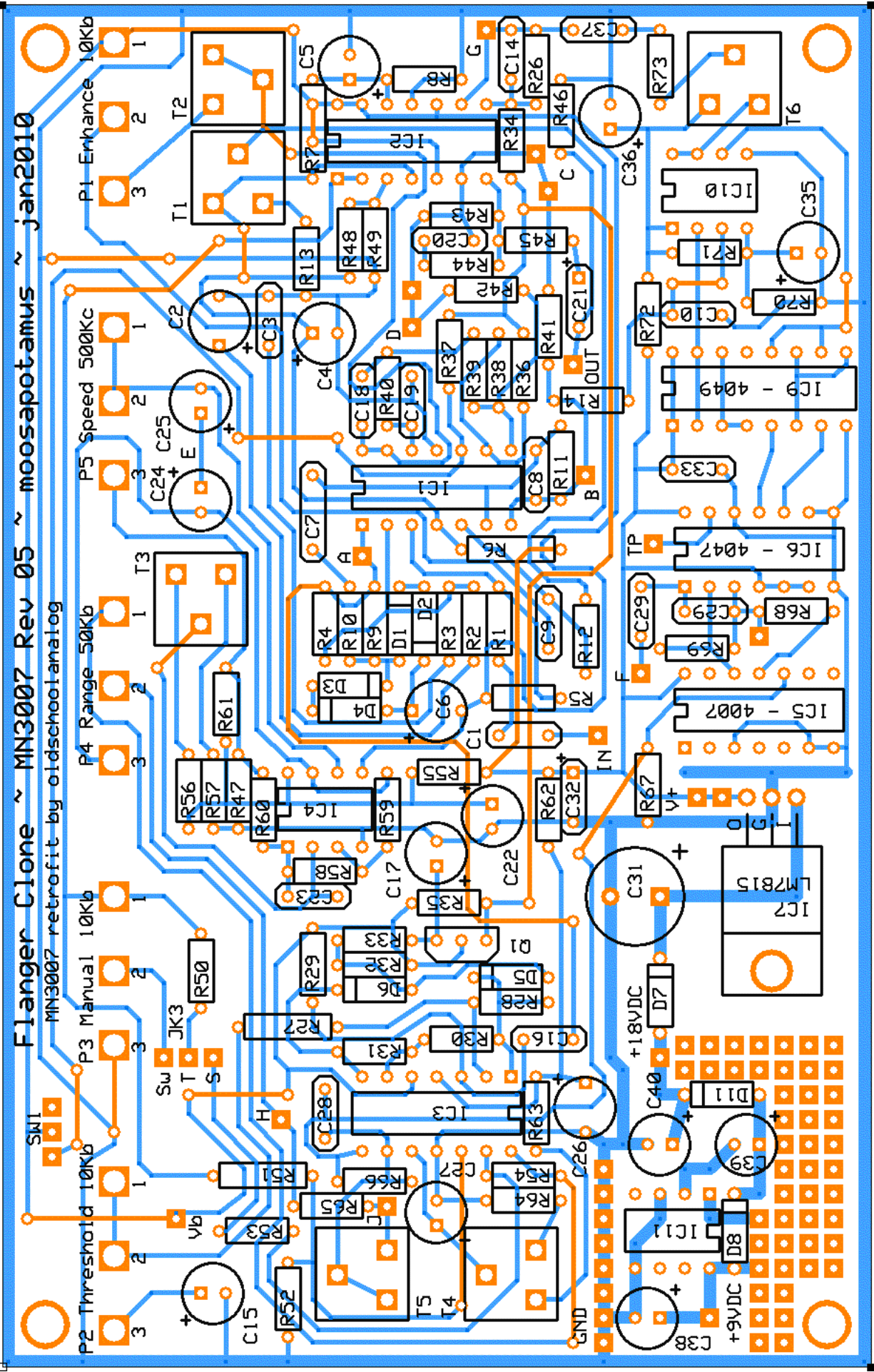


To build the stock circuit with no modifications...

- Power supply – The circuit is intended to run on regulated 15VDC. Two options for this are provided for on the PCB...
 1. Option 1 – Use a 9VDC wall wart power supply. In this case, the footprint for a voltage doubling circuit consisting of IC11 (charge pump) and associated components is provided in the lower left-hand corner of the PCB (IC11, C38, C39, C40, D8, D9). 9VDC power should be applied to the pad at the junction of IC11 pin 8/C38/D8. IC11 should be LT1054 or similar. This will provide ~18VDC to the node at the junction of D9/C40. D7 may be replaced with a jumper. A 15VDC regulator (IC7) and associated components (C31, C32) provide regulated 15VDC power to the circuit.
NOTE – If using this option, MAX1044 might work for IC11, but be aware it is only rated for 10mA, compared to the 100mA rated LT1054. If using MAX1044, install a jumper to connect pads 1 and 8.
 2. Option 2 – Use an 18VDC wall wart power supply. In this case, IC11 and associated components (C38, C39, C40, D8, D9) do not need to be installed. 18VDC power should be applied to the pad at D7. A 15VDC regulator (IC7) and associated components (D7, C31, C32) provide regulated 15VDC power to the circuit.
- 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.
- LFO timing capacitors (C24 and C25) – Install only C25 (33uF) and install a jumper in place of C24. The footprint for C24 is included to allow mixing, matching and/or switching capacitor values to suit taste and/or to enable building alternate configurations found in different revisions of the original circuit.
- C29 appears twice in the layout (to the left of IC6 - 4047). Do not install the one that connects to Pad F (just leave it out), unless you want to try modifying the circuit to enable switching between alternate timing capacitors in the clock section.
- Use a switching type jack for the manual sweep input jack (JK3). Something similar to Mouser pn 568-NYS218 should work well. See the parts list, below. 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, the plug's ring should connect to R53, and the plug's tip should connect to the wiper of P3. The pads on the PCB are labeled as follows – Sw (switch contact), T (tip contact), S (sleeve contact).
- 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. 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.
- Here is an approach to building this, or any circuit FTM, that was outlined by Stephen Giles at diystompboxes, 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.
 6. 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 with a felt tipped pen as a guide.



ADA Flanger Clone (MN3007 version) Bill of Materials				
Mouser p/n	Description	Quantity	Part Reference	Comment
140-PM2A103K	0.01	5	C1, C3, C10, C20, C23	
140-PM2A104K	0.1	4	C9, C16, C28, C37	
505-MKS20.022/63/5	0.22	1	C33	
75-MKT1818447064	0.47	1	C7	
581-TAP105K025SCS	1	1	C32	Tant
505-MKS21/50/10	1	1	C21	Film
140-L35V2.2-RC	2	1	C38	
140-L35V2.2-RC	2.2	2	C6, C17	
140-MLRL50V4.7-RC	4.7	4	C2, C5, C15, C27, C35	
140-L35V10-RC	10	1	C39	
140-ESRL50V22-RC	22	1	C4	
140-ESRL50V33-RC	33	4	C22, C24, C25, C26	
140-L25V100-RC	100	1	C40	
140-XRL25V470-RC	470	1	C31	
140-500P5-101K-RC	100p	2	C8, C14	
140-PF2A152J	1500p	1	C18	
	22-33u	1	C36	
140-50N2-390J-RC	39p	1	C29	
140-500P5-501K-RC	510p	1	C19	
271-47-RC	47	4	R6, R55, R62, R68	
271-100-RC	100	3	R27, R45, R50	
271-250-RC	250	1	R72	
271-100K-RC	100k	6	R30, R31, R46, R48, R52, R58	
271-10K-RC	10k	5	R13, R34, R36, R37, R67	
271-150K-RC	150k	1	R65	
271-14K-RC	14k	1	R71	
271-1K-RC	1k	4	R1, R14, R60, R70	
271-1.0M-RC	1M	3	R5, R35, R54	
291-1.3M-RC	1M3	1	R28	
271-20K-RC	20k	3	R9, R63, R64	
271-22K-RC	22k	5	R32, R33, R39, R51, R73	
271-27K-RC	27k	4	R10, R41, R42, R43	
271-2.7K-RC	2k7	3	R3, R47, R61	
271-2.2M-RC	2M2	1	R69	
271-30K-RC	30k	3	R2, R4, R38	
271-43K-RC	43k	1	R26	
271-47K-RC	47k	1	R11	
291-510K-RC	510k	1	R53	
271-51K-RC	51k	2	R49, R66	
271-5.1K-RC	5k1	1	R44	
271-68K-RC	68k	6	R7, R8, R12, R29, R40, R56	
271-75K-RC	75k	1	R59	
271-82K-RC	82k	1	R57	
512-1N914	1N914	6	D1, D2, D3, D4, D5, D6	
512-1N4001	1N4001	1	D7	
512-1N5817	1N5817	2	D8, D9	
313-1000F-10K	10kb Pot	3	P1, P2, P3	Enhance, Threshold, Manual
313-1000F-50K	50kb Pot	1	P4	Range
smallbear	500kc Pot	1	P5	Speed (rev log taper)
313-1500-10K	10ka Pot	1	P6	Volume
858-72PMR-20K-LF	20k Trim	4	T1, T2, T3, T4	Bias, Enhance, Auto Sweep,

				Max Clock
858-72PMR-100K-LF	100k Trim	2	T5, T6	Clock Range, Delay Bal
595-TL074IN	LM324 / TL074	3	IC1, IC2, IC3	
595-TL072CP	MC1458 / TL072	1	IC4	
595-CD4007UBE	CD4007	1	IC5	
595-CD4047BE	CD4047	1	IC6	
511-L7815CV	LM7815	1	IC7	
595-CD4049UBE	CD4049	1	IC9	
outsorce	MN3007	1	IC10	BBD
595-LT1054CP	LT1054	1	IC11	
512-PN4393	LS4393 / 2N4393	1	Q1	N channel JFET
568-NYS218	stereo w/ ring switch	1	JK3	stereo w/ ring switch
108-1MS1T2B3M1QE-EVX	SPDT toggle	1	SW1	Odd/Even Toggle switch
567-274-2AB	TO-220 heatsink	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	D9	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	10k 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		

Flanger Calibration and Bench Test Procedure



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 symmetrical adjust T-5 and T-6 (Rev.1 and 2) or T-1 (Rev.3 and 4) for maximum symmetry. 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 (Rev.1 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

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 or theremin 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.
- 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 about the calibration procedure...
 - 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 definitely 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.