Holy City Audio Forum

Former Home of SpinCAD Designer

tap tempo block

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tap tempo block (#p1386)

by **slacker** » Tue Jul 09, 2013 11:27 am

Hi Garry

As promised here's a tap tempo block for you to try. This takes any pot as an input, using the pot input as a switch, and generates a value held in the "taptempo" register of between 0 and 1 representing the tapped tempo, this would be the output of the block which could be passed as a control value to any other block.
In the original version the maximum time between taps was 1 second, so "taptempo" values between 0 and 1 directly corresponded to delay times of 0 to 1 second. I've altered the code so that the maximum time between taps and therefore the slowest tap tempo can be more than 1 second, this make it more useful for other effects. The maxtime and deftime registers could probably be sliders on the control panel.
To hook this up to LFOs would require scaling the output to make the LFO speed match the tempo, I'll have a think how to do that.

Anyway here's the code

```
;A pot is used as a tap tempo switch input. This should be a momentary
switch, transition can be high to low or low to high.
;see guitar amp application note for examples of switch hookup.

;set up registers and equates

equ  db reg0      ;debounce
equ  mom reg1      ;momentary output of switch +1 high, -1 Low
equ  latch reg2      ;latched output of switch +1 high, -1 low
equ ramp reg3      ;current value of rmpo, scaled to 0 to 1
equ taptempo reg4   ;taptempo value, 0 to 1
```

```
equ maxtime 1      ;maximum tap tempo time in seconds
equ deftime 0.33      ;default tap tempo time in seconds
equ ramprate 1/maxtime/16 ;sets speed of RAMP0
equ count 0.01      ;debounce counter
equ ttpot pot2      ;pot to use for tap tempo control

skp run,START
wldr rmp0,0,4096      ;set up rmp0
sof 0,0.99
wrax latch,1      ;set latch = 1 high
sof 0,deftime/maxtime   ;set initial tap tempo
wrax ramp,0

START:

;Switch Debouncing and pot filtering work around

ldax   ttpot   ;read tap tempo pot
sof 1,-0.5   ;level shift to -0.5 to 0.5
skp neg,DOWN   ;if negative jump to DOWN
ldax db      ;else high, read db
sof 1,count   ;add count
wrax db,0   ;write new value to db
skp zro,ENDDB   ;jump to ENDDB
DOWN:
ldax db      ;read db
sof 1,-count   ;deduct count
wrax db,0   ;write new value to db

ENDDB:

;latching switch, falling edge triggered flipflop
;Output of debounce routine of < -0.9 is low, > 0.9 is high, values in
between
;are ignored and the switch does nothing, Schmitt trigger action.


ldax db         ;read db
absa         ;get absolute value
sof 1,-0.9      ;deduct 0.9 so only values < -0.9 or > 0.9 give a positive
result
skp neg,ENDSWITCH   ;if negative then jump to ENDSWITCH
ldax db         ;read db
sof 1,-0.9      ;deduct 0.9
skp neg,LO      ;if negative jump to LO, output of debounce is low
sof 0,0.999      ;else output of debounce is high
```

```
wrax mom,0      ;set mom to 1 (high)
skp zro,ENDSWITCH   ;jump to ENDSWITCH
LO:
ldax mom      ;read mom
skp neg,ENDSWITCH   ;if it's negative then debounce was already low last
time so do nothing, jump to ENDSWITCH
sof 0,-0.999      ;else mom was high last time so switch has only just been
pressed (falling edge)
wrax mom,0      ;set mom to -1 (low)
ldax latch      ;read latch
sof -1,0         ;invert, high becomes low, low becomes high
wrax latch,0      ;write to value to latch

ENDSWITCH:

;tap tempo, uses rmp0 as a 1 Hz rising ramp, runs whilst latch is low and
is sampled and held when latch is high

ldax latch      ;read latch
skp neg,LOW      ;if negative jump to LOW
jam rmp0      ;else latch is high, jam rmp0 (reset to 0)
ldax ramp      ;read ramp, will contain last value of rmp0 before latch
went high
wrax taptempo,0      ;write to taptempo
skp zro,ENDTT      ;jump to ENDTT
LOW:
sof 0,ramprate
wrax rmp0_rate,0      ;set rmp0 rate to ramprate
cho rdal,rmp0      ;read value of rmp0
sof -2,0.999
sof 1,0.001      ;level shift to 0 to 1 rising ramp
wrax ramp,1      ;write to ramp
sof 1,-0.999      ;deduct 0.999 from ramp
skp neg,ENDTT      ;if answer is positive then second tap hasn't happened
with 0.999 ms of first
ldax taptempo      ;so keep last value of taptempo
wrax ramp,0
sof 0,0.999      ;and reset latch high
wrax latch,0
ENDTT:
```

This doesn't include the code to flash a LED at the tapped tempo, I can do that as a separate block if you like.

Top

- Edit post (./posting.php?mode=edit&f=31&p=1387)
- Delete post (./posting.php?mode=delete&f=31&p=1387)

- Report this post (./report.php?f=31&p=1387)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1387&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1387)

Re: tap tempo block (#p1387)

by **Digital Larry** » Tue Jul 09, 2013 11:37 am

Thanks slacker!

Currently I'm writing a little tool that will let me import Spin ASM much more rapidly than doing it manually, so it may be a few days before I am able to turn this into a block.

I'm sure I'll have some questions once I get it running.

Would you be willing to share the schematic "segment" showing how to connect the tap tempo switch?

DL

Top

- Edit post (./posting.php?mode=edit&f=31&p=1388)
- Delete post (./posting.php?mode=delete&f=31&p=1388)
- Report this post (./report.php?f=31&p=1388)
- Warn user (./mcp.php?i=warn&mode=warn_post&f=31&p=1388&sid=befaf904784df501ab581b011c284453)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1388&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1388)

Re: tap tempo block (#p1388)

by **slacker** » Tue Jul 09, 2013 12:23 pm

Cool, any question just let me know.
Here's a couple of ways to hook up the switch, the top one probably isn't that useful as it dedicates the pot into just being a switch. The bottom one allows a pot to be used as normal, to use the switch turn the pot to maximum generating a value of 3.3 volts on the pot input, the switch then shorts the input to ground. The switch could be connected to 3.3 volts instead of ground reversing the action or a second switch could be used to choose whether the switch connects to ground or 3.3 volts as shown here http://www.aronnelson.com/gallery/main.php/v/slackers-stuff/babelfish/babelfishschem.jpg.html?g2_imageViewsIndex=1 (http://www.aronnelson.com/gallery/main.php/v/slackers-stuff/babelfish/babelfishschem.jpg.html?g2_imageViewsIndex=1) . This lets you use the switch to set the pot to min or max values. There's some examples of the tap tempo and other uses for the switch in this video if you're interested.

http://www.youtube.com/watch?v=0e4X5dU-12o (http://www.youtube.com/watch?v=0e4X5dU-12o)

Attachments
potswitch.jpg (13.78 KiB) Viewed 216 times
Top

- Edit post (./posting.php?mode=edit&f=31&p=1389)
- Delete post (./posting.php?mode=delete&f=31&p=1389)
- Report this post (./report.php?f=31&p=1389)

- Information (./mcp.php?i=main&mode=post_details&f=31&p=1389&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1389)

Re: tap tempo block (#p1389)

by **Digital Larry** » Wed Jul 10, 2013 6:33 am

I'm wondering whether the tap tempo block is general purpose enough to warrant being a stand alone controller, or whether it should just have two forms:

1) Tap tempo LFO
2) Tap tempo delay

I'd probably have to wire up a pedal like this and actually play the guitar (gasp) to have a better idea of what it's capable of.

For the delay application it seems like you have to dedicate the full 1 second delay line to it so there's not much else (requiring delay RAM anyway) that you're going to be able to do simultaneously.

For LFO I'm guessing that having an LFO that cycles at the tap rate, or maybe even 2x or 4x tap rate might be OK. Or 6x if you are into English ale?

Just a thought - what do you think?

DL

Top

- Edit post (./posting.php?mode=edit&f=31&p=1390)
- Delete post (./posting.php?mode=delete&f=31&p=1390)
- Report this post (./report.php?f=31&p=1390)
- Warn user (./mcp.php?i=warn&mode=warn_post&f=31&p=1390&sid=befaf904784df501ab581b011c284453)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1390&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1390)

Re: tap tempo block (#p1390)

by **slacker** » Thu Jul 11, 2013 9:10 am

Good point, I guess it depends on how many delay style blocks you plan on having, you could end up with a large number of these for example ones with different filters, pitch shifters or other things in the feedback loops, in which case a separate block that can control any of them possibly makes sense. I suppose you could add tap tempo as a control panel option to any delay based block, tick a box for tap tempo or not to have normal pot control.

A tap tempo LFO is definitely a good idea though, I'll have a go at writing one.

Top

- Edit post (./posting.php?mode=edit&f=31&p=1391)
- Delete post (./posting.php?mode=delete&f=31&p=1391)
- Report this post (./report.php?f=31&p=1391)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1391&

sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1391)

Re: tap tempo block (#p1391)

by **Digital Larry** » Thu Jul 11, 2013 11:29 am

The "best way" to do things many times only becomes obvious out of trying certain things and seeing what happens. Right now I'm trying to isolate control blocks to their smallest possible implementation. However, if in practice they always get hooked up to the controlled block in the same way, I'll be tempted to simply include that structure as part of the block itself. And there's nothing that says we can't have it both ways. 

Top
- Edit post (./posting.php?mode=edit&f=31&p=1403)
- Delete post (./posting.php?mode=delete&f=31&p=1403)
- Report this post (./report.php?f=31&p=1403)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1403&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1403)

Re: tap tempo block (#p1403)

by **Digital Larry** » Mon Sep 09, 2013 8:26 pm

I added the tap tempo block finally!

Please see:

viewtopic.php?f=29&t=1311 (http://holycityaudio.com/forum/viewtopic.php?f=29&t=1311)

Top
- Edit post (./posting.php?mode=edit&f=31&p=1711)
- Delete post (./posting.php?mode=delete&f=31&p=1711)
- Report this post (./report.php?f=31&p=1711)
- Warn user (./mcp.php?i=warn&mode=warn_post&f=31&p=1711&sid=befaf904784df501ab581b011c284453)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1711&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1711)

Re: tap tempo block (#p1711)

by **disasterarea** » Sat Aug 02, 2014 4:55 pm

The thread referenced above is missing. Any tips on how to control something with the tap tempo block?

I'd love to see an LFO-driven example as well as a delay example. Also, any pointers on changing tap divisions?

Top
- Edit post (./posting.php?mode=edit&f=31&p=1712)
- Delete post (./posting.php?mode=delete&f=31&p=1712)
- Report this post (./report.php?f=31&p=1712)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1712&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1712)

Re: tap tempo block (#p1712)

by **Digital Larry** » Sat Aug 02, 2014 6:59 pm

The link was probably for a release announcement for a previous version.

As I recall, the tap tampo outputs a value from 0.0 to 1.0 indicating the time between button clicks in seconds. Then if you used this with the servo delay with total time = 1.0 second then your delay time would match the tap interval. The servo delay takes the control input from 0.0 to 1.0 to map to 5% to 100% of the allocated buffer length. Since the servo delay block adjusts the tap position to whatever percent of the delay length, you could create shortened delay blocks, e.g. 250 msec, 500 msec and daisy chain these and connect their time control inputs all to the tap tempo output. And then take the output of each delay block into a submix.

At least, that's what comes to mind for me.

Top

- Edit post (./posting.php?mode=edit&f=31&p=1742)
- Delete post (./posting.php?mode=delete&f=31&p=1742)
- Report this post (./report.php?f=31&p=1742)
- Warn user (./mcp.php?i=warn&mode=warn_post&f=31&p=1742&sid=befaf904784df501ab581b011c284453)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1742&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1742)

Re: tap tempo block (#p1742)

by **disasterarea** » Thu Aug 14, 2014 9:43 am

Maybe I'm being dumb here, but wouldn't tapping half the total time (1 second) call up 50% of the buffer length? In other words wouldn't tapping a 500mS interval call up a 125mS interval on a 250mS delay?

Top

- Edit post (./posting.php?mode=edit&f=31&p=1745)
- Delete post (./posting.php?mode=delete&f=31&p=1745)
- Report this post (./report.php?f=31&p=1745)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1745&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1745)

Re: tap tempo block (#p1745)

by **Digital Larry** » Thu Aug 14, 2014 7:07 pm

It's possible that I missed your intention. I thought you wanted to be able to tap in a master delay time length which would automagically have some subdivisions to it.

So my hastily conceived idea was to daisy chain a number of "Straight Delay" blocks which would total to 1000 msec (max). As you say, the 500 msec tap rate would set each of two 500 msec delays to 250 msec each, but since they are daisy chained, the end point would be at 500 msec and the output of the first one (which you could bring to a mixer) would be at 250 msec.

Top

- Edit post (./posting.php?mode=edit&f=31&p=1748)
- Delete post (./posting.php?mode=delete&f=31&p=1748)
- Report this post (./report.php?f=31&p=1748)

- Warn user (./mcp.php?i=warn&mode=warn_post&f=31&p=1748&sid=befaf904784df501ab581b011c284453)
- Information (./mcp.php?i=main&mode=post_details&f=31&p=1748&sid=befaf904784df501ab581b011c284453)
- Reply with quote (./posting.php?mode=quote&f=31&p=1748)

Re: tap tempo block (#p1748)

by **disasterarea** » Fri Aug 15, 2014 7:58 am

No, that makes sense, we were just thinking about different things! I think the plan would be to have separate algorithms for each desired tap division, and select either with a rotary switch or a pushbutton + a micro to set the address lines. Even a dumb ATTiny45 or 85 could handle this although you'd need a 3-to-8 decoder to light up an LED to match... Total cost about $2 per unit so not terrible.

Top

Display posts from previous: All posts Sort by Post time Ascending Go

Post a reply

12 posts • Page **1** of **1**

Return to SpinCADBlocks

Jump to: SpinCADBlocks Go

Quick-mod tools: Lock topic Go

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