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*The following is extracted from the FRA National Highway-Rail Crossing Inventory Instructions and Procedures Manual dated December 1996 and updated.*

## **The HIGHWAY-RAIL CROSSING INVENTORY NUMBER**

### **Background**

In 1974, an effort was undertaken to inventory and assign a unique number to all public and private highway-rail intersections and pedestrian crossings in the United States. A National Advisory Committee, having representation from all involved stakeholders, was appointed to provide technical guidelines for the implementation of the inventory program to start on January 1, 1975.

A special crossing inventory numbering system was designed to reduce the possibility of error in identifying a crossing and its location, thus insuring that crossing data was recorded and identified for the correct location. A simple numeric system requiring the use of six digits followed by the alpha character at the end of the numerical sequence (a total of seven character spaces) was adopted by the National Advisory Committee. This crossing identification number was placed at all crossings on number boards (see Figure 1) along with the "U.S. DOT-AAR" designation (the AAR designation has since been dropped at their request in 1999). Some exceptions were made in the numbering system. For example, numbers having the same digit repeated consecutively three or more times were eliminated (e.g., 777). Also, numbers having three digits or less other than "0" were not used. (Thus, #001 001 K is the first valid number.) And, some numbers will have leading zeros.

The number assigned to each highway-rail intersection is unique to that location. The number, or a number series, has no significant relation to a railroad or locale. It has no relation until it is placed on a completed Inventory Form and submitted to FRA for placement in the National Crossing Inventory File. It is important for proper identification to have the crossing number permanently displayed at all public, private, and pedestrian crossings and mounted on a number board (Figure 1) or on an emergency notification sign (ENS). The number should be displayed on both sides of the track at each and every crossing. Individual Number Boards can be made by the railroad or purchased from Keyes-Davis in Battle Creek, Michigan, for between \$8.00 and \$25.00, depending on the number purchased (phone 269-962-7505).

In many ways the National Highway-Rail Crossing Inventory number is similar to a street name sign. Important crossing information is collected by State agencies and railroads is identified with the number in the National File. Police, accident investigators, project engineers, consultants, attorneys, States and railroads are but a few of those who regularly refer to the numbers and the connecting data.

In addition to the assignment of data regarding the physical and operational characteristics of a

crossing, the inventory number is required to be on all FRA grade crossing accident reports and warning device malfunction reports. All railroads and States use the inventory number on crossing improvement project documents, and railroad crews report near misses and other information regarding a crossing by the inventory number.

### Number Validation Calculation

The alpha character is a feature of the National Inventory number that allows the number to be checked and verified that it is a valid number, thus identifying it with the correct crossing location and inventory information. The inventory numbers are generated by a special software program that uses an algorithm to determine the alpha check character, which is at the end of the numeric numbers. Thus, every number can be validated or verified as being correct by the check character. The validation calculation is performed as follows:

- a. Add the six individual numbers, which result from the products of each of the first six digits, times the digit's position in the number stream, with position one being the left-most digit (see Step 1 below).
- b. Subtract multiples of 22 from this total until the remainder is less than 22 (see Step 2 below).
- c. The remainder is then compared to Table 2 to determine the alpha check character (see Step 3 below).

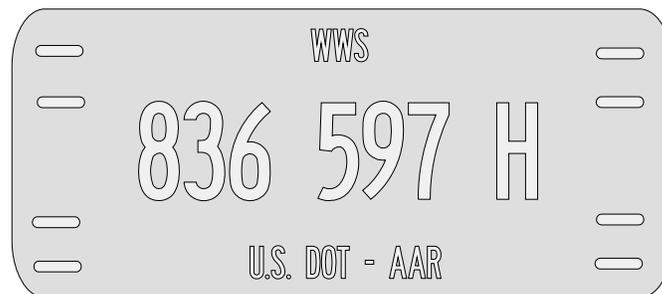


Figure 1. Sample Crossing Inventory Number and Number Board

EXAMPLE #1

The procedure can be illustrated by validating the inventory number in Figure 1, which is # 836 597 H. The calculation process is as follows:

Step 1. Compute the Total Numeric Value

$$\begin{aligned} &= [(8 \times 1) + (3 \times 2) + (6 \times 3) + (5 \times 4) + (9 \times 5) + (7 \times 6)] \\ &= (8 + 6 + 18 + 20 + 45 + 42) \\ &= 139 \end{aligned}$$

Step 2. Find Remainder for the Alpha Code.

$$\begin{aligned} &= 139 - (\text{subtract multiples of 22 until you get a number that is less than 22}) \\ &= 139 - (22 \times 6) \\ &= 139 - 132 \\ &= 7 \end{aligned}$$

Step 3. Determine the Valid Alpha Code

The remainder “7” corresponds to the Alpha Code letter “H” (see Table 2). Therefore, the inventory number # 836 597 H in Figure 1 is valid.

EXAMPLE # 2

A second example is shown below for crossing Number # 076 521 C :

Crossing Number:	0	7	6	5	2	1	C	
Multiplication:	x 1	2	3	4	5	6		
Sum:	0	+14	+18	+20	+10	+6	=	68

Remainder:  $68/22 = 3$  with a remainder of 2

(NOTE: Use long division or subtract multiples of 22. Do not use a calculator to divide.)

Alpha Code:  $2 = C$  from Table 2

Remainder	Alpha Code						
0	A	6	G	12	N	18	V
1	B	7	H	13	P	19	W
2	C	8	J	14	R	20	X
3	D	9	K	15	S	21	Y
4	E	10	L	16	T		

5	F	11	M	17	U
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Table 2. Remainder vs. Alpha Code

### Assignment of Valid Crossing Inventory Numbers

Every crossing in the United States, including public, private and pedestrian, both at grade and grade separated is required to have a crossing inventory number assigned and recorded in the National File. The only exception is for crossings created to serve specific temporary activities (six months or less), such as construction. Crossings that are located within a company's rail-yard facility, or within a railroad's rail-yard on railroad property, or for a port or dock area where there are numerous crossings that are not distinguishable, one number needs to be assigned to include all crossing areas within the property facility limits. The number should be clearly posted at the railroad point of entry. It is this number that is placed on an accident report if such an accident should occur.

Further, there should only be one crossing number assigned to a crossing which is defined as those tracks that lie between a pair of warning devices, regardless of how many railroads own track that traverses the crossing. There may be cases where two mainline tracks, owned and maintained by two different railroads, traverse a crossing, and with each of these railroads having assigned a separate crossing inventory number to the crossing. If this situation exists, one of the numbers should be deleted (closed) and the primary (usually the dispatching) railroad involved should claim the crossing in their inventory as the Operating Railroad and list the other railroad as "operating over the crossing."

To identify the Operating Railroad for a crossing for Inventory purposes, use the following procedure: (1) identify the primary operating railroad or the railroad that owns the property, or (2) identify the dispatching railroad, or (3) identify the railroad that performs maintenance on the crossing, or (4) the railroads need to jointly decide and agree as to who will carry the crossing in its inventory.

For additional information on the *Assignment of Crossing Inventory Numbers* and how to obtain valid crossing inventory numbers, see the separate section on this subject.