

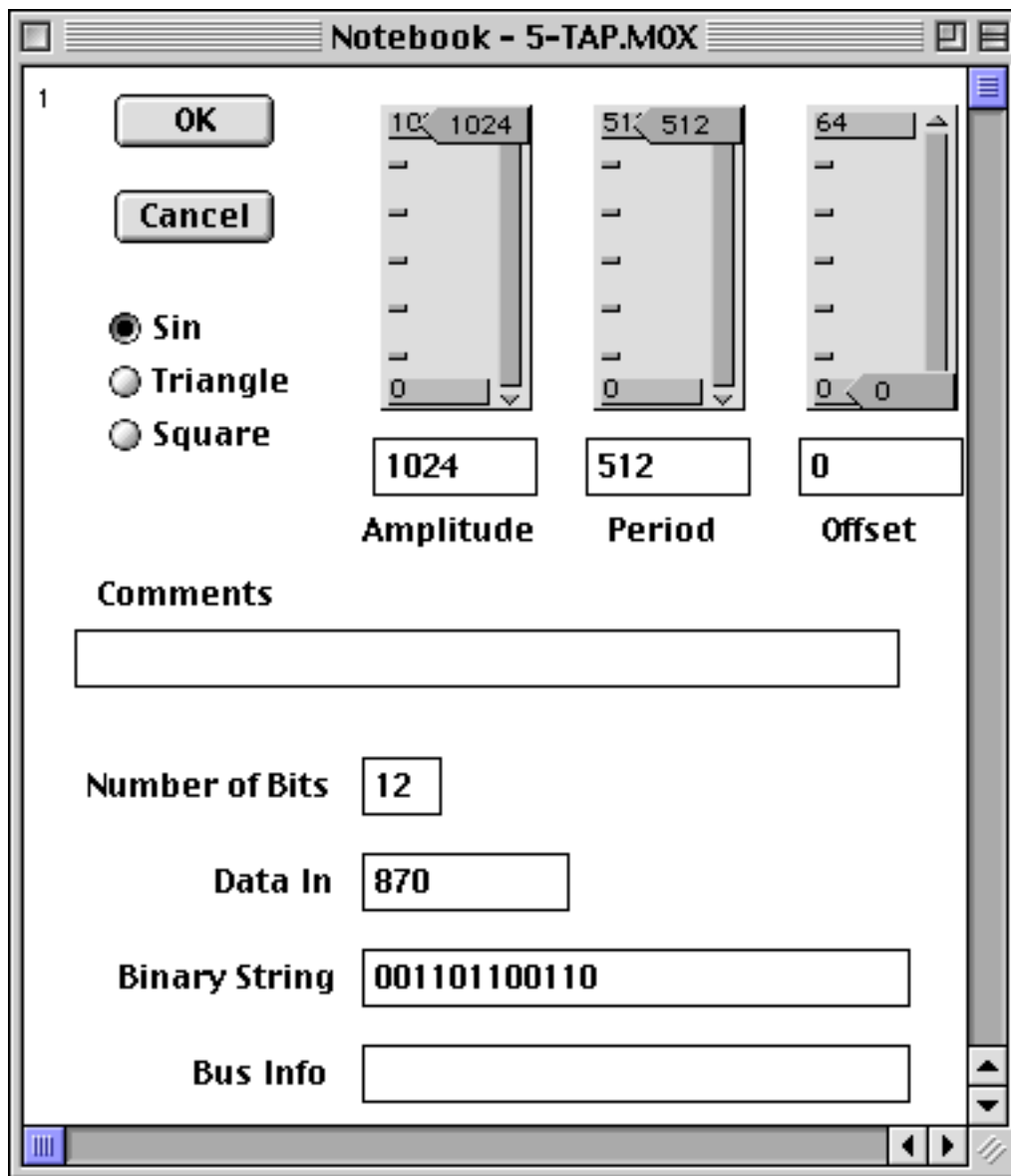
The 2-Digit DBNS Simulator

Unzip the 2-Digit file 2-DIGIT.ZIP attached to the e-mail. You will also need to download the simulator Player from:

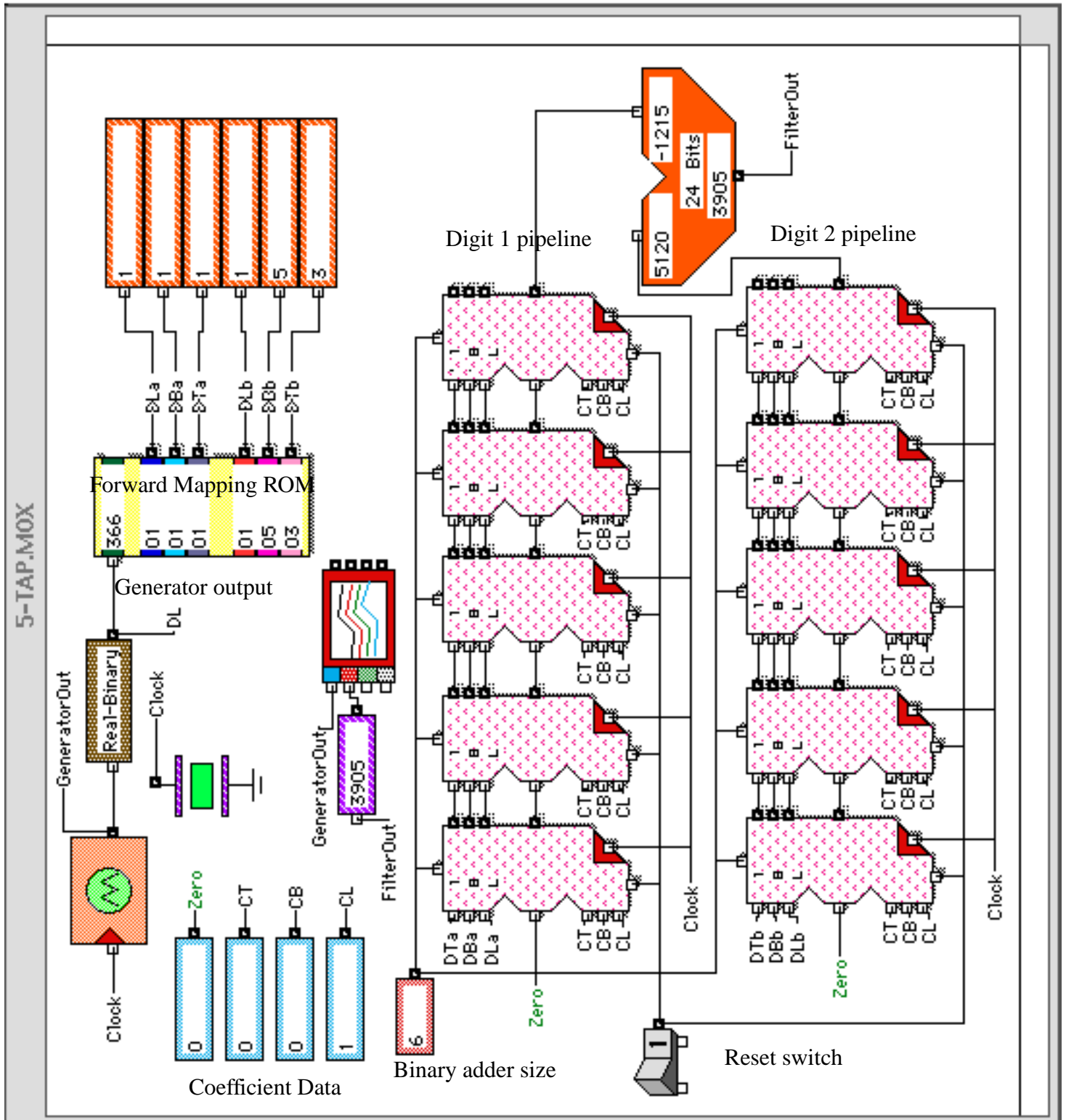
<http://www.imaginethatinc.com/pages/player.html>

You should be able to launch the Player by double-clicking the simulator file 5-TAP.MOX. You may be asked to point to the library; this is the other file DBNS.LRX.

2 windows will open up. The top one will probably be the notebook that is used to control and monitor the data generator outputs (see screen dump below).



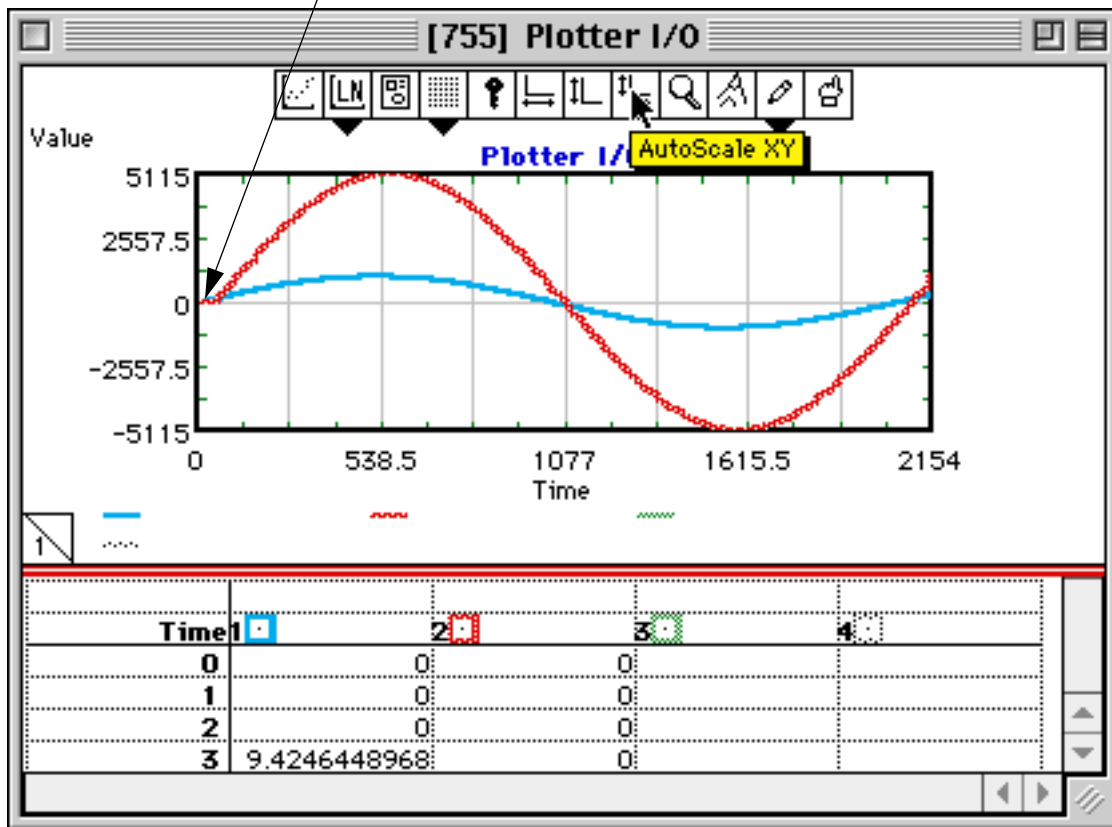
The other window is the simulator as shown below:



The forward mapping ROM generates the 2-digit DBNS indices from a look-up table. The sign of the input data is used to change the sign of the digits. Each digit is independently used in a separate pipeline to compute the FIR filter convolution. The binary output of the 2 pipelines is added to form the output sample. In this simulation the filter has 5 taps, each has the same value given by the coefficient data registers (this value can be changed by double clicking on each register and typing a new number).

The simulation is run from the RUN menu (Run Simulation); the parameters are already set up. A plotter window will open up (see below); you will need to keep pressing the tool bar item shown in order to see the updated plot at any time (this automatically scales the plot to fit in the plot area). The generator is set to provide a sinusoid; you can see the input and output waveforms together. The filter coefficients are set to 1, and so the gain should be 5 (5 taps of unity).

The pipeline can be flushed out by pressing the reset switch. You can see the latency in the 5 pipeline stages at the beginning of the plot.



The size of the binary adder used to generate the exponent of the binary floating point output in each tap can be adjusted. This drives a 2's complement adder producing the residue Mod 2^n . For this simulation occasionally the barrel shifter requires 16 shifts so we need a 6-bit adder to represent this.