# Yet another LORENZ system

Recently, I stumbled over PETER MCNAIR's gerat blog *Analog Ontology*,[1] where he describes – among many other highly interesting things – his implementation of a rather unknown attractor devised by EDWARD N. LORENZ. In 1984 LORENZ published a paper titled *Irregularity: a fundamental property of the atmosphere*[2] where he describes a system of three coupled differential equations:

$$\begin{aligned}\dot{x} &= -y^2 - z^2 - ax + af \\ \dot{y} &= xy - bxz - y + g \\ \dot{z} &= bxy + xz - z\end{aligned}$$

The parameters of this system are $a = \frac{1}{4}, b = 4, f = 8, g = 1$.

Scaling this system is pretty straight-forward as a quick numerical experiment shows: $|x|$ and $|y|$, $|z|$ are bounded by $2$ and $3$, respectively. The resulting analog computer program is shown in figure 1. Tweaking the parameters is quite interesting, a typical set of solutions is shown in figure 2.

## References

[LORENZ 1984] EDWARD N. LORENZ, *Irregularity: a fundamental property of the atmosphere*, Tellus (1984), 36A, pp. 98–110

[1] http://analog-ontology.blogspot.com/
[2] See [LORENZ 1984].

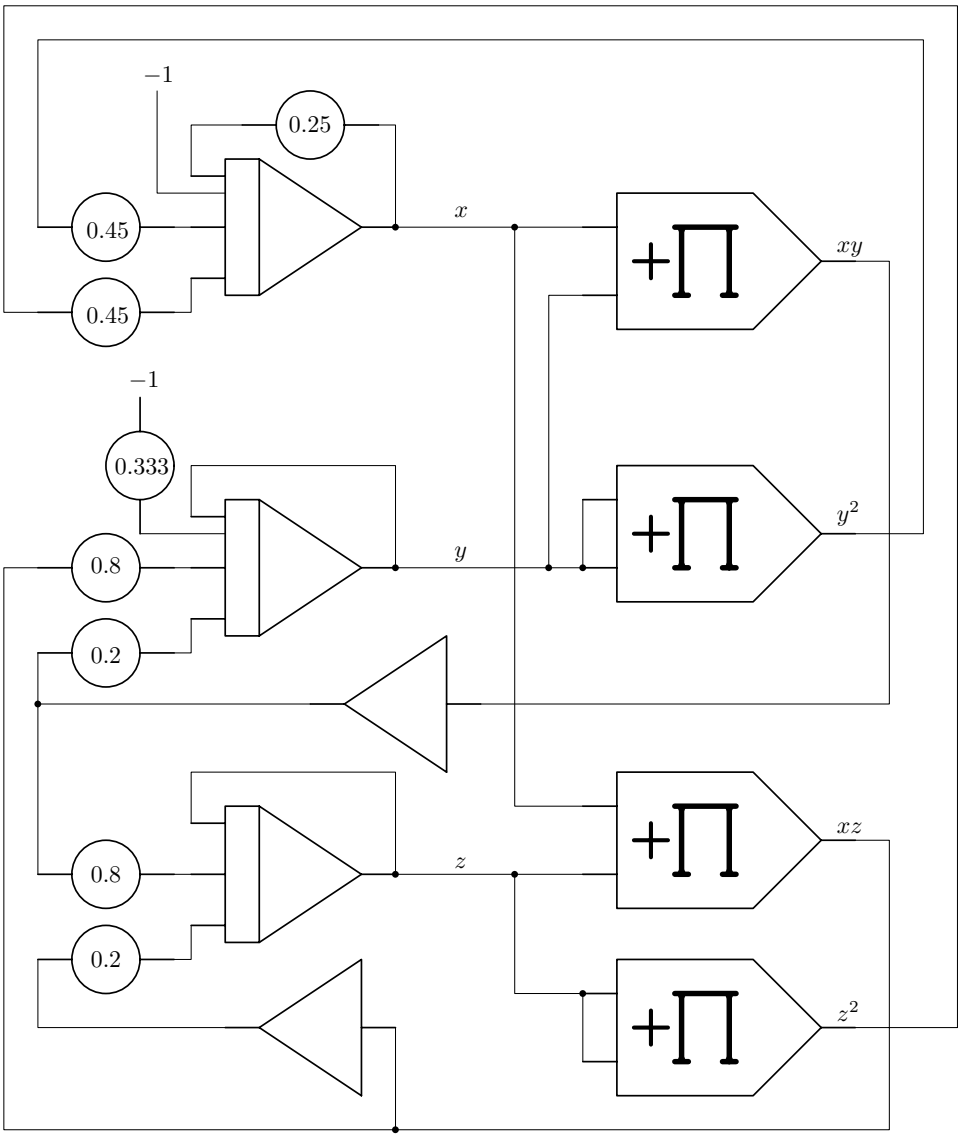


Figure 1: Program for the chaotic LORENZ-84 system

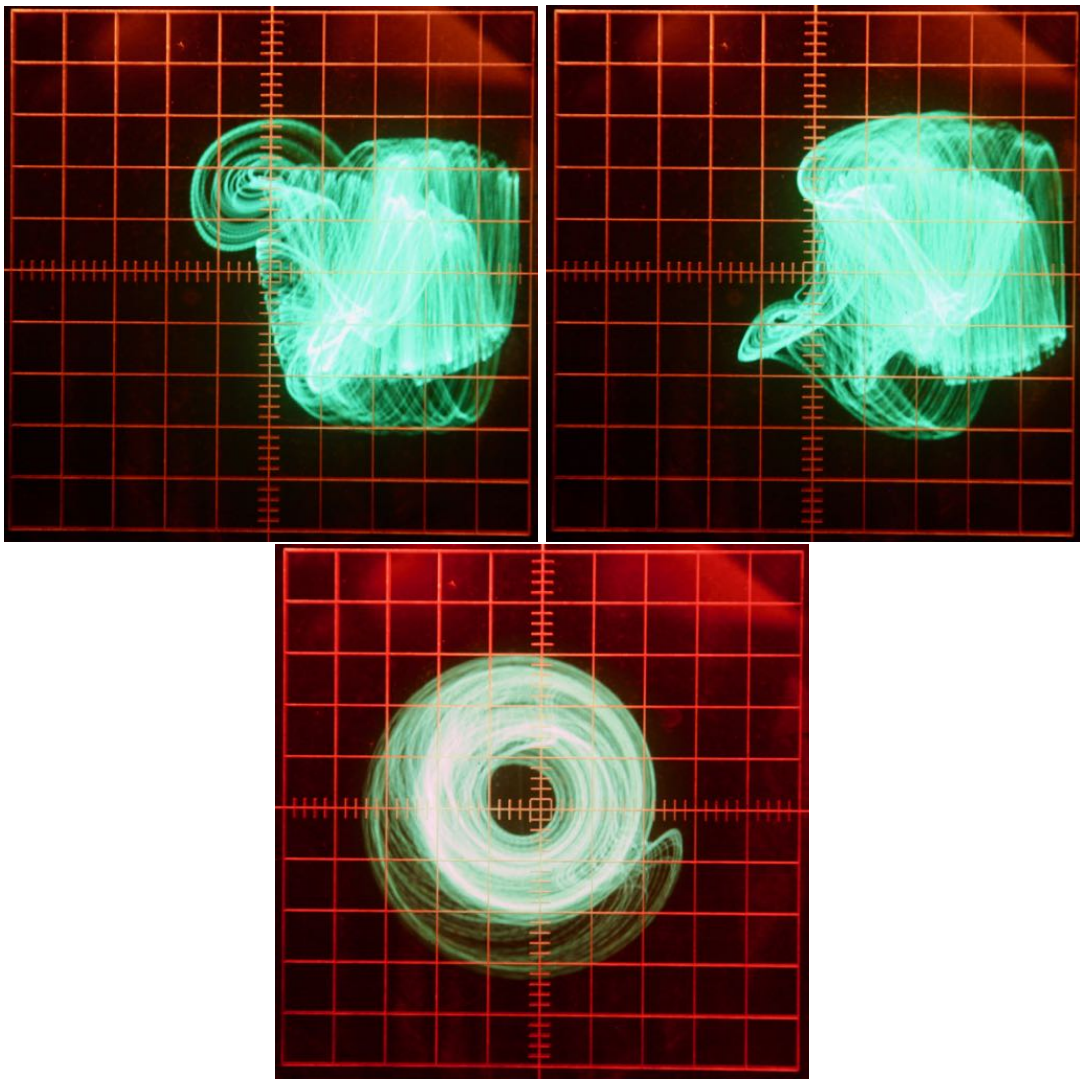

Figure 2: Typical behavior of the LORENZ-84 system, the three screen shots show $x$ vs. $y$, $x$ vs. $z$, and $y$ vs. $z$