To : OIC, Projects Section, Cryptologic Branch

Subject: Proposed System For Guaranteeing A Minimum Cycle Of
Great Length In Any Irregular Motion Rotor System

A. It is proposed that any thoroughly irregular motion
system whatsoever be used, including Sigaba type, or patterns
of notches and CCM motion. This system shall be devised
solely for erratic motion, with no sacrificing of unpredict-
ability to insure a minimum cycle.

B. It is further proposed that a simple device be in-
cluded as described below which shall have a definite known
period. This device will in effect interrupt the erratic
motion of the rotors, in an irregular manner according to its
known cycle. Since this device has one function only and is
to involve no contribution to security as a detail of erratic
motion, its components, notches, etc. shall be fixed in the
most expedient pattern.

I propose 4 1/8" thick aluminum disks each attached to a
stamped gear wheel of the type found in the M-209. Each gear
shall be a number prime to each other and of such a number that
the product of the 4 will be a cycle long enough to permit
24 hour operation at maximum speed without resetting and with-
out repetition of the cycle. Numbers such as 43, 45, 49, 51,
fulfill these requirements.

These disks shall be on a common shaft and advanced 1 one
tooth for each step of the machine. They shall each register
at a given point as in the M-209.

There shall be on the perimeters of these disks a suff-
icent number of notches so that at a given percentage of the
time four notches will be simultaneously effective. Whenever
this condition occurs the interrupter shall operate by:

a. Denying stepping of one or more relatively fast rotors
   or control rotors.

b. Or by stepping a relatively slow rotor.

c. Or By reversing any 1 or 2 of the rotors, i.e., if
   rotor 2, for example, was by reason of the stepping
   system set to move, it would not, if it was not set
   to move, it would. This removes to the greatest
   degree predictability of the action of a rotor because
   of the known interrupter setting; a disadvantage of
   a. and b.

d. Irregular patterns are no object to the interrupter.
   Therefore on a given disk every fifth possible notch
   would not be effective, for example,

c. Since its function is limited, the interrupter need add no complications to the setting of the machine either for each message, or daily. It could have a pin in each disk, so that at the end of each message a button could be pressed and have all 4 disks automatically return to the same setting.

d. This device would permit greater flexibility of systems, since they could be used continuously on line without fear of ultimate depths for extended periods of time.

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