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GitHub – https://github.com/kk60503/CS-Audio-Course

"Brina Luna" Phaser Plugin

("Bree-nah Loo-nah" with a fancy 'rolled r': Italian (hopefully?) for Moon Frost)

I would like to use this project to understand how phasers work on a digital/waveform level. Phasers are a really fun effect that I like to add to an electric guitar signal chain. I think my favorite guitar pedal phaser would be the MXR "Script Logo" Phase 90 (wish I had one!), which is kind of a reissue of the original Phase 90 that is more mellow/subtle than the modern "Block Logo" version. The Phase 90 has one knob that sets the "Speed" effect, or the frequency of the LFO. From what I understand, it's a 4-stage "sweeping" phaser.

I plan on using the JUCE framework with C++ programming to create the plug-in. As far as I know, JUCE supports conversion into VST3, AU, and most other major plugin formats. I also have the first version (~2013) of "Designing Audio Effect Plug-ins with C++" by Will Pirtle, which is supposed to be a great reference book. So, my roadmap is using those tools and the others suggested by the class to achieve my plugin.

I usually play electric guitar with at least a little distortion (otherwise, what's the point?!), and I have a Strymon Blue Sky digital reverb pedal that I really love. I originally thought I would try to recreate the same sort of DSP-reverb effects that Strymon does so well, and I may try to implement at least a little into this project. I also have a Black-Box Russian Big Muff fuzz pedal which I adore, so I figured maybe I could find out how to simulate that for light-ish distortion in my plugin.

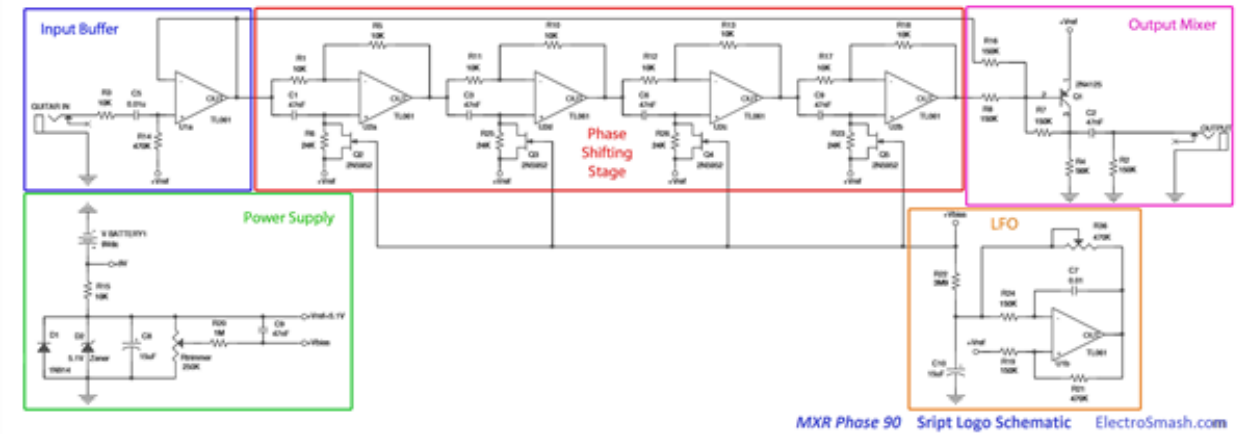
I am not sure if there's a lot of effort to make a plugin compatible with a MIDI vs. Direct Input guitar vs. generated (like HW 1) signal input. I have the capability to test any at home, but I'm not sure which would be the easiest for this project. I'm also not sure if it's possible to easily combine with a phaser; but it would be cool to have a targeted effect around 6000Hz that's like a shimmery reverb or maybe a ping-pong delay. I think implementing nice digital reverb can be tricky (something like nth-order feedback delays?), so I'll have to research if that's feasible within the timeframe.

I've included some schematics/websites/info below that I think will be useful for my project.

Phaser:

Electrosmash seems like a really great website for deep technical dives into how guitar pedals work. This page and schematic go into the details of the Phase 90, and I think a lot of the graphs, frequency response models, mathematical functions, etc. will be useful.

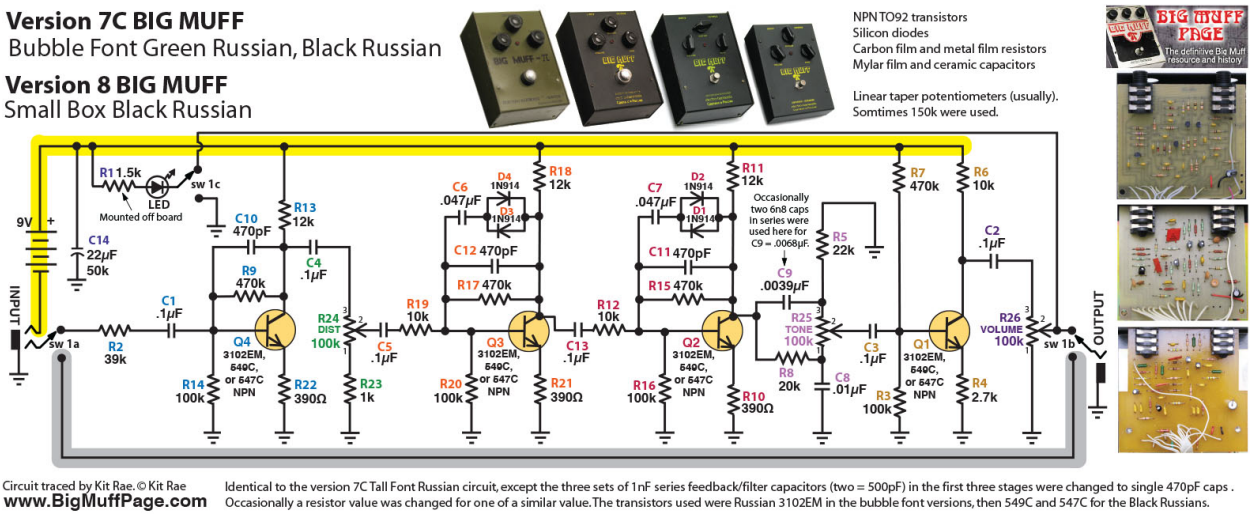
https://www.electrosmash.com/mxr-phase90
MXR Phase 90 “Script Logo” Schematic:



Distortion:

Here’s a page from Electrosmash and a schematic from BigMuffPage.com about the old Big Muffs. I think learning what kind of distortion type it represents will be a good start.

Black-Box Russian Big Muff:
https://www.electrosmash.com/big-muff-pi-analysis



Reverb/Delay:

Here's a page from the Strymon website that goes into detail about how one of their digital delay pedals works. There's also a lot of other "white paper" pages they have on the website. Unfortunately (and understandably), they don't have a lot of info on things like their reverb DSP's/technology, but I think this page will be a good reference.

https://www.strymon.net/dig-digital-delay-technology-white-paper/

Strymon "Ping-Pong" delay configuration: