18. RANDOM DRAWING AND DATA ANALYSIS

18.1 Random_drawing

18.1.1 Generation_of_random_numbers

The basic method for the generation of random numbers is described in the sequel. This is only one of several possible methods. The results of random number generators using this method at NCC have been satisfactory.

The technique described below obtains a basic drawing from the uniform distribution in the interval 0 to 1.

A basic drawing will replace the value of a specified integer variable, u, by a new value according to the following algorithm:

$$u(i+1) := remainder ((u(i)*5**(2*p+1))//2**n),$$

where u(i) is the i-th value of u.

It can be proved that, if u(o) is a positive odd integer, the same is true for all u(i), and the sequence u(o), u(1),u(2)..... is cyclic with the period 2**(n-2). (The last two bits of u remain constant, while the other n-2 take on all posible combinations). For the UNIVAC 1107/1108 implemention, we have n=35. P is chosen equal to 6.

The real numbers v(i)=u*2**(-n) are fractions in the range 0,1. The sequence v(1),v(2),..... is called a stream of pseudo-random numbers, and v(i), (i=1,2,....) is the result of the i-th basic drawing in the stream u. A stream is completely determined by the initial value u(o) of the corresponding integer variable. Nevertheless it is a fairly good approximation to a sequence of truly random drawings.