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Modulated delay (#p2334)

by **scintillation** » Sat May 02, 2015 1:16 am

Firstly, I would like to say how fantastic a tool this is. I have developed with assembler in the past, FPGAs etc and this graphical tool is simply excellent.

I came to the Spin FV-1 after getting fed up with the PT2399. My dream is to build my own multihead delay with modulation (something resembling an old tape delay). I purchased a devboard and have been playing around with various programs to get my head round things. All the basics sounding good so far.

In spincad I've made a four head modulated delay. LFO and POT mixed together (LFO very low mix) going into a six tap delay. I haven't yet fully got my head round the underlying architecture of the Spin FV-1, but it seems that smooth stepping between the delay isn't possible? A modulated six tap delay isn't implemented yet, my question, is this because it is not possible with the hardware, or just it hasn't been done yet?

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Re: Modulated delay (#p2335)

by **Digital Larry** » Sat May 02, 2015 5:47 am

Well, you have a few options. The "Servo Delay" as it's called up until build 922 (afterwards to be called "Coarse Delay") , uses the RMPA instruction and can access delay memory directly. Advantage of RMPA is that it can access the full delay memory and is very efficient instruction wise. Disadvantage is that if you connect it to a control pot (or LFO), you'll get clicks as you change the control because it just jumps directly from one spot in delay RAM to the other. You can connect a control smoother to smooth out the jumps. In fact this block, up until build 922, includes a built in non adjustable smoother on the delay time control input. I decided to take it out after 922, since there's a separate smoother block available if you want it.

There's also the "Servo" block under the Modulation menu. This is renamed to "Servo Flanger" after 922. This has the advantage of being able to interpolate between samples which gives a nicer sound for flanging and chorusing. The disadvantage here is that it's limited to the max width of the Ramp LFO which it uses internally, or 4096 samples. At 32 kHz that's 1/8th of a second, so it's still pretty flexible.

All of the multi-tap delays use the RMPA method for delay time control. Three Tap delay has individual tap delay time control inputs and the others all scale the delay times from the single delay time control input. Where there's a delay time control panel slider, this sets the % of the total allocated delay time for the block as the max delay time of that tap. Adding the control input will scale from 100% of this when the pot is full up to 5% of this when the pot is full down. You can add a scale/offset block in between to limit the range if you prefer.

In the case where you want a modulated multi-tap, you might want to daisy chain a delay that gives you your coarse delay with the actual multi-tap that would be modulated. Then set the multi-tap to a shorter delay time, which would allow you to use more of the range for modulation. You could use two Servo flangers, setting each to use a unique ramp LFO, but I can't currently think of a way to make these go beyond a single tap per block. Maybe it's possible with a fixed offset? Right now I'm (mentally) up in Java land and really busy at work preparing for the Maker Faire in 2 weeks. So I'm probably not going to be creating any new blocks short term, but as they say, hold that thought!

Let me know if you have more questions and thanks for the kind remarks!

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Re: Modulated delay (#p2336)
by **Digital Larry** » Sat May 02, 2015 1:07 pm

I think there's another option though it's not directly possible with SpinCAD (yet).

The Chorus, or after build 922, "LFO Chorus" uses a built-in sin/cos LFO to modulate delay RAM pointers. With the CHO RDA instructions it also is possible to do inter-sample interpolation for smooth flanging and chorusing. You can use a single LFO and modulate any number of pointers anywhere within the delay RAM. You have a limitation here in that they will all be modulating at the same frequency and using the same sweep width. You have another twist in that you can get 3 additional phases of LFO - 90 degrees, 180, 270 degrees. This is described as the "rich chorus" in the knowledge base example. You could just spread them out further for simulating a multi-head tape delay.

For an actual tape delay though it's hard to imagine the out of phase modulation being physically possible.

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Re: Modulated delay (#p2355)
by **scintillation** » Mon May 11, 2015 9:09 am

For now, I've added a vibrato hardware circuit after the delay, but will be interested to see future modules which could compliment this.

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Re: Modulated delay (#p2359)
by **Digital Larry** » Mon May 11, 2015 11:57 am

If you can give me some parameters such as:

a) Delay time of each tap
b) Modulation depth (msec) and cycle speed of each tap
c) Mix level of each tap
d) Feedback paths and EQ
e) Delay EQ

I'll better understand what you're getting at.

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Re: Modulated delay (#p2366)
by **scintillation** » Tue May 12, 2015 10:11 am

I'm mostly making this up as I go along. I've heard enough youtube demos of tape/magnetic drum delay to like what I hear. I spent my Christmas holiday playing with the PT2399 but just could satisfy my noise requirements. Searching through the diy forums, everyone says don't bother making one, but buy one of the pre-made tape delay emulators. But this goes against my ethos, I like to learn about everything along the journey by making it myself.

I have played around with some of the Binson Echorec style taps on the FV-1 over the last week. I've never seen one in the flesh, so I'm mostly basing my investigations on youtube videos and this:

http://www.effectrode.com/magnetic-dela ... schematic/ (http://www.effectrode.com/magnetic-delay/binson-echorec-schematic/)

I've tried a few of the tap configurations detailed here, really great sounds!

I have:

a) 4 Servo delays in series with each tap into a main 4 to 1 output mixer, this is working quite nicely, I can even change delay "on the fly" and it sounds ok.

b) This is the best resource I have found regarding wow/flutter.
http://www.echotapper.nl/wp/?p=1303 (http://www.echotapper.nl/wp/?p=1303)

from my own experiments with modulated delay with the PT2399, a simple sinusoidal wave form sounds too regular. So far in the FV-1 I tried Flanger or Chorus on the output as an experiment. My thinking is one of each set at different LFO rates could sound good? But from a quick test with a simple design, you can't have flanger and chorus in the same project as SIN0 gets full. Is it possible for one to be on SIN0 and the other SIN1, or is this an architecture constraint?

c) Mix level of each tap, either unity or off depending on the "tap configuration" in the above link. I spent some time thinking about using the FV-1 as a rotary switch to setup each of these tap configurations, but I think I actually like the idea of having each tap configuration as a separate program (as I've been doing in my hacking over the past week). Per my diystompboxes post, I'm going to have a crack at getting an Atmel uC to behave as an EEPROM to hopefully allow this to happen.

d) Perhaps for other people, they would prefer an "all in DSP solution". However, here is my current setup:
-Dry signal through external circuitry
-Use input 1 for dry signal
-Use input 2 for wet signal feedback. I send the delay out through some analogue circuitry (so far I've played with some germanium diode soft clipping, attempting to saturate a transformer and a vibrato circuit), I then mix this back into the FV-1 through the second input.
e) Delay EQ - I'm not after and BDD style darkening for now, so EQ wise, I'm happy enough doing this in my analogue wet path.

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Re: Modulated delay (#p2367)
by **Digital Larry** » Tue May 12, 2015 1:24 pm

Briefly - you can use multiple LFO Chorus/LFO Flanger blocks. In the control panel you can select LFO 0 or LFO 1. But that's only 2. You could also use the "Servo Flanger" (note I'm using block names from build 934 - they were different before then). Each one of those uses a Ramp LFO. Again you can select Ramp 0 or Ramp 1. There's also an "Oscillator" block that gives you Sin/Cos LFOs independent of internal hardware, but of course they use more instructions.

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Re: Modulated delay (#p2371)
by **scintillation** » Wed May 13, 2015 8:09 am

Hi, thanks for your patience with me, these are the dangers of only working on this late at night when the family have gone to bed! Thanks to your gently pointer I realised I was missing the whole LFO 0/1 box to flanger AND chorus. New delay names in the version 934 make a lot more sense from the first time you look at them. I'm starting to get something sounding good now. I'll be sure to post my "recipe" to this site when I'm happy with it, I need to do a bit more playing and listening first to tweak the values.

Now I'm going to go straight into setting up an AVR and seeing about pretending to be an EEPROM. I'll report back in a week or two with my findings...

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