Applesoft: Random numbers

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Security: Everyone

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All numbers produced by running Applesoft's random number generator follow
the same sequence as the first RUN, since the Applesoft's random number
seed is not reinitialized. This seed number, stored in locations $C9 to $CD,
is initialized when your system is first booted.

The Applesoft random number generator is only a pseudo-random generator (as
are most generators); thus, non-random patterns eventually occur. The
frequency these patterns repeat varies from program to program, though proper
re-seeding of the random number generator helps prevent small repeating
sequences. Here are two suggestions:

 1. Use the monitor's random seed at locations 78 and 79 to
     initialize Applesoft's random number seed. Since the monitor's
     seed is constantly incrementing while waiting for a
     key to be pressed, you'll start on one of 65536
     different sequences.

     10 X = RND (-PEEK (78) - PEEK (79) * 256)

 2. This random sequence can be lengthened by re-seeding the
     generator occasionally within the application program by
     adding the statement X = RND (-RND (1)).

No method completely eliminates patterns in the random numbers generated, but
you can lengthen the sequences until they're difficult to detect.

Applesoft's algorithm is:

Multiply the random seed by 11879546.4.
Add the result to 3.92767778 E-08.
Swap the most and least significant bytes of the result.
Force the exponent into the 0..1 range.

The example below shows the effect of the algorithm on a number. The most
and least significant two decimal digits are swapped instead of bytes in this
example:

```
   0.500000000
 * 11879546.4
   ----------
   5929773.2
 +        0.0000000392767778
   ------------------------
   5929773.2        (the rest is lost)
   --     ---        swap "bytes"
   3229775.9

 0.32297759       force value between 0 and 1
```

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