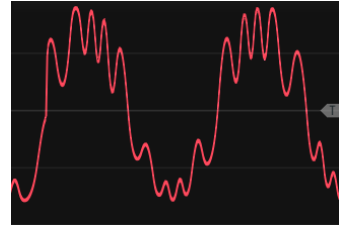# "CARTOON RUNNING!"
by Allieway Audio
An Owner's Guide
Concepts: WTF is this nonsense?!?!

CARTOON RUNNING! is probably the messiest music-thing I've ever made - in fact, I almost decided not to release it because of how *wonky* it is. However, despite the chaos, it became, it's design began with a *relatively simple goal* - to *use the principles of Newtonian physics to create a "signal woggler"which chased after (but* never *fully caught up to) an input signal,* overshooting comically like Charlie Chaplain on greased roller-skates. Or like a cartoon!

But… something went wrong.

Due to some programming mistakes made in prototyping, *non-linear feedback* was introduced into the heart of the kinematic equations I was utilizing. However, I discovered that, while this made the module highly *unstable and chaotic*, it also *added character* and made way for tons of neat *sweet-spots* and an *extremely wide and interactive parameter range.*

So, I let my *Id* take over and, instead of simply removing these nonlinearities, I added *MORE.*

In other words, *I circuit-bent Newtonian Physics.*

And it's wacky! *Maybe too wacky?*

CARTOON RUNNING!'s oscillations do *not* track volt-per-octave - in fact, it doesn't convey any of the voltages it receives very accurately in the slightest. It behaves differently at different sample rates - it's levels can fluctuate wildly, and I would not recommend listening to it's raw output without a Limiter and DC-filter as protection. It is a beast which at this point can't really be tamed - *I don't even fully understand how it works at this point.* More than any prior project of mine, it's truly taken on a life of its own!

So what is it useful for? Cartoon Running does serve admirably in adding variable amounts of *wonkiness* to an incoming LFO or sequence, just as I originally intended it to. Just plug in a CV input, *turn up the "Mixture" knob,* and play around hunting for those organic and wiggly sweet spots. It can also serve as an *unstable LFO or envelope* when not receiving an input signal, chasing itself instead of the input. It can be *"pinged" or "plucked"* with the "Excite" trigger input, and it can even be used as a *chaotic audio source* with the proper precautions *(Use a limiter like Koan, and set the module to Audio-Mode via the Right-Click menu!).*

The OCD, "developer" side of me is not super pleased with the mess Cartoon Running has become, but the chaotic artist in me *loves it.* It's *cartoon nonsense personified,* like the Tasmanian Devil trying to possess the Roadrunner and engaging in a battle for mind-dominance… In the end, I've simply decided to *embrace this mess* rather than start from scratch and make a *less-interesting* module as a result.

*I hope you'll enjoy exploring the vast and strange cartoon universe hidden in this crazy lil dude. Meep meep! ^_^*

Overview: What does each part do?

Note: It is hard to describe the different parts of CARTOON RUNNING! in isolation, as all the controls are heavily interactive, or "inter-tangled" - the way Damping behaves depends heavily on how Inertia is set, and Acceleration is impacted by Gravity - etc etc etc. Despite this, I'll do my best to describe in isolation:

1. **Acceleration Knob / Input.** Acceleration is *the rate at which velocity changes*. This control sets *how quickly the "woggler" changes direction after overshooting it's target.* Oftentimes it ends up behaving as a *combined "coarse frequency" and "level" control* - beware large changes in output amplitude when increasing Acceleration!!! At the lowest levels of acceleration, we reach a near stand-still...

2. **Inertia Knob / Input.** "*Inertia is a property of matter!*" This control models the natural *resistance* objects have to *change* in speed/direction. It's *flipped* so that at lower levels, inertia is very high, and the woggler has a hard time changing its direction of travel, leading to wider voltage swings. At the highest levels, inertia is quite low, so the woggler will be able to make much tighter turns.

3. **Gravity Knob / Input.** This controls the *pull of gravity* in the simulation. *At initialization / double-click,* we are in outer-space - gravity has no impact and we woggle freely. As we move the knob lower, gravity begins to increasingly *pull the voltage down* towards -10v - as we move higher gravity begins to pull us *upward* instead! *At extreme Gravity levels, motion may become impossible!*

4. **Damping Knob / Input.** Controls the Damping of the simulation - *Damping is the tendency for a system to suppress it's oscillations.* You can think of it as a kind of "low-pass filter" - *this control is flipped, so that at lower values there is a lot of damping happening and things are muffled and tiny*, at maximum values there is almost none and the system is liable to break into runaway noisy feedback!

5. **Mixture Knob / Input.** <u>*This control is very important!*</u> On initialization / double-click, we are at a center "dry" mixture - meaning whatever signal you send to the Input (6) gets passed right to the Position output (8). This means that, *for oscillation to occur, we must turn the Mixture left or right from the center position.* To the left, we start to mix in the pure oscillations of the woggling system, and to the right we combine these woggles with the signal going into the input (6). *Take note that this control has no impact on the trig/gate outputs, only the CV outputs.*

6. **Main Signal Input.** This is the big one - this is the roadrunner which Mr. Coyote is futilely chasing after. Whatever signal you send into here will be *woggled to oblivion* by the physics simulation inside *CARTOON RUNNING!* - try patching *LFOs, sequences, audio, or gates* into here*,* and mess with the Mixture (5) as you monitor the Position output (8).

7. **Excite Trigger Input / Momentary Button.** Causes the simulation to be "pinged" or "plucked", quickly introducing a *huge amount* of energy into the oscillating system, *injecting new life.* Sometimes, the simulation may become stalled, or reach a state without much interesting movement - in these cases it can be helpful to Excite to get things moving again! With the right settings, *this input can also be used to trigger a sort of drum voice* - see the Tips and Tricks page for more info on that. *Also, try sending audio here!*

8. **Position CV Output.** This is the Main Output, and represents the current location of the particle/woggler in a 1-dimensional space. When mixture is set to the *centered* position, *this will simply output whatever is patched into the Main Input (6). When mixture is turned left, we crossfade between the input signal and the system's oscillations - when mixture is turned right, we bring the woggles and the input together in harmony.* Ranges from -10v to +10v, and can swing quite wildly so watch your levels and *use a limiter if monitored!*

9. **Velocity CV Output.** This auxiliary CV output gives an approximation of the velocity vector of the particle/woggler. *When it's going fast up, velocity should be high, and vice versa when going fast down!*

10. **Trigger Output.** Outputs a trigger *whenever the woggled signal zooms past the input signal.* Use as a clock!

11. **Trajectory Gate Output.** This gate out represents the *trajectory* of the woggled signal. Goes *high* when we are accelerating *upwards*, and goes *low* when we are accelerating *downwards*. *Gravity acts as a sort of PWM!*

Finally, by right-clicking the module you can enable <u>"Audio Mode"</u>, which applies a DC-filter to the CV outputs! :)

Tips, Tricks, and Patch Ideas

▶▶▶ Let's start by using *"CARTOON RUNNING!"* as it was originally intended - as a *"signal woggler"!* Patch a bipolar LFO or CV sequence into the Main Input (6), slowly turn up the Mixture (5), and *you'll observe the incoming signal become increasingly wiggly-wobbly*. With the Mixture increased, begin to increase the acceleration, observing how it impacts the *speed and intensity* of the wobbles. Next, try turning the Gravity to the right, and watch how the wobbles get increasingly *pulled down toward the ground*, eventually *giving up the fight entirely as it falls into a black-hole at -10v.* Return Gravity to it's zero-position (*double-click the knob*), and continue to explore the other controls in a similar way. **Remember that CR is heavily *inter-tangled* - if one knob doesn't seem to be doing much, try changing another and then check back with the original knob - it's all connected, man!**

▶▶▶ Cartoon Running can also act as a *standalone LFO/Audio-Rate-Oscillator.* ***To be safe, whenever monitoring listening to output from CR!, use an attenuator and a limiter (Koan will work for this), and set the module to Audio-Mode via the Right-Click menu!*** Simply unpatch the Input (6) and turn the Mixture (5) to the left or right. Make sure to try listening to *all four of the outputs* - they can all be useful for audio purposes! When listening to the Gate Output (11), turn the gravity knob for thru-zero PWM effects. The Excite Trigger Input (7) can be used for *sync-like effects*, and by feeding the gate or trigger output (10 or 11) back into the Excite Input (7) you can get more *angular, sawlike waveforms. Do note that CR! does NOT track pitch Volt-Per-Octave, it follows it's own weird tuning logic, and you just gotta embrace it in all it's weird microtonal glory!*

▶▶▶ To further the above patch, CR! can actually function as a *standalone drum voice!* Send a *rhythmic trigger sequence* into the Excite Input (7), and listen to the different CV outputs (8 or 9). Experiment with different parameters (esp Damping / Gravity!) - *you can get anything from high-voltage squeals, to 808 thwacks, to some truly malevolent kick drums -* you can *send another signal into the Main Input (6) for more lively sequences*, and remember you can *modulate* all the params! <3

▶▶▶ While "CR!" already has a great deal of *internal feedback,* it also loves to be self-patched! Try sending the position or velocity output back to any of the CV inputs, and observe how this impacts the module's behavior. Then try using *several CR! modules with cross-modulation between them!* You'll find with just 2 or 3 modules with different settings, you can achieve wildly chaotic and organic results!

▶▶▶ You can also use "CR!" as an audio-processor - *though as with the prior audio tips, make sure to use a Limiter + Audio-mode!* Try patching an *oscillator or sample* into the Main Input (6), and experiment with how the different parameters impact the resulting sound. Generally, Damping (4) will behave as a sort of "cutoff control" - with experimentation you can get anything *from standard filtered sounds, to squelchy wet organic sounds, to gnarly distortion, to glitchy squealing, to subharmonic divisions of the input signal!* Experiment with *patching audio to the Excite Trigger Input* (7) as well, it's really cool - and *make sure to listen to all the different outputs! :)*
▶▶▶ CR!'s Trigger and Gate outputs (10 and 11) can function as a very *organic-sounding Clock source* - unlike those boring other Clock modules which keep a "steady beat", *CR! is quite unstable, with a tendency to accelerate and slow down,* especially when Excited, or when it's parameters are modulated. *Perfect Clocks are boring!*

▶▶▶ To be honest, due to this module's unhinged nature, *this is a hard one to really teach super concrete stuff about -* you'll really just need to *explore and find those sweetspots for yourself!* Just remember to use *caution* and a healthy dose of *curiosity* ^_^

Appendix: Use Cases

I like to design open-ended modules which can be used for many different kinds of tasks.
Why would you ever choose to use CARTOON RUNNING!?
Here is an non-exhaustive list of things CARTOON RUNNING! can be used for:
- Organic glitchy signal-follower / chaser / woggler
- Standalone unstable LFO with multiple shape outputs and unique modulation methods
- Unstable pingable audio oscillator with eldritch pitch tracking and the capability to output sine, triangle, PWM, and squelchy sawtooth shapes, among other more unknown ones
- Triggerable/Pingable Standalone Drum Voice
- Chaotic modulation generator, especially when feedback patched with other CRs
- Organic and Highly Inaccurate Clock generator
- An extremely gnarly and resonant, pingable audio filter/effect
- Plucked envelope generator with optional resonant shaping
- And at its most extreme settings, a standalone crazy digital noise generator and ultrasound generator - remember, *USE CAUTION!*

Appendix: Design Inspirations + Special Thanks

- My PHY211/PHY212 Professor - *though if this module is anything to go by, maybe I should've studied harder ;P*
- The Wiard / Makenoise *Wogglebug*
- Nonlinear Circuits *Sly Grogan*
- Newfangled Audio *Pendulate/Generate* - it was quite reassuring after finishing this module to stumble upon *their article about "Model-Bending Synthesis",* as it was comforting to know I was not alone in this wacky endeavor!
- Cartoon characters and the people who bring them to life
- Meng Qi, a huge inspiration for me - 非常感谢！
- The VCVrack team and community, with a special thanks to Andrew for his dedicated work and passion
- My lovely beta testers and supportive synthfriends :)
- You for reading this far and for supporting my dream ^^

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