

# Logistic Equation

1st order chaotic system implemented in a modular synthesizer

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## Abstract.

LogEq comes from Biology. It describes expansion of a population and its limit. For example many rabbits many foxes. Many foxes reduce a lot of rabbits and so on. You cannot describe it in a linear way. It is non-linear, chaotic:  $f(x) = k(x^2 - x)$ , a simple function.

Every result is a new starting point for next iteration; that is the loop.

As one can see in the Mandelbrot diagram, it starts nice but between 3.0 and 4.000 it is chaotic. Chaotic system's are self-similar, sometimes stable (Attractor) chance of change or unstable (chaotic). This behaviour is useable for musical purpose. It produces not random results, it is more a melody producing generator in German I call it "Spieluhr".

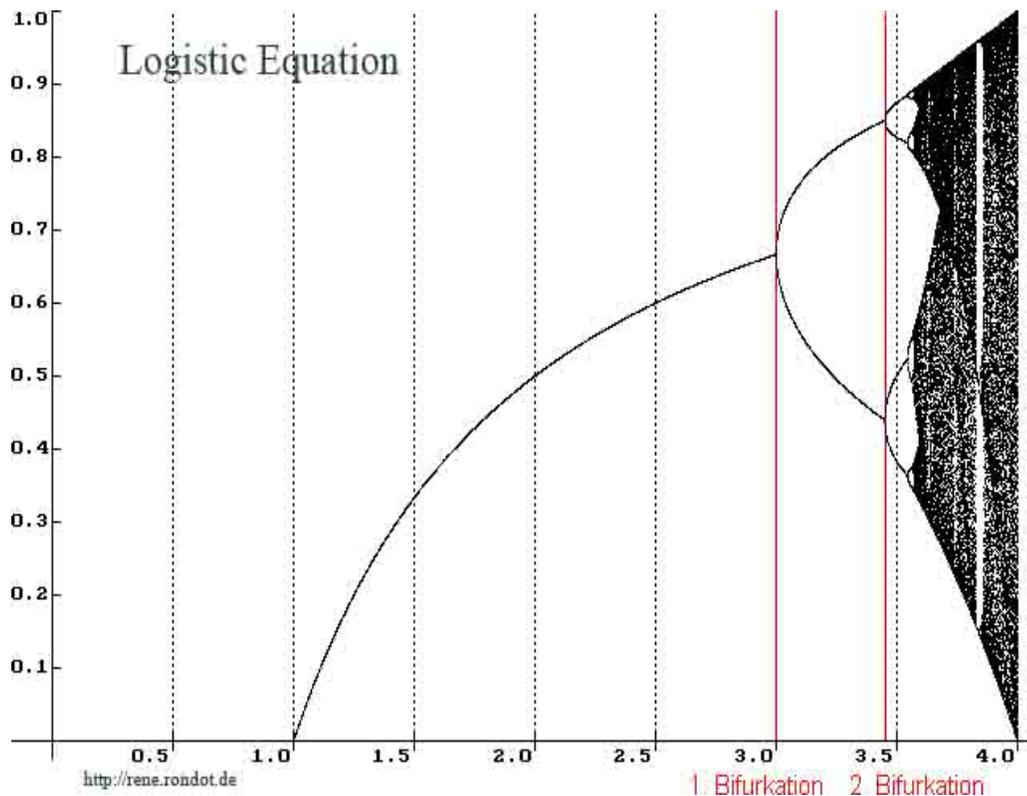
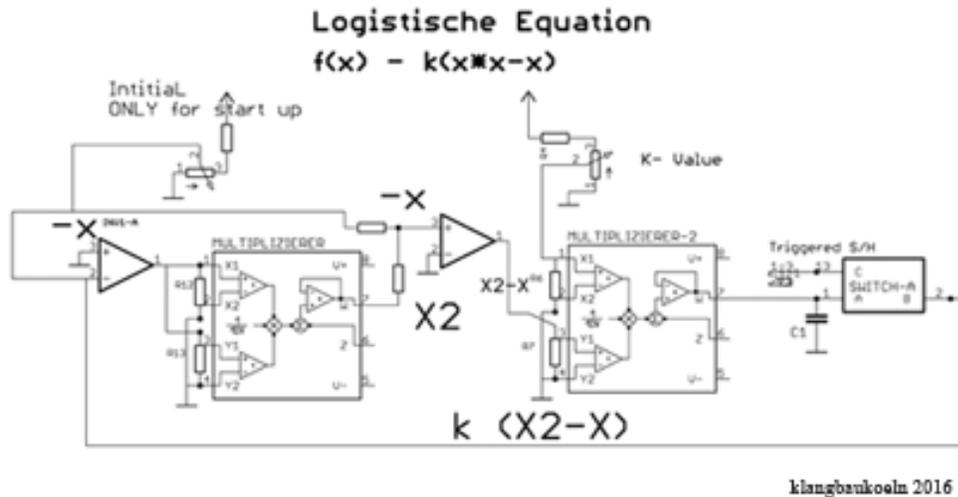


Figure 1. A closer look at the associated Mandelbrot diagram teaches the evolution of the system. Starting linear, passes different bifurcations and reaches total chaotic regions interrupted by short phases of linearity.

Dan Slater describes such a system in CMJ1998 (22/2). He gives an overview how to patch it in a Moog modular system. And he explained, an Analog Computer can do it also.

What is an Analog Computer? It looks like a synth-rack with different modules like oscillators, integrators, adders (mixer), differentiators and multiplications (VCA). Most of such things we have in our analog systems also, but a bit hidden.

So we will patch it and listen to the result. Take the simplified schematic as reference.



Further reading:

Analog Computer, this was my first inspiration to build a working analog version of LogEqu. Look closer to the double S/H for a stable loop.

<http://www.analog-synth.de/synths/logequ/logequ.htm>

Dieter Doeber page,

<http://www.doepfer.de/> Look at Patch Examples“ - Chaos Patch.

More chaos modul ideas by Ian Fitz at electronic soundhouse:

<http://ijfritz.byethost4.com/?ckattempt=1>

Easy links:

LogGI in action, the melody generator.

<https://www.youtube.com/watch?v=ewrxcotQel0&feature=youtu.be>

[https://www.muffwiggler.com/forum/viewtopic.php?t=137656&highlight=.](https://www.muffwiggler.com/forum/viewtopic.php?t=137656&highlight=)

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