Ultra Simple 8038 LFO circuit & PCB

UPDATE!!!! I recently built a triple LFO version of this build and ran into some problems with the new set of 8038 chips I purchased, they don't all work the same, The amazing range I got were specific to my first batch of chips. keep your eye out for this set of numbers, because they worked.
ICL8038CCPD
FQ306BDVZ

And the following set of numbers did not work with this set up.
ICL8038CCPD
F106BDVZ

I tried ordering more chips with the correct numbers based on the picture of the chips on ebay and they sent different chips that didn't work. I'm really annoyed with the 8038 chip situation. So, I'm going to revisit this LFO project with a different circuit, one that doesn't utilize the 8038.

For my modular project, I'm trying to keep it simple, at least in the beginning, so i can learn what I can from each circuit I build. A simple LFO circuit, is something I've tried to build a few times, with limited success. It wasn't until I was clicking around on YUSYNTH (my new favorite website. It's loaded with projects and information), that I came across this ultra simple implementation of the ICL8038 chip.
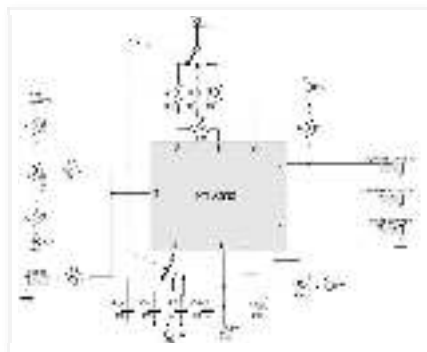
I wired up the circuit almost exactly how it is here and it worked pretty good, But I didn't have the necessary switch for all the cap and resistor combinations--which led me to experiment with different combinations of resistors and caps to cover the range I wanted. I put in a 1uF Tantalum cap at pin 10 and a 1M pot (replacing R5, R6, & R7) and was able to achieve the ultra low oscillations I was looking for. The 1M Pot basically working as a Coarse tune, and the 10K pot working as a Fine tune. I also found that the voltage input was basically useless to me, it seemed to hardly affect the frequency and when i hit it with higher voltages, it would stop oscillating altogether. I decided to skip that aspect of it, at this time anyway.

Theres some extra chips on there because I was testing to see if the square wave output would work as a clock for the a 4017 decade counter chip. it does.
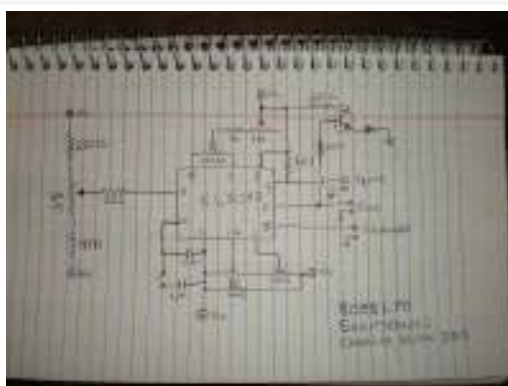

Above is the schematic that I came up with and ultimately built into a module.

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Above is the schematic that I came up with and ultimately built into a module.
Electronics is one of those things, where I don't exactly understand, at what point you can call a circuit "my circuit". I mean, how much do you need to change and does it really matter if you're giving away the plans for free. Anyway, I felt like I changed enough to call it my circuit, but it's really just a modified version of the circuit I found on Yusynth.... It's like a remix
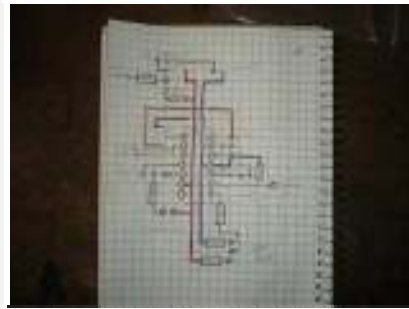
I decided to just draw the PCB.
I made a little mock up of the traces

I thought it might be easier, especially with the chip, to drill the holes first, using a perf prototyping board to set the spacing. I guess that helped, though drawing little traces with a fat tipped permanent marker can be kinda stressful.

I realized, after I started etching the pcb, that I forgot to put the transistor rate indicator on there, so I added that. Strangely, I found that drawing on the partially acid etched board was easier, and the ink stuck to it better, probably because the acid made the surface less smooth. It made me consider dipping my boards in acid for a second before I apply transfers to them also. who knows?

The board came out good and so i put the components in there.

In the end, I opted for a switch between Sine and Triangle waves. The square wave gets it's own output, so I can use it as a clock.


KICK ASS!

So, I spent some time this weekend and made a PCB in photoshop which everyone is welcome to use. let me know if there are any problems with it, because, I hand drew mine. It's designed to be transfered, so you should be able to read the writing correctly after it's transfered.
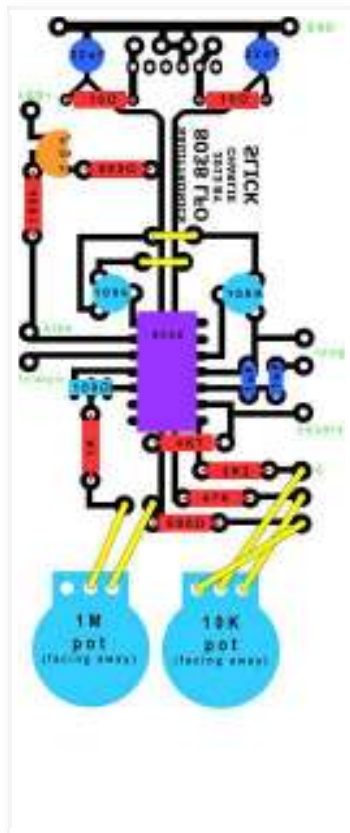
few things to know about this circuit. Both the .1uF cap and 1uF cap are bipolar. The Transistor is a 3904 but you can use an equivalent NPN. You can change the 680Ω resistor that is connected to the transistor according to the LED you choose. The negative side of the LED should be connected to ground (I panel wired all of that stuff). I forgot to mark the orientation of the two 22uF caps, but that's something you should be able to figure out. The left cap is for the positive rail, it should be oriented with the positive side of the cap connected to the rail and negative side to ground. The right cap should be opposite, positive side to ground and negative side to negative rail. You will probably need an oscilloscope to tune the 3 trim pots. you may be able to do it by ear. One of the 100k pots is responsible for offset, adjust it to center the wave over ground. the second 100k is for shaping. The 100Ω is also for shaping, do that one last because it's more of a fine shaping. The shape of the wave changes depending on what frequency was when you set the trim pots, as you get farther away from that frequency, the waves begin to distort. I set the trim pots to be most accurate when the LFO was at lower speeds because that's when you'd be able to hear it most clearly. so, the wave becomes a little mis-shaped at high frequencies.... enjoy.
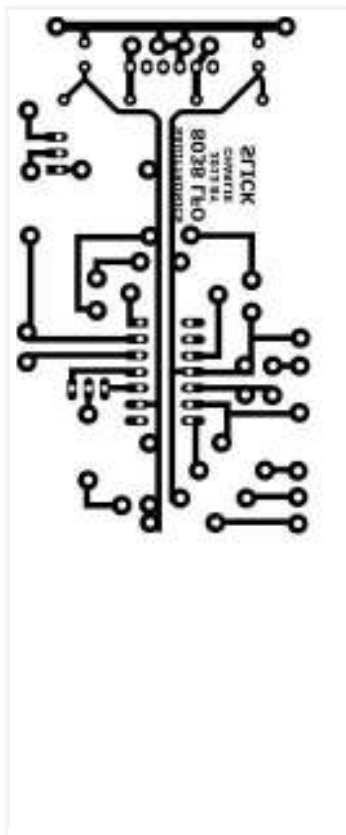
In the video, I have the 8038 LFO hooked up to the cut off frequency of my Synthesizers.com State Variable Filter. Enjoy.

Posted by Charlie at 10:58 AM

6 comments:

dan May 5, 2013 at 6:21 AM

Hi Charlie, I found a couple 8038 chips in a drawer so i'm gotta try out your design.

dan May 5, 2013 at 6:21 AM

Hi Charlie, I found a couple 8038 chips in a drawer so i'm gotta try out your design.
Do you think it would work on +/-12 or there are some mods to do?
dan

Reply

Charlie   May 5, 2013 at 8:29 AM

DAN, it should work with +/-12v. if I were you, I would breadboard it up first, and if the component values I used, don't seem to work, try some of the values on the YUSYNTH page.
http://www.yusynth.net/gear/US1/images/VCLFO-US1.gif
as I said before in my post, the extended range I found by changing values, doesn't work with all 8038 chips. It may have just been a fluke with the chip I had. I have been unable to get the same range with other 8038 chips. HAVE FUN!

Reply

GORDON ROBERTSON October 17, 2013 at 11:13 AM

Thanks for the heads up on the serial number, thankfully mine are all of the good batch number!

There is actually a very good application note on the 8038, explaining some of its quirky behavior and how to work round it. It can be found here:

http://www.intersil.com/content/dam/Intersil/documents/an01/an013.pdf

Reply

acidblue August 30, 2014 at 11:48 AM

Take www.me.com ware.com web .the author

Reply

José Luis Santorcuato Tapia October 9, 2015 at 2:17 PM

Excellent project, I have a couple of questions.
Where is connected the "long" pin?
Cheers
José

Reply

   Replies

   Charlie   October 9, 2015 at 8:26 PM

   The long pins are for a switch, to switch between short time LFO and long time LFO