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Routinely, in all identification bureaus employing the Henry fingerprint system, the classification formula for a set of prints consists of a numerical fraction. Primary filing and searching is dependent on this fraction.

The literature, however, does not indicate the precise *numbered* position of each primary classification, nor how to calculate it. Because it is first, it is perhaps well known that primary $\frac{1}{1}$ is number one serially. Similarly, because it is last, primary $\frac{32}{32}$ is known to be the last, or 1024th. But there is nothing to indicate the serial numbers of the 1,022 intermediate primaries, such as $\frac{9}{17}$, $\frac{5}{13}$, $\frac{15}{23}$, $\frac{27}{30}$, etc.

Nor, in routine procedure, are such serial numbers required. Perhaps that is why standard texts omit reference to it, and why none of the experts questioned by present writers knew these serial numbers or how to calculate them. Neither multiplication, subtraction, nor addition alone provide these numbers.

FIRST METHOD

Having need for these serials, the present writers' first method was to insert, in each square of the Henry grid,[1] a whole number, beginning with "1," to represent each primary fraction. This had the effect of ordering all primaries serially by number, from *1* to *1,024*. It was necessary to record the numbers from left to right on each horizontal row in order to avoid arriving at a false result.

The grid and resulting chart of serial numbers is not reproduced here because after it was complete, the writers worked out a method for calculating the numbers without grid or chart. Up to this point they had merely extended the principle utilized in their little-lettered sequence controls.[2]

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1. Henry's grid is the series of horizontal and vertical squares, 32 each way, comprising the total of 1,024 squares (32 x 32), horizontal squares representing numerators and vertical squares the denominators. It is always shown blank in the literature.
2. MYERS AND WILLARD: *Sequence Controls for the Filing of Finger Prints.* Finger Print & Identification Magazine (Chicago), *28* (4), Oct., 1946.

Midway in the recording of serials on the grid we observed that the numbers for the *first* and *last* fractions for any primary group could be arrived at by simple addition. Thus, primary fraction ½ would have serial number 33. This is determined by the mere addition of "1" to the total number of primaries possible for the denominator-*1* group (i. e. 32). Similarly, the serial number for the *last* fraction for any primary group may be determined by adding the totals of each full complement of 32 numerators in all the primary groups concerned. Thus, by adding total numerators for the denominator-*1* and denominator-*2* primary groups, it is determined that the serial number for ³²⁄₂ is 64.

In other words, the primary denominator group *1,* having 32 numerators, presents the serial *1* for fraction ¹⁄₁, and serial 32 for fraction ³²⁄₁. Therefore, the next group in sequence would be the denominator-*2* group and, since its first numerator would be *1* (i.e., ½) the total of 32 for preceding group is added to the numerator of the succeeding group or 32 plus 1. In this manner all the *first* fractions for any primary group may be determined.

The same method is employed for the *last* fractions for these primary groups. Here, however, the *highest* fractional component in each group, namely the numerators-*32* is added. Thus, the serial for ³²⁄₂ is arrived at by adding total numerators (32) for the first primary group (¹⁄₁ with highest component 32) to the highest component (32) in the denominator-*2* group, or 32 plus 32 equals 64. By repeating the process for all groups up to and including the group for which the serial is required, any serial number for the first and last fractions of any primary group may be obtained.

But the same method does not provide serial numbers for the intermediate fractions in any of the 32 primary denominator groups. In short, there remain 960 primary fractions for which first method does not provide serial numbers. By experiment a process was discovered for calculating the serial numbers without grid or chart, thus rendering this discussion almost pointless except for this: That the grid-chart method can be used to test the validity of results determined by the second method. This applies to intermediate, as well as to first and last fractions for a given primary group, provided that the Henry grid is completely filled in (1 to 1,024).

SECOND METHOD

The second method, and the one herewith reported as a process for calculating serial numbers for Henry primaries, is simple in operation,

requiring only a few trial runs for development of proficiency in its use.

Rule 1: Where problem NUMERATOR is 32. Multiply problem numerator by problem denominator. The product equals the serial number for the problem fraction.

Example: Calculate serial number for the primary $^{32}\!/_{17}$.

Solution: 32 x 17 = 544. Serial number for the primary fraction $^{32}\!/_{17}$ is therefore 544.

Rule 2: Where problem NUMERATOR is LESS THAN 32. First, multiply problem denominator by 32 (the total number of numerators possible for a given primary group).

Second, subtract problem NUMERATOR from 32 (total numerators for the group).

Third, subtract the result of step two, from the total numerators for the problem group. The product equals the serial number for the problem fractional primary.

Example: Calculate serial number for primary $^{9}\!/_{17}$.

Solution: (1st step); 32 x 17 = 544.

$$
\begin{array}{c}
\text{(2nd step)};\quad
\begin{array}{r}
32 \\
-\ 9 \\
\hline
23
\end{array}
\\[2ex]
\text{(3rd step)};\quad
\begin{array}{r}
544 \\
-23 \\
\hline
521
\end{array}
\end{array}
$$

Serial number for primary $^{9}\!/_{17}$ is 521.

The "triple play" procedure under Rule 2 is brought about by the compound nature of the interrelated fractions, which in themselves are serially ordered. When, therefore, a problem numerator is less than the total possible numerators for the problem primary group, this total has to be considered in order to preserve the equilibrium of the sequences in their relation to the whole.

However, the product resulting from the first step provides a number greater than that represented by problem numerator, hence the second step which provides the reducing element needed for lowering the first-step product to a serial number of the fraction. Stated differently, the result is always a serial number which occupies, as an integer, precisely the same position on the grid, and in the finger print file, as that occupied by a given fraction.

As to application, we leave that in the hands of others. Obviously, if present writers had need for these serials, others may have similar or other need for them. For example, if the finger print records of citizens of the United States ever are to be included with vital statistics records, it might be desired to have the record serials interrelated with the finger print record numbers.[3]

If a record serial number, say 19182700, were prefaced by a *key* number representing an individual's finger print classification formula, accuracy plus interrelation would be served. The example serial number with key then would look something like this: 317—19182700.

Aside from the merits pro or con relative to universal finger printing, it is certain that population increases, such as are indicated by the Bureau of Census, plus an ever-increasing documentation imposed by national security measures, would call for a vaster use of some system for serial order. However, these writers are not making proposals but advance the point for illustration only.

Despite popular—and some expert belief—no single identification bureau, employing any finger print system so far devised, could adequately care for the finger prints of the entire population of the United States.

CALCULATED EXAMPLES

Following are a few calculated serial numbers for specific Henry Primaries. Readers may test the accuracy of their own computations by working out the fractions themselves and comparing results with the serial numbers given below.

Henry Primary	Serial Number	Henry Primary	Serial Number
$1\frac{1}{1}$	11	$3\frac{2}{13}$	416
$2\frac{3}{2}$	55	$3\frac{2}{27}$	864
$2\frac{9}{12}$	381	$3\frac{1}{32}$	1,023

Use *Rule 1* whenever problem primary numerator is 32. Use *Rule 2* whenever problem primary numerator is *less* than 32.

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3. The United States Public Health Service, in April of 1948, approved a plan of the Office of Vital Statistics for the assignment of serial numbers to all new-born. In these cases, however, serials based on finger print classification would have to be made later, *i.e.,* when growth made the finger printing feasible.