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tReMoLo ThOuGhTs

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tReMoLo ThOuGhTs (#p1937)

by **Digital Larry** » Thu Oct 30, 2014 4:25 pm

Ok I looked at the tremolo block and I should be ashamed! 😔

It has a built in LFO, which isn't so bad other than it's not obvious I suppose. But worst of all the LFO simply is multiplied by the input waveform. (cough)

Let's back up a bit. An EA tremolo modulates the gain by about 12 dB down from unity (or a slight boost). That is supposing a multiplying factor that, when the width is 0, is 1, and when the width is 1, varies between 1 and 0.25. So we need to be dealing with a signal that only goes above 0, then invert it and add it to 1.

The Sin/Cos LFO set to 0.0 -> 1.0 sounds promising, but when the width is all the way down, it's centered at 0.5. Somehow I need the LFO offset to move with the LFO gain as well.

The existing triangle LFO would be better because it naturally goes from 0 to 0.25.

Supposing the triangle LFO value is in REG5...

```
RDAX REG5,1.0 ; 0 to 0.25
SOF -2.0,0 ; 0 to -0.5
MULX POT0 ; scaled by POT0
SOF 1.5, 1.0 ; range is now 1.0 to 0.25 with POT0 all the way up, 1.0 to 0.25 < x < 1.0 as the POT goes CCW.
WRAX REG6, 0.0 ; save it in REG6
RDAX ADCL, 1.0
MULX REG6
```

this should leave a tremoloed signal in the accumulator. I'll have to think about how to have the maximum depth controllable.

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Re: tReMoLo ThOuGhTs (#p1938)

by **Digital Larry** » Thu Oct 30, 2014 7:55 pm

I figured out how to do it with the Sin oscillator as well.

Start with the LFO in 0.0 -> 1.0 range mode.
Don't use the LFO width control input.

```
MULX POT0 ; you can turn it down, but minimum stays at zero
SOF -1.0, 1.0 ; flip it over and add it to 1.0
```

Clever eh!

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Re: tReMoLo ThOuGhTs (#p1939)

by **Jacko** » Fri Oct 31, 2014 3:56 am

Thanks! I was working for a little while last night on code similar to this to drive the Volume block. You saved me the trouble of having to figure out the last bits!

Best regards, Jacko

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Re: tReMoLo ThOuGhTs (#p1940)

by **Digital Larry** » Fri Oct 31, 2014 5:01 am

Let me run this thought past you...

I'm wondering whether it really makes sense to have a dedicated tremolo block, given the wide variety of sonic character that one could achieve by making changes to the LFO waveform. For example, you could start with a -1.0 to +1.0 Sin and then run it through an ABSA. So it would spend more time at louder volume then suddenly swoop down and back. Or you can run any 0.0 to 1.0 signal through a power block and use flip/invert options. etc. etc. etc.

Of course there is no harm in offering a trem block, I'm just trying to weigh the alternatives of a dedicated trem block with a few LFO options vs. encouraging folks to simply create their own LFO processing chain. I'm going to try a few things today but I'm leaning towards creating trems from smaller pieces and maybe leaving the dedicated block in there but not putting a ton of options in it.

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Re: tReMoLo ThOuGhTs (#p1941)

by **Jacko** » Fri Oct 31, 2014 5:27 am

Yes, that's what I was getting at in the other thread. A tremolo is just a vca driven by an LFO. If you have a vca (Volume) then you can drive its control input in a variety of manners to customize the sound, and make it more than just the plain old wobbly volume tremolo.

How about a dynamic tremolo where the speed of the LFO is increased by the envelope of the signal, so the harder you play, the faster it trems.

No harm in having a dedicated Trem block though, as you said. I would keep it.

Best regards, Jacko

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Re: tReMoLo ThOuGhTs (#p1942)

by **Digital Larry** » Fri Oct 31, 2014 6:47 am

I love the envelope controlled trem. Just take the envelope output to the LFO speed input (suitably SOF'ed, of course).

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Re: tReMoLo ThOuGhTs (#p1943)

by **Digital Larry** » Sat Nov 01, 2014 5:31 am

I had this thought about a new control block - the "Tremolizer".

It takes an input waveform that would go from 0.0 to 1.0, so you could use the Sin/Cos set to that range, or the triangle with a 12 dB gain boost. You could also put some shaping between the LFO and the tremolizer input.

You would have one control panel slider, which would be "maximum cut" and I'd probably have it go from -30 dB to -6dB or thereabouts.

And there would be two control inputs. The first control input would be for the LFO signal and the second would be for the depth adjust.

I did some tests with different symmetry on the LFO waveform. If the LFO is "mostly high" and dips down (cutting volume) for only a brief part of the cycle, the end result is very subtle. Now of course we need some subtle options, but I think there's more excitement on the other end when the tremolo gets choppy.

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Re: tReMoLo ThOuGhTs (#p1944)

by **Jacko** » Sat Nov 01, 2014 8:41 am

One of the more popular tremolo effects is when the vca is driven by a square wave so that it chops on-off (or mostly off). Not my fave but it is a popular option on hardware tremolos.

regards, Jacko

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Re: tReMoLo ThOuGhTs (#p1948)

by **Digital Larry** » Sat Nov 01, 2014 1:18 pm

This is easy enough, just generate the sin wave and use

SKP GEZ, one
CLR
SKP ZRO, go
one:
LDAX 1.0
go:

This probably REALLY wants a smoothing filter after it to reduce clicks.

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Re: tReMoLo ThOuGhTs (#p1949)

by **Digital Larry** » Sat Nov 01, 2014 1:45 pm

In anticipation of the next release, which may be a few weeks off, here's a square wave tremolo with cube distortion afterwards. I am using a control smoother which decreases the tremolo depth a bit at higher LFO speeds.

POT0 = speed
POT1 = depth

```
;  Program: Render Block exported from SpinCAD Designer
;------ Pot 0
;------ Scale/Offset
RDAX POT0,1.0000000000
SOF 0.5000000000,0.5000000000
WRAX REG0,0.0000000000
;------ LFO 0
SKP RUN ,1
WLDS 0,217,32767
RDAX REG0,0.4246575342
WRAX SIN0_RATE,0.0000000000
CHO RDAL,0
WRAX REG1,0.0000000000
;------ SquareWave
RDAX REG1,1.0000000000
SKP GEZ,2
CLR
```

```
SKP ZRO,1
SOF 0.0000000000,0.9990234375
WRAX REG2,0.0000000000
;------ Smoother
RDAX REG2,1.0000000000
RDFX REG4,0.0013265689
WRAX REG4,0.0000000000
;------ Input
;------ Pot 1
;------ Tremolizer
RDAX REG4,0.9900000000
MULX POT1
SOF -0.9990000000,0.9990000000
WRAX REG5,0.0000000000
;------ Volume
RDAX ADCL,1.0000000000
MULX REG5
WRAX REG6,0.0000000000
;------ Cube gain
RDAX REG6,1.0000000000
WRAX REG7,-0.9333300000
MULX REG7
MULX REG7
RDAX REG7,1.0000000000
SOF 1.5000000000,0.0000000000
WRAX REG8,0.0000000000
;------ Output
RDAX REG8,1.0000000000
WRAX DACL,0.0000000000
RDAX REG8,1.0000000000
WRAX DACR,0.0000000000
```

To eliminate the smoother, just change this:

```
;------ Tremolizer
RDAX REG4,0.9900000000
```

to this:

```
;------ Tremolizer
RDAX REG2,0.9900000000
```

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Re: tReMoLo ThOuGhTs (#p1950)

by **Jacko** » Sat Nov 01, 2014 1:49 pm

Ha! Here is what I was writing while you posted that:

```
// Basic Choppy Tremolo
// Changing the sine wave to a square wave
cho rdal,SIN0    ; Read LFO Sine0 into ACC
skp GEZ,pos    ; Skip if ACC >= 0
clr            ; Make ACC zero
skp ZRO,out    ; Skip next instruction if ACC = 0
pos:
sof 0,1.0      ; Make ACC positive at 1.0
out:
mulx adcl      ; multiply input by the value of the sqr wave
wrax DACL,0    ; write output and clear Acc
```

Obviously in a real world application, at the 'out' label, you would want to read a POT and scale the minimum value so that the output may not chop all the way off.

Best regards, Jacko

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Re: tReMoLo ThOuGhTs (#p1960)

by **Digital Larry** » Wed Nov 05, 2014 5:43 am

You can also change the duty cycle of the "square" wave by adding a SOF 1.0, x right after the CHO RDAL - this shifts the sine wave so that it is not centered around zero any more. Positive values of x will result in more "on" time and negative values will result in more "off" time - errr, or vice versa.

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