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Buchla instruments have done the most extensive developments in random voltage functions.

The Buchla 266 Source of Uncertainty (figure 6.66) makes it possible to define these random voltages in a variety of ways. The upper section of the module provides three "flavors" of noise: white (+3 db/octave), pink (musically flat), and reciprocal white noise (−3 db/octave) which sounds like lowpass filtered pink noise but really involves a redistribution of energy rather than band limiting.

The second section produces two fluctuating random voltage sources. This is analogous to "low" noise on most other random voltage sources. The probable speed of fluctuation can be defined anywhere between .05 and 50 times per second. The direction and maximum magnitude of the change cannot be predicted but the rate can be controlled. This function is voltage controllable so that various random rates can be pre-programmed by a sequencer, played by a keyboard or a brainwave, or even determined by another random voltage.

The "quantized random voltage" output is the most interesting, and a minimal amount of math is involved. There are two outputs that generate a voltage whenever a pulse is received. One output is marked "n + 1" and the other is marked "2^n". "n" is a numerical value from 1 to 6 and may be defined by a front panel offset or determined by an external control voltage. If n = 1, then the n + 1 output gives two random voltages, chosen in random order at the rate of the input pulse. The 2^n output also generates the same two random voltages (2 × 1 = 2) but in a different random order. As n is set to 2, the n + 1 output is 3 voltages and the 2^n output is 4; when n = 3, the n + 1 output is 4 random voltages and the 2^n output gives 8 random voltages, and so on. Thus it may be that this means linear or geometric access to the number of random voltages. As n increases, n + 1 increases linearly and 2^n increases geometrically. This leads to some interesting correlations, as illustrated in figure 6.71. In this instrument the n + 1 output is patched to a VCO and to the "n" input of the RVS. The 2^n output is patched to control a filter and to the period input of the pulser. the pitch will be correspondingly low and set the value Before reading further, make your own analysis and prediction about how this random instrument will behave! A high magnitude random voltage will generate a high pitch (depending on the attenuation setting on the VCO) and simultaneously set the value of n higher so that the next pitch can be randomly selected from a greater range of possibilities. If the voltage is low, the pitch will be correspondingly low and set the value of "n" so that the next pitch will have more restricted range of possibilities. Simultaneously the 2^n output controls the filter. Thus as the range of pitch selection increases, the number of possible spectral ranges becomes greater, but in a geometric relation. The speed of the pulser providing the triggering information is also controlled by the 2^n output so that bright timbre is accompanied by longer events, longer events are accompanied by greater range probabilities for pitch, and the number of range probabilities for pitch selection is correlated geometrically with the number of possible spectral choices! This tail-chasing configuration can really consume many hours in the studio. However, it is worth exploration, therefore just keep it under control according to your compositional and performance interests.

The fourth section of the Buchla 266 also has two outputs: one marked and the other marked . Both outputs generate stepped random voltages when an input trigger is received. But each output has a different voltage distribution probability. The top output generates random voltages according to even voltage distribution. The bottom output has a pot and control voltage input for establishing random voltage distribution probabilities. With the distribution pot to the "low" setting, most of the random voltages will be low magnitude, with occasional medium and even less frequent high magnitude voltages. This is not the same as attenuating, because the total magnitude is not compressed but rather involves a redistribution of energy. As the distribution pot is turned to the right, or as a control voltage is applied, the distribution moves through medium to high magnitude random voltage distribution. Voltage control of this distribution also allows one to program or play in real-time the center areas of random activity. The two lower sections of the Buchla 266 are a voltage controlled integrator with the time constant defined by an offset, or a control voltage and a polyphonic sample-hold.

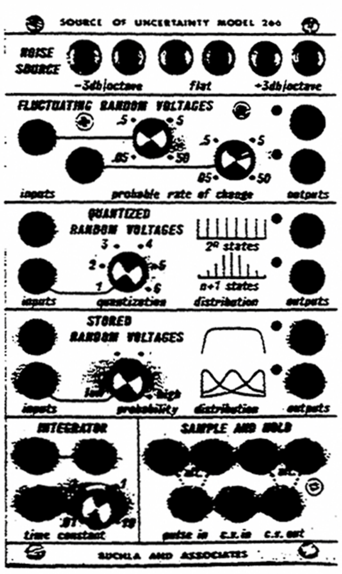

Figure 6.66. Buchla Series 266 source of uncertainty

Figure 6.71. Correlation of random voltages in an instrument