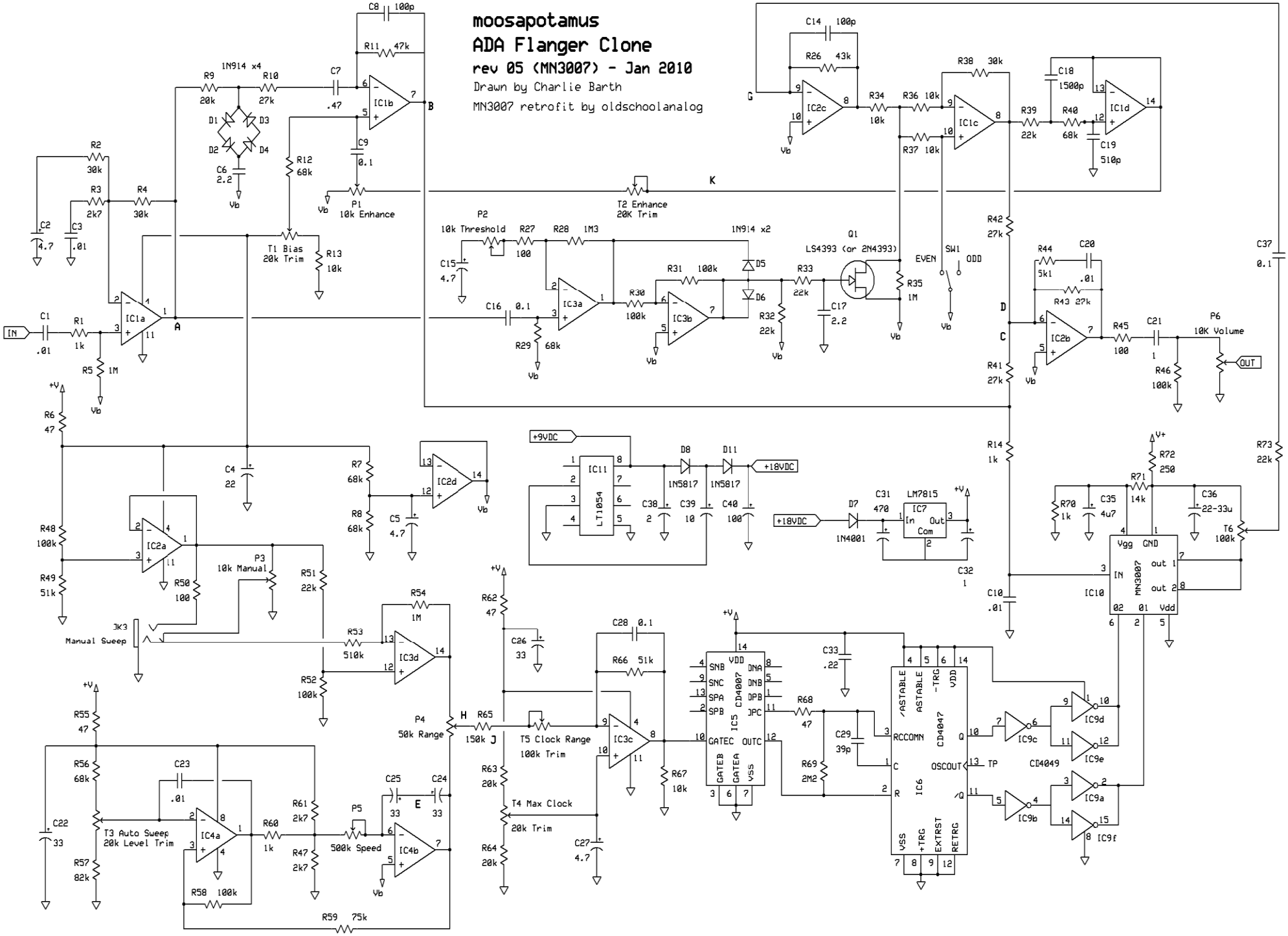
1. Power supply and Vb generator - test that the Vb generator is giving 1/2 +ve voltage otherwise nothing will work!
2. Input / output amps, test that all opamps have good signal at outputs.
3. LFO and manual CV generator - test for changing voltage at Range wiper.
4. Do all components from Range pot to 4049 and check that clock signals are each around 7v.
5. Do components around MN3007. Set up bias and you should have flanging of sorts. I set up the rest by ear using the clock range and max clock trims.

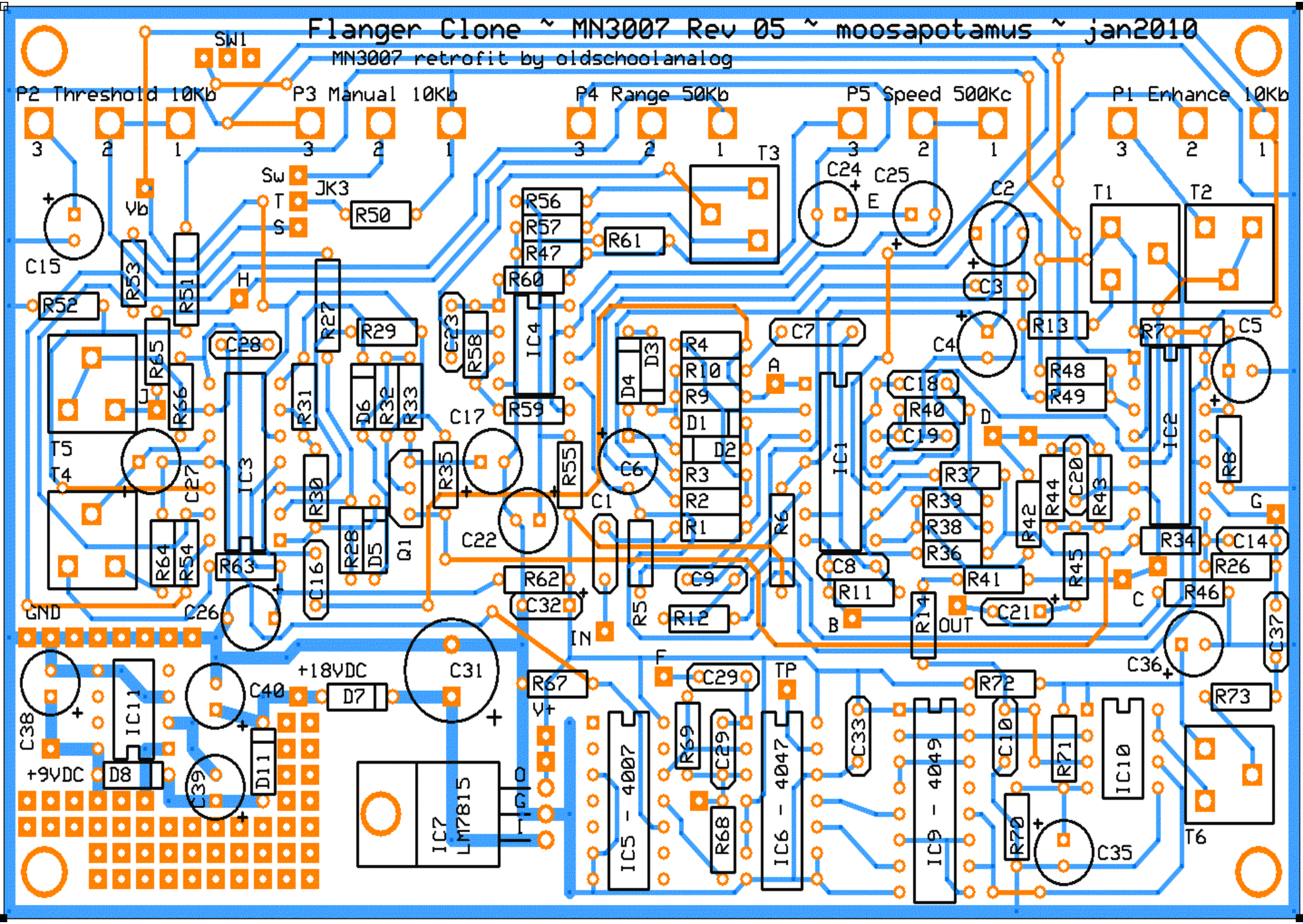
This route would be beneficial to a novice because it is possible to see each separate building block working on its own and makes it easy to remember where everything is in the board - good for troubleshooting. I would even draw round the various sections on the circuit board with a felt tipped pen as a guide.

# moosapotamus
# ADA Flanger Clone
## rev 05 (MN3007) - Jan 2010

Drawn by Charlie Barth

MN3007 retrofit by oldschoolanalog




Flanger Clone ~ MN3007 Rev 05 ~ moosapotamus ~ jan2010
MN3007 retrofit by oldschoolanalog
P2 Threshold 10Kb
P3 Manual 10Kb
P4 Range 50Kb
P5 Speed 500Kc
P1 Enhance 10Kb
SW1
JK3
Sw
T
S
H
L
A
B
C
D
E
F
G
IN
OUT
TP
GND
+18VDC
+9VDC
V+
V-
T1
T2
T3
T4
T5
T6
IC1
IC2
IC3
IC4
IC5 - 4007
IC6 - 4047
IC7 LM7815
IC9 - 4049
IC10
IC11
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R26
R27
R29
R30
R31
R32
R33
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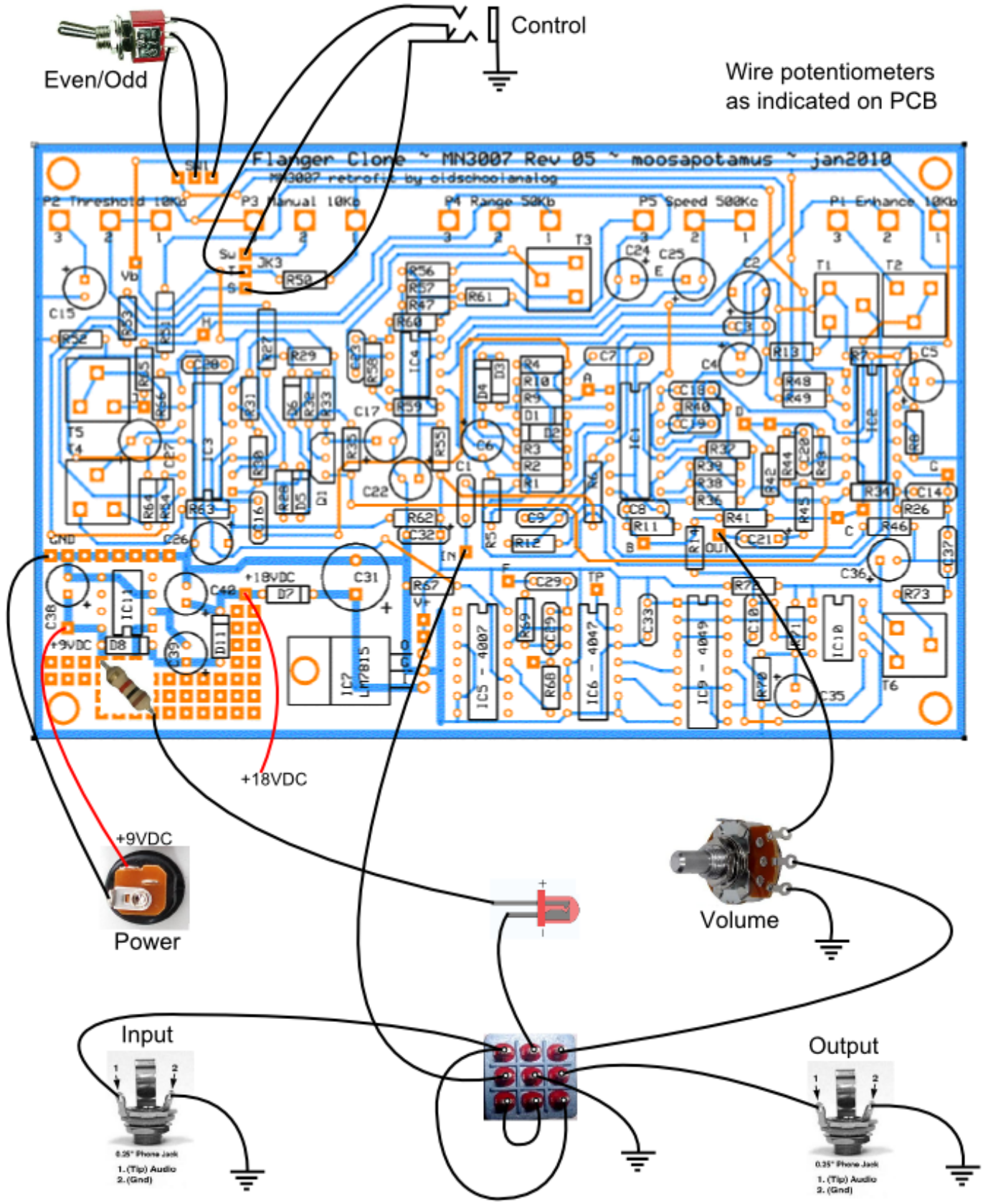
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C31
C32
C33
C35
C36
C37
C38
C39
C40
D1
D2
D3
D4
D5
D6
D7
D8
D11
Q1
Vb


Even/Odd
Control
Wire potentiometers
as indicated on PCB
Flanger Clone ~ MN3007 Rev 05 ~ moosapotamus ~ jan2010
MN3007 retrofit by oldschoolanalog
P2 Threshold 10Kb
P3 Manual 10Kb
P4 Range 50Kb
P5 Speed 500Kc
P1 Enhance 10Kb
+18VDC
+9VDC
Power
Volume
Input
Output
0.25" Phone Jack
1. (Tip) Audio
2. (Gnd)

| ADA Flanger Clone (MN3007 version) Bill of Materials | | | | |
|---|---|---|---|---|
| | | | | |
| **Description** | **Mouser p/n** | **Qty** | **Part Reference** | **Comment** |
| 0.01 | 140-PM2A103K | 5 | C1, C3, C10, C20, C23 | |
| 0.1 | 140-PM2A104K | 4 | C9, C16, C28, C37 | |
| 0.22 | 505-MKS20.022/63/5 | 1 | C33 | |
| 0.47 | 75-MKT1818447064 | 1 | C7 | |
| 1 | 581-TAP105K025SCS | 1 | C32 | Tant |
| 1 | 505-MKS21/50/10 | 1 | C21 | Film |
| 2 | 140-L35V2.2-RC | 1 | C38 | |
| 2.2 | 140-L35V2.2-RC | 2 | C6, C17 | |
| 4.7 | 140-MLRL50V4.7-RC | 5 | C2, C5, C15, C27, C35 | |
| 10 | 140-L35V10-RC | 1 | C39 | |
| 22 | 140-ESRL50V22-RC | 2 | C4, C36 | |
| 33 | 140-ESRL50V33-RC | 4 | C22, C24, C25, C26 | |
| 100 | 140-L25V100-RC | 1 | C40 | |
| 470 | 140-XRL25V470-RC | 1 | C31 | |
| 100p | 140-500P5-101K-RC | 2 | C8, C14 | |
| 1500p | 140-PEI2A152J-RC | 1 | C18 | |
| 39p | 140-50N2-390J-RC | 1 | C29 | |
| 510p | 140-500P5-501K-RC | 1 | C19 | |
| 47 | 271-47-RC | 4 | R6, R55, R62, R68 | |
| 100 | 271-100-RC | 3 | R27, R45, R50 | |
| 250 | 271-249-RC | 1 | R72 | |
| 100k | 271-100K-RC | 6 | R30, R31, R46, R48, R52, R58 | |
| 10k | 271-10K-RC | 5 | R13, R34, R36, R37, R67 | |
| 150k | 271-150K-RC | 1 | R65 | |
| 14k | 271-14K-RC | 1 | R71 | |
| 1k | 271-1K-RC | 4 | R1, R14, R60, R70 | |
| 1M | 271-1.0M-RC | 3 | R5, R35, R54 | |
| 1M3 | 291-1.3M-RC | 1 | R28 | |
| 20k | 271-20K-RC | 3 | R9, R63, R64 | |
| 22k | 271-22K-RC | 5 | R32, R33, R39, R51, R73 | |
| 27k | 271-27K-RC | 4 | R10, R41, R42, R43 | |
| 2k7 | 271-2.7K-RC | 3 | R3, R47, R61 | |
| 2M2 | 271-2.2M-RC | 1 | R69 | |
| 30k | 271-30K-RC | 3 | R2, R4, R38 | |
| 43k | 271-43K-RC | 1 | R26 | |
| 47k | 271-47K-RC | 1 | R11 | |
| 510k | 291-510K-RC | 1 | R53 | |
| 51k | 271-51K-RC | 2 | R49, R66 | |
| 5k1 | 271-5.1K-RC | 1 | R44 | |
| 68k | 271-68K-RC | 6 | R7, R8, R12, R29, R40, R56 | |
| 75k | 271-75K-RC | 1 | R59 | |
| 82k | 271-82K-RC | 1 | R57 | |
| 1N914 | 512-1N914 | 6 | D1, D2, D3, D4, D5, D6 | |
| 1N4001 | 512-1N4001 | 1 | D7 | |
| 1N5817 | 512-1N5817 | 2 | D8, D11 | |
| 10kb Pot | 313-1000F-10K | 2 | P1, P3 | Enhance, Manual |
| 100kb Pot | 313-1000F-100K | 1 | P2 | Threshold |
| 50kb Pot | 313-1000F-50K | 1 | P4 | Range |
| 500kc Pot | smallbear | 1 | P5 | Speed (rev log taper) |
| 10ka Pot | 313-1500-10K | 1 | P6 | Volume |
| 20k Trim | 858-72PMR-20K-LF | 4 | T1, T2, T3, T4 | Bias, Enhance, Auto Sweep, Max Clock |

| | | | | |
|---|---|---|---|---|
| 100k Trim | 858-72PMR-100K-LF | 2 | T5, T6 | Clock Range, Delay Bal |
| LM324 / TL074 | 595-TL074IN | 3 | IC1, IC2, IC3 | |
| MC1458 / TL072 | 595-TL072CP | 1 | IC4 | |
| CD4007 | 595-CD4007UBE | 1 | IC5 | |
| CD4047 | 595-CD4047BE | 1 | IC6 | |
| LM7815 | 511-L7815CV | 1 | IC7 | |
| CD4049 | 595-CD4049UBE | 1 | IC9 | |
| MN3007 | outsource | 1 | IC10 | BBD |
| LT1054 | 595-LT1054CP | 1 | IC11 | |
| LS4393 / 2N4393 | 512-PN4393 | 1 | Q1 | N channel JFET |
| stereo switching | 568-NYS218 | 1 | JK3 | stereo w/ ring switch |
| SPDT toggle | 108-1MS1T2B3M1QE-EVX | 1 | SW1 | Odd/Even Toggle switch |
| TO-220 heatsink | 567-274-2AB | 1 | | optional |

**ADA Flanger Clone (MN3007 version) Bill of Materials**

| part | value | | part | value | | part | value | | part | value |
|---|---|---|---|---|---|---|---|---|---|---|
| C1 | 0.01 | | C39 | 10 | | T4 Max Clock | 20k Trim | | R42 | 27k |
| C2 | 4.7 | | C40 | 100 | | T5 Clock Range | 100k Trim | | R43 | 27k |
| C3 | 0.01 | | D1 | 1N914 | | T6 Delay Bal | 100k Trim | | R44 | 5k1 |
| C4 | 22 | | D2 | 1N914 | | R1 | 1k | | R45 | 100 |
| C5 | 4.7 | | D3 | 1N914 | | R2 | 30k | | R46 | 100k |
| C6 | 2.2 | | D4 | 1N914 | | R3 | 2k7 | | R47 | 2k7 |
| C7 | 0.47 | | D5 | 1N914 | | R4 | 30k | | R48 | 100k |
| C8 | 100p | | D6 | 1N914 | | R5 | 1M | | R49 | 51k |
| C9 | 0.1 | | D7 | 1N4001 | | R6 | 47 | | R50 | 100 |
| C10 | 0.01 | | D8 | 1N5817 | | R7 | 68k | | R51 | 22k |
| C14 | 100p | | D11 | 1N5817 | | R8 | 68k | | R52 | 100k |
| C15 | 4.7 | | IC1 | LM324 / TL074 | | R9 | 20k | | R53 | 510k |
| C16 | 0.1 | | IC2 | LM324 / TL074 | | R10 | 27k | | R54 | 1M |
| C17 | 2.2 | | IC3 | LM324 / TL074 | | R11 | 47k | | R55 | 47 |
| C18 | 1500p | | IC4 | MC1458 / TL072 | | R12 | 68k | | R56 | 68k |
| C19 | 510p | | IC5 | CD4007 | | R13 | 10k | | R57 | 82k |
| C20 | 0.01 | | IC6 | CD4047 | | R14 | 1k | | R58 | 100k |
| C21 | 1 | | IC7 | LM7815 | | R26 | 43k | | R59 | 75k |
| C22 | 33 | | IC9 | CD4049 | | R27 | 100 | | R60 | 1k |
| C23 | 0.01 | | IC10 | MN3007 | | R28 | 1M3 | | R61 | 2k7 |
| C24 | 33 | | IC11 | LT1054 | | R29 | 68k | | R62 | 47 |
| C25 | 33 | | JK3 | stereo w/ ring switch | | R30 | 100k | | R63 | 20k |
| C26 | 33 | | P1 | 10k Enhance | | R31 | 100k | | R64 | 20k |
| C27 | 4.7 | | P2 | 100k Threshold | | R32 | 22k | | R65 | 150k |
| C28 | 0.1 | | P3 | 10k Manual | | R33 | 22k | | R66 | 51k |
| C29 | 39p | | P4 | 50k Range | | R34 | 10k | | R67 | 10k |
| C31 | 470 | | P5 | 500k Speed | | R35 | 1M | | R68 | 47 |
| C32 | 1 | | P6 | 10K Volume | | R36 | 10k | | R69 | 2M2 |
| C33 | 0.22 | | Q1 | LS4393 / 2N4393 | | R37 | 10k | | R70 | 1k |
| C35 | 4u7 | | SW1 | SPDT toggle | | R38 | 30k | | R71 | 14k |
| C36 | 22-33u | | T1 Bias | 20k Trim | | R39 | 22k | | R72 | 250 |
| C37 | 0.1 | | T2 Enhance | 20K Trim | | R40 | 68k | | R73 | 22k |
| C38 | 2 | | T3 Auto Sweep | 20k Trim | | R41 | 27k | | | |

4/17/84 SG

Flanger Calibration
and Bench Test Procedure

ADA SIGNAL PROCESSORS
ANALOG DIGITAL ASSOCIATES
2316 FOURTH STREET
BERKELEY, CALIFORNIA 94710
(415) 548-1311
(800) 241-8888
TELEX: 470 880 ADA UI

1. Power Supply

(A) Check supply voltage at:
(Rev.1 and 2) I.C.-5 pin 10 +14.5V +/-4%
(Rev.3 and 4) I.C.-7 pin 3 +15V +/-4%

2. Clock Frequency

(A) With frequency counter check clock frequency at pin 13 of I.C.-7 (Rev.1 and 2) or pin 13 of I.C.-6 (Rev.3 and 4). With Manual CCW adjust range trim T-1 (Rev.1 and 2) or T-5 (Rev.3 and 4) for 34.8KHz.
(B) With Manual CW adjust Bias T-2 (Rev.1 and 2) or T-4 (Rev.3 and 4) for 1.3MHz -Recheck and adjust as necessary for interaction between trims.
(C) Check sweep range, turn Range CW, range should sweep from 34.8KHz to 1.3MHz, adjust T-3 (Rev.2, 3 and 4 only) CW to sweep higher.

3. BBD Bias

(A) Inject 1KHz signal @ 2V p-p at input jack, probe 1458I pin 7 (Rev.1 and 2) or I.C. 2 pin 8 (Rev.3 and 4), turning Manual end to end observe signal, if not symetrical adjust T-5 and T-6 (Rev.1 and 2) or T-1 (Rev.3 and 4) for maximum symetry. Note - clock noise will be present at low end of clock.

4. Regeneration (Enhance) and Noise Gate (Threshold)

(A) Inject 1KHz signal, probe output jack, adjust all settings CW, adjust T-4 (Rev1 and 2) or T-2 (Rev.3 and 4) into self oscillation, remove signal adjust trim until signal gradually attenuates.
(B) Inject 1KHz signal 25mV p-p or less, set all adjustments CW, probe output jack, using maximum sensitivity on scope turn Threshold CCW signal should attenuate to 10mV p-p or less.

Note: For Rev. identification see Flanger Revision Identification Sheet

**NOTE –** Because this version of the circuit uses a MN3007 instead of a SAD1024, the clock frequencies stated in step 2, above, should be doubled to 69.6 KHz to 2.6 MHz (not 34.8 KHz to 1.3 MHz).

**Additional Notes on Calibration**

- A frequency counter is needed to set the min and max frequency of the clock circuit. If you do not have an oscilloscope available, many digital multi meters (DMM) also have a frequency counter function. The circuit can also be calibrated by ear with some trial-and-error. When calibrating, it is very helpful to input some sort of constant sound source that is rich in harmonics and listen to the output. A synth, sampler, theremin or something similar fed through some type of fuzz or distortion effect, for example, should work well.
- Follow the factory calibration instructions, above, referring to (Rev. 3 and 4), but double the values for the clock frequency settings. The factory procedure was not written with reference to this new MN3007 based version of the circuit. So, take frequency readings at the test point (TP), and instead of setting the range to go from 34.8 KHz to 1.3 MHz, set the range to go from 69.6 KHz to 2.6 MHz.
- Also, adjust TR6 to balance the delay signal and the dry signal so that they are approximately equal. A 50/50 wet/dry mix is ideal and can be set by using an oscilloscope, or approximated by ear.

Here are some additional notes on calibrating the circuit that were taken from "the big TZF thread" at diystompboxes, here – http://www.diystompboxes.com/smfforum/index.php?topic=49929.640

BTW, there is a lot of good info in that discussion; the majority of it is with reference to the old SAD1024 version of the circuit, but pretty much everything applies equally to this newer MN3007 version.

Here's what I posted at diystompboxes.com about the calibration procedure for the SAD1024 version. If building the MN3007 version, adjust the clock frequencies as noted above…

- I used the frequency counter on my DMM, positive lead on the test point (TP) and common lead to ground. But, I think you could definately do this by ear, too.
- Threshold 100%, Manual 0%, Range 100%, Speed 50%, Enhance 50%, all trimmers at 50%.
- Plug in a noise maker, theremin, looper/sampler, keyboard, whatever... Something that makes a continuous sound, as opposed to having to keep strumming your guitar, for example. If you use a theremin or keyboard or something that doesn't have a lot of harmonics, try putting it through some kind of fuzz/dist/od pedal so you'll be able to hear the sweep more prominently.
- Adjust T1 bias until you hear the effect sweeping. Then turn Range to 0%. You should now be able to sweep the effect manually by twisting the Manual knob.
- Now, set the low and high points of the sweep, keeping Range at 0%...
- With Manual at 0%, adjust T4 to set the low point, ~35kHz. Turn Manual up to 100% and adjust T5 to set the high point of the sweep, ~1.3MHz. T4 and T5 interact with each other, so you need to go back and forth (set Manual 0% adj T4, set Manual 100% adj T5, repeat) until you get the low and high sweep points set where you want.
- I left T3 set at 50%. It does seem to alter the range, but I couldn't hear it doing much of anything else.
- I also left T6 at 50%. I'm not hearing any appreciable bad noise. It quiets down

very nicely when not playing.
- I'm still deciding where I want to leave T2... to self-oscillate or not to self-oscillate... that is the question.

Here's what TR in NC posted about the calibration procedure…
- Of course verify power (all IC's etc.).
- Clock frequency adjustment. I don't want to spell out the bench test procedure so here's my easy calibration. Measure frequency with a scope at IC6 (CD4047) Pin 10 (pin 11 will also work). Adjust Threshold, Manual, Range, Speed and Enhance pots fully CCW. Adjust T5 fully CW, Adjust Manual pot fully CW, Adjust T4 to 1.3MHz. Adjust Manual pot fully CCW and verify min frequency (mine was around 21.7KHz). Bench spec states min 34.8KHz, max 1.3MHz (I could not adjust T4 and T5 to get both setpoints). You can adjust the low end up but this also raises the high end of the sweep range. I chose to keep the low end at 21.7KHz (you can compromise in either direction).
- BBD Bias and Regeneration. This is where I didn't have any luck with the bench test procedure. When I thought I had everything setup I hooked it to my amp and nothing. So here's my easy setup procedure. With the output connected to your amp (keep amp volume VERY low), Adjust Threshold, Manual, Range, Speed and Enhance pots fully CW. Set T1 fully CW and T2 fully CCW. Adjust T1 CCW just until you hear the full sweep next; adjust T2 until the sweep is almost fully attenuated. Adjusting the Enhance pot will fully attenuate the sweep. If you don't want to hear the sweep at all with the Enhance pot fully CW then just adjust T2 until the sweep is fully attenuated (I chose to hear the sweep so I know where the attenuation threshold is when setting the Enhance pot).
- I kept both T3 and T6 at 50%, didn't really see much change with either of them.

And, some additional thoughts from bajaman can be found at diystompboxes, here…
- http://www.diystompboxes.com/smfforum/index.php?topic=74367.msg607565#msg607565



Be safe and have fun!