DRAFT

Proposal
For A
World Product Code
(WPC)

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Contents

1.0 Introduction

Two concurrent developments indicate that it will be advantageous at this time to define a merchandise identifying symbol that can be used effectively in countries outside the U.S. and Canada, where the UPC is in use.

First, industry associations and standards bodies in a number of countries throughout the world are actively analyzing merchandise identification requirements in their countries. Second, the U.S. grocery industry has demonstrated a technically and economically viable solution of the problem of merchandise identification symbology.

The purpose, then, of this proposal is to provide a symbology that at once will be consistent with code requirements of the various countries and will facilitate implementation of those codes in practical point of sale systems.

What this proposal does not do is structure the data content of the symbol. It provides a well-defined data resource which can be formatted to meet special code requirements of countries.

Also, even though the symbology is the same, the proposed symbol is not a sub-set of the UPC symbol being used in America. Actually, it makes available as great a data resource as that of the UPC symbol, with no risk of ambiguity. Further, in its design it exploits the experience and know-how that has been acquired by U.S. industry since the UPC symbol was adopted.

In order to avoid confusion with the UPC symbol, the symbol of this proposal will be termed WPC, an acronym for World Product Code.

1.1 Overview of Symbol

The WPC symbol has two versions: Paired Version and Single Version, or P and S, respectively (see FIGURE 1-1).

The WPC symbol displays a series of parallel dark bars on a light background. The widths of the bars and the widths of the spaces between the bars are varied; the machine readable data encoded in these bars and spaces determines their widths.

The human readable interpretation of the data encoded in the bars and spaces is printed below the bars in OCR-B numeric font.

The machine readable bars of Version P encode twelve numeric data characters plus one check character included to ensure a high level of reading reliability. Similarly, Version S encodes six numeric data characters plus one check character.

Version P is intended to be used primarily for manufacturer source marking and for in-store marking of pre-packaged random weight items.

Version S is intended to be used for marking of items where the requirement is for up to six data characters. Such codes can be useful for small items, for private label items, and for in-store marking of other than random weight items.

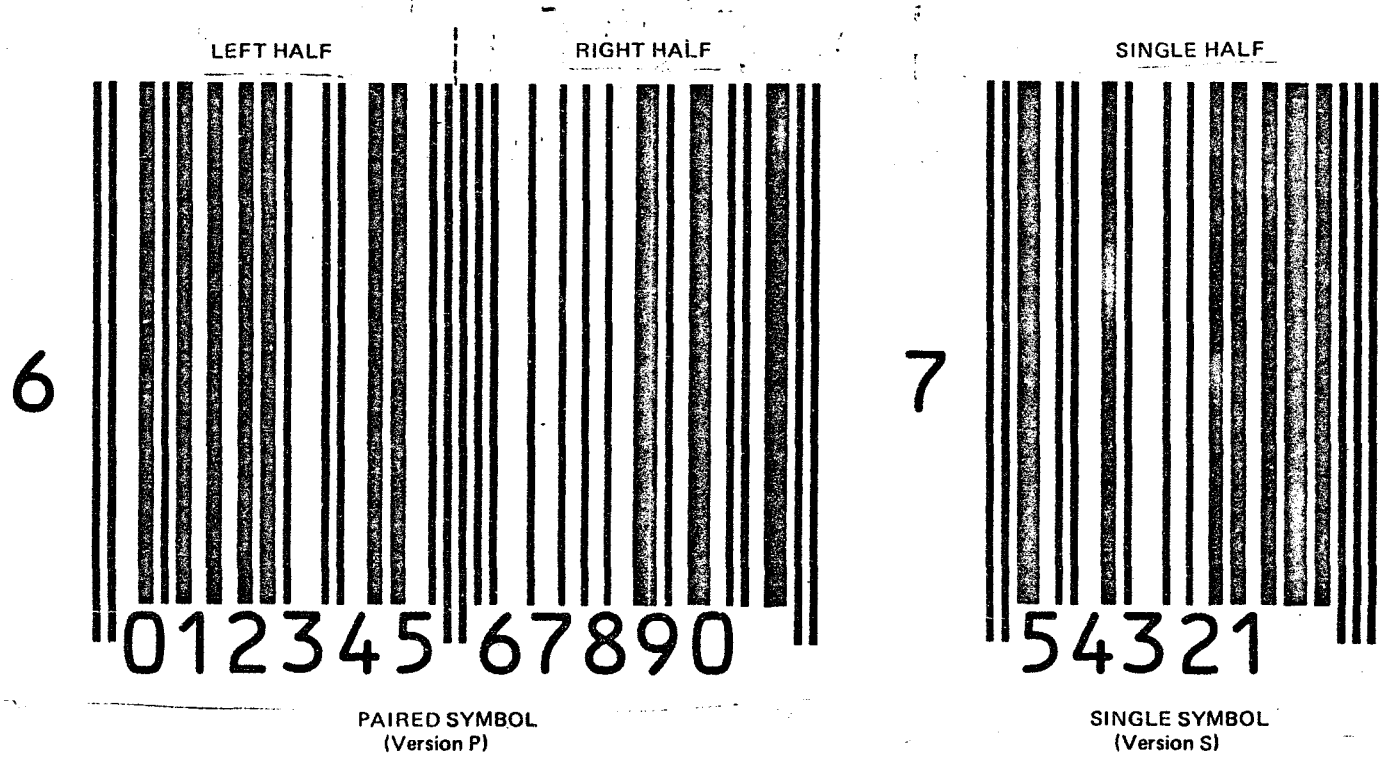

FIGURE 1-1. Examples of the two symbol versions.

FIGURE 1-2. Version P symbol structure.

The Version P symbol is divided into two halves, referred to as the left and right halves in FIGURE 1-2. These halves share the two narrow bars in the center, called center bar pattern. Similar pairs of bars, called guard bars, are located at the left and right of the symbol.

The Version S symbol has two guard bars on the left and three guard bars on the right. (See FIGURE 1-3.)

In both versions the left-most human readable character is the flag which indicates the country of origin and the format of the data following the flag. The format will be that favored by the country of origin.

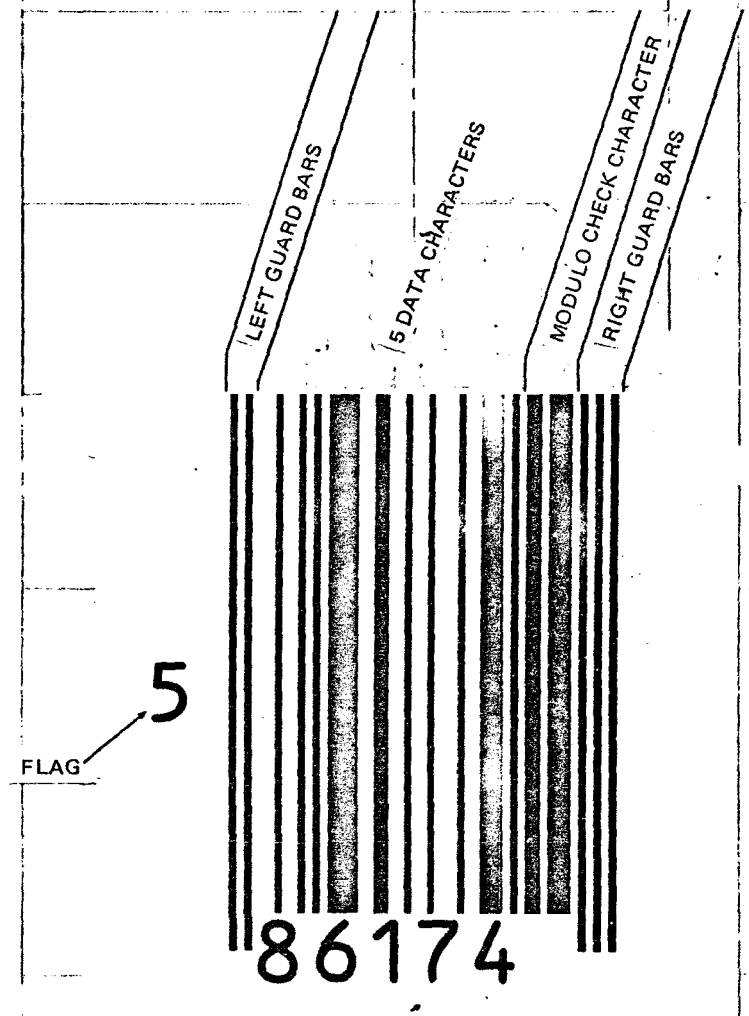

FIGURE 1-3. Version S symbol structure.

The left-most human readable character in each version is the flag; in the examples of FIGURE 1-1 it is a "6" (in Version P), and a "7" (in Version S). The right-most character in each version is a modulo-10 check character; it is bar coded only. The characters between the flag and the check character constitute a data field, the meaning of which is determined according to code and format relating to the flag (see Section 1.1).

Unlike the other characters, the flag (in either version), does not have machine readable bars dedicated to it; its numeric value is bar coded in the manner described in Sections 2.1.2 and 2.1.3.

2.1 Character Coding

2.1.1 Character Structure

If we break out one data character, say the "9" in FIGURE 2-1, we can examine the structure of the bars, that is, the coding which makes up the machine-readable portion of the character.

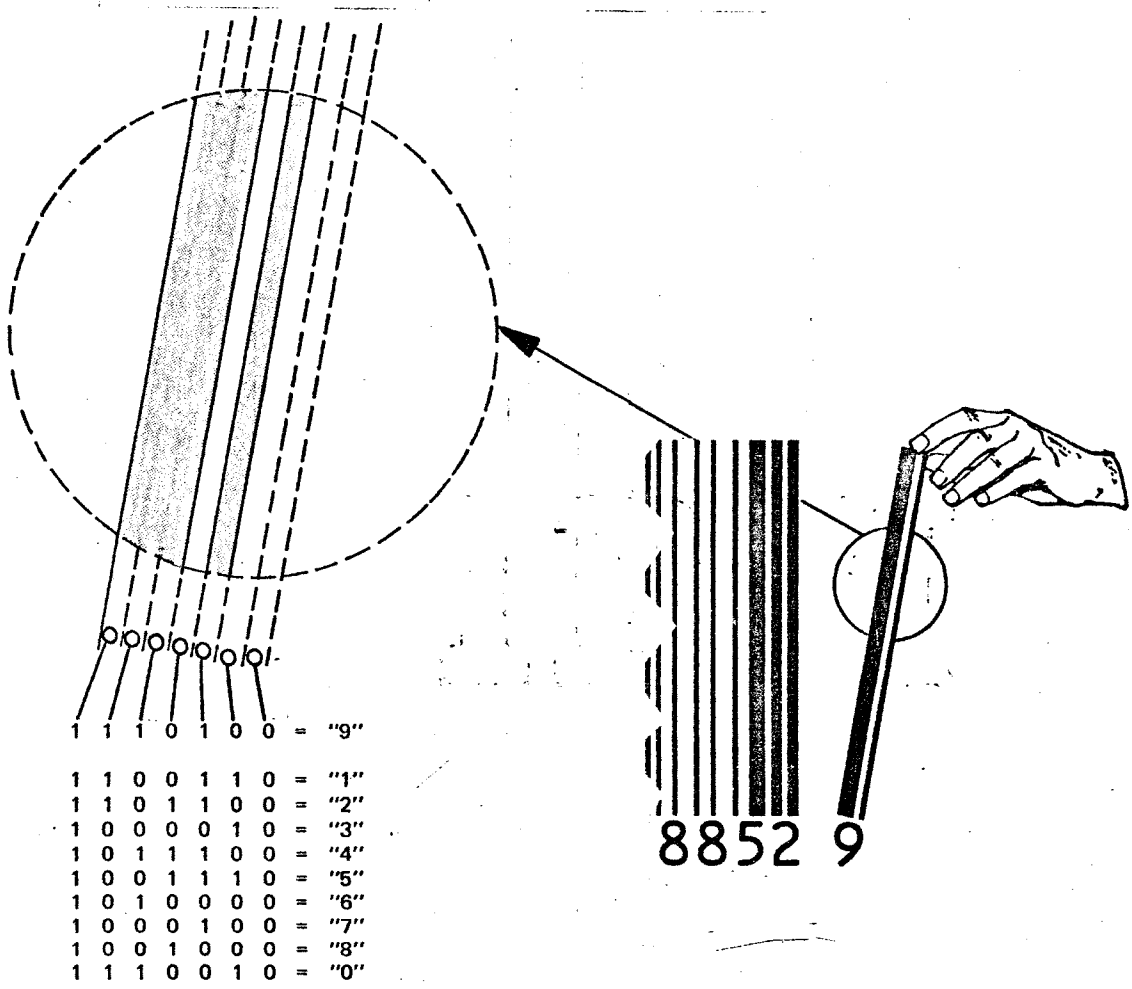

FIGURE 2-1. Character structure. This example involves "even parity" characters only.

The arrow points to a blown-up view of the portion of the character within the circle. Notice that there are two bars in the character; in this case one is wide and one is narrow. Every bar coded character in the symbol has two bars; the widths of these two bars represent the value of the digit they stand for.

Notice in the enlarged section that the character is divided into seven parts, or modules. Each character is seven modules wide and every module is either light or dark. In the case of the "9", we see that the wide bar is composed of three dark modules and the narrow bar is a single dark module. If we let a "0" stand for a light module, and a "1" for a dark module, then, as we go from left to right through the character, we find that the coding for a "9" is 1110100. Of course, there are similar, but necessarily different, codings for the other decimal values.

There is another interesting point to note about the characters that are on the right side of the version P symbol: all the characters begin with dark bars (that is, there is a 1 on the left) and end with light spaces (there's a 0 on the right).

In FIGURE 2-2 one sees that the determination of character structure depends not only on the decimal value of the character but also on where the character is located. Nevertheless, each of the characters has seven modules and two dark bars. Notice, too, that each "left" character begins with a light space (0) and ends with a dark bar (1).

Another important feature is parity. Odd parity characters have an odd number of 1's (or dark modules), while even parity characters have an even number of 1's.

DECIMAL NUMBERS	VERSION P LEFT CHARACTERS AND VERSION S CHARACTERS		VERSION P RIGHT CHARACTERS
	ODD PARITY	EVEN PARITY	EVEN PARITY
0	0 0 0 1 1 0 1	0 1 0 0 1 1 1	1 1 1 0 0 1 0
1	0 0 1 1 0 0 1	0 1 1 0 0 1 1	1 1 0 0 1 1 0
2	0 0 1 0 0 1 1	0 0 1 1 0 1 1	1 1 0 1 1 0 0
3	0 1 1 1 1 0 1	0 1 0 0 0 0 1	1 0 0 0 0 1 0
4	0 1 0 0 0 1 1	0 0 1 1 1 0 1	1 0 1 1 1 0 0
5	0 1 1 0 0 0 1	0 1 1 1 0 0 1	1 0 0 1 1 1 0
6	0 1 0 1 1 1 1	0 0 0 0 1 0 1	1 0 1 0 0 0 0
7	0 1 1 1 0 1 1	0 0 1 0 0 0 1	1 0 0 0 1 0 0
8	0 1 1 0 1 1 1	0 0 0 1 0 0 1	1 0 0 1 0 0 0
9	0 0 0 1 0 1 1	0 0 1 0 1 1 1	1 1 1 0 1 0 0

FIGURE 2-2. Character structure for versions S and P.

2.1.2 Version S Coding

Version S incorporates seven characters. Six of the characters are coded directly in the character structure; i.e., as per FIGURE 2-2. The seventh character, which happens to be the flag, is coded through the parity pattern of the other six characters. The parity patterns are specified in FIGURE 2-3.

FLAG	CHARACTER POSITIONS 1	2	3	4	5	6
0	E	E	E	O	O	O
1	E	E	O	E	O	O
2	E	E	O	O	E	O
3	E	E	O	O	O	E
4	E	O	E	E	O	O
5	E	O	O	E	E	O
6	E	O	O	O	E	E
7	E	O	E	O	E	O
8	E	O	E	O	O	E
9	E	O	O	E	O	E

E = EVEN PARITY O = ODD PARITY

FIGURE 2-3. Parity patterns of the bar-coded characters in version S.

Notice in the matrix of FIGURE 2-3 that each flag character is determined by a parity pattern in which three of the six bar-code characters are of odd parity, and that each "three out of six" pattern is unique. Of course, so long as the flag does not change, neither will the parity pattern.

2.1.3 Version P Coding

Version P incorporates thirteen characters. Six of the characters are coded directly in the character structure of the right half, as per FIGURE 2-2. The thirteenth character, which is the flag, is coded through the parity combination of the six bar-coded characters of the left half as specified in FIGURE 2-4. However, the right half, as FIGURE 2-2 shows, is coded in all even parity. Notice that except for flag 0, the parity patterns of the matrix of FIGURE 2-4 consist of 3 odd and 3 even characters and that each of the patterns in FIGURES 2-3 and 2-4 is unique.

FLAG	CHARACTER POSITIONS 1	2	3	4	5	6
0	O	O	O	O	O	O
1	O	O	E	O	E	E
2	O	O	E	E	O	E
3	O	O	E	E	E	O
4	O	E	O	O	E	E
5	O	E	E	O	O	E
6	O	E	E	E	O	O
7	O	E	O	E	O	E
8	O	E	O	E	E	O
9	O	E	E	O	E	O

E = EVEN PARITY O = ODD PARITY

FIGURE 2-4. Parity patterns of the bar-coded characters in version P left half.

2.2 Modulo Check Character Calculation

The steps in the modulo check character calculation are the same in versions S and P. The WPC number in FIGURE 1-2 will be used as an example:

Step 1: starting with the first character after the flag, sum up the values of all the characters in the even positions (that is, first from the flag, third from the flag, and so on) up to and including the character in the position immediately adjacent to the modulo check character position. (In the example, 2 + 4 + 1 + 3 + 8 + 2 = 20.)

Step 2: multiply by 3 the sum obtained in Step 1. (The product for the example is 60.)

Step 3: starting with the second character to the right of the flag, sum up the values of all the characters in the odd positions (that is, second from the flag, fourth from the flag and so on) up to but not including the final, or modulo check character, position. (In the example, 6 + 5 + 7 + 8 + 5 = 31.)

Step 4: add the sum of step 3 to the product of step 2. (For the example the sum is 91.)

Step 5: The modulo-10 check character is the smallest number which, when added to the sum of step 4, produces a multiple of 10. (In the example the check character value is 9.)

3.0 Flag Zero

3.1 Random Weight Items

Provision for symbols on random weight items, such as meat, produce, and cheese, is achieved by restricting assignment within flag "0" to numbers with the following format:

0	20	XXXXX	XXXX
		Item	Price

4.0 WPC and UPC Symbols Compared

The only real difference between the WPC and UPC symbols is in the rules for character parity. The way these rules are written for WPC provides an "implicit" additional data character for WPC version P. (See Section 2.1.3.)

The WPC symbol exploits the same character set as does the UPC. That is, WPC utilizes only character encodations which have been specified for UPC.

Versions P and S in the WPC symbol correspond in size and general appearance to UPC versions A and E. In their corresponding versions the WPC and UPC symbols have the same number of bar-coded characters and the same overhead features, including margins, guard bars, and center bar pattern.

The WPC and UPC symbol widths are the same. In their corresponding versions the symbols have the same number of character division modules: In WPC version P and UPC version A the total symbol width comprises 113 modules (including required marginss outside the bar code), and in WPC version S and UPC version E there are 67 modules. At nominal size the WPC module width is 0.33 millimeters which, for practical purposes, is equivalent to the UPC module width of 0.013 inches.

The WPC and UPC symbols have the same height, too. At nominal size the overall height is 25.9 millimeters, or 1.020 inches.

The only difference in appearance between WPC version P and UPC version A is that in version P eleven of the twelve bar-coded characters are interpreted in human readable form directly below its code bars; in version A only ten characters are so interpreted. Also, in WPC version S five of the six bar-coded characters are interpreted in human readable form while in UPC version E all six bar-coded characters are so interpreted.