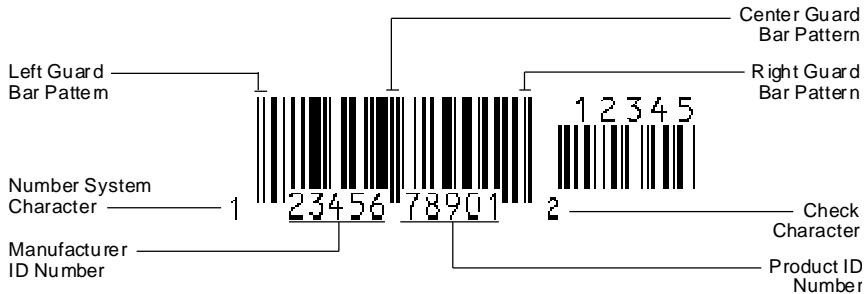


UPC Bar Code QwikTip™ (ASCII)

UPC Version A

A typical UPC version A bar code consists of 2 halves representing a total of 12 numeric digits. The two 6-digit halves are enclosed by left, center and right guard bar patterns. The left half uses an Odd Parity encoding of digits, and the right half uses an Even Parity encoding of digits. At top of the next column is a break down of an UPC Version A bar code:



Character Locations for UPC A:

Character	Location	Representation
A	Dec 65/Hex 41	0 (Number System + Start + Left Parity)
B	Dec 66/Hex 42	1 (Number System + Start + Left Parity)
C	Dec 67/Hex 43	2 (Number System + Start + Left Parity)
D	Dec 68/Hex 44	3 (Number System + Start + Left Parity)
E	Dec 69/Hex 45	4 (Number System + Start + Left Parity)
F	Dec 70/Hex 46	5 (Number System + Start + Left Parity)
G	Dec 71/Hex 47	6 (Number System + Start + Left Parity)
H	Dec 72/Hex 48	7 (Number System + Start + Left Parity)
I	Dec 73/Hex 49	8 (Number System + Start + Left Parity)
J	Dec 74/Hex 4A	9 (Number System + Start + Left Parity)

Character	Location	Representation
#	Dec 35/Hex 23	0 (Left Parity for Version A)
\$	Dec 36/Hex 24	1 (Left Parity for Version A)
%	Dec 37/Hex 25	2 (Left Parity for Version A)
&	Dec 38/Hex 26	3 (Left Parity for Version A)
s. quote	Dec 39/Hex 27	4 (Left Parity for Version A)
(	Dec 40/Hex 28	5 (Left Parity for Version A)
)	Dec 41/Hex 29	6 (Left Parity for Version A)
*	Dec 42/Hex 2A	7 (Left Parity for Version A)
plus	Dec 43/Hex 2B	8 (Left Parity for Version A)
comma	Dec 44/Hex 2C	9 (Left Parity for Version A)

Character	Location	Representation
minus	Dec 45/Hex 2D	0 (Right Parity for Version A)
period	Dec 46/Hex 2E	1 (Right Parity for Version A)
/	Dec 47/Hex 2F	2 (Right Parity for Version A)
0	Dec 48/Hex 30	3 (Right Parity for Version A)
1	Dec 49/Hex 31	4 (Right Parity for Version A)
2	Dec 50/Hex 32	5 (Right Parity for Version A)

3	Dec 51/Hex 33	6 (Right Parity for Version A)
4	Dec 52/Hex 34	7 (Right Parity for Version A)
5	Dec 53/Hex 35	8 (RightParity for Version A)
6	Dec 54/Hex 36	9 (Right Parity for Version A)

Character	Location	Representation
U	Dec 85/Hex 55	0 (Right Parity + Stop + Check Character)
V	Dec 86/Hex 56	1 (Right Parity + Stop + Check Character)
W	Dec 87/Hex 57	2 (Right Parity + Stop + Check Character)
X	Dec 88/Hex 58	3 (Right Parity + Stop + Check Character)
Y	Dec 89/Hex 59	4 (Right Parity + Stop + Check Character)
Z	Dec 90/Hex 5A	5 (Right Parity + Stop + Check Character)
[	Dec 91/Hex 5B	6 (Right Parity + Stop + Check Character)
\	Dec 92/Hex 5C	7 (Right Parity + Stop + Check Character)
]	Dec 93/Hex 5D	8 (Right Parity + Stop + Check Character)
^	Dec 94/Hex 5E	9 (Right Parity + Stop + Check Character)

Dec 138 / Hex 8A	Center Guard Bar
Dec 125 / Hex 7D	Supplemental Start Character
Dec 126 / Hex 7E	Supplemental Delineator Bar

Character	Location	Representation
l	Dec 105/Hex 69	0 (Supplemental Even Parity)
j	Dec 106/Hex 6A	1 (Supplemental Even Parity)
k	Dec 107/Hex 6B	2 (Supplemental Even Parity)
l	Dec 108/Hex 6C	3 (Supplemental Even Parity)
m	Dec 109/Hex 6D	4 (Supplemental Even Parity)
n	Dec 110/Hex 6E	5 (Supplemental Even Parity)
o	Dec 111/Hex 6F	6 (Supplemental Even Parity)
p	Dec 112/Hex 70	7 (Supplemental Even Parity)
q	Dec 113/Hex 71	8 (Supplemental Even Parity)
r	Dec 114/Hex 72	9 (Supplemental Even Parity)

Character	Location	Representation
s	Dec 115/Hex 73	0 (Supplemental Odd Parity)
t	Dec 116/Hex 74	1 (Supplemental Odd Parity)
u	Dec 117/Hex 75	2 (Supplemental Odd Parity)
v	Dec 118/Hex 76	3 (Supplemental Odd Parity)
w	Dec 119/Hex 77	4 (Supplemental Odd Parity)
x	Dec 120/Hex 78	5 (Supplemental Odd Parity)
y	Dec 121/Hex 79	6 (Supplemental Odd Parity)
z	Dec 122/Hex 7A	7 (Supplemental Odd Parity)
{	Dec 123/Hex 7B	8 (Supplemental Odd Parity)
|	Dec 124/Hex 7C	9 (Supplemental Odd Parity)

The first digit in a UPC-A bar code is the Number System Character. It indicates what type of product the bar code is identifying. Following is a description of each value:

Number System Character	Specified Use
0	Regular UPC Codes

1	Reserved
2	Random weight consumer items
3	Drug Products
4	In-store marking without format restriction
5	UPC Coupons
6	Reserved
7	Reserved
8	Reserved
9	Reserved

How to Calculate the Check Character for the Sample UPC-A bar code on page 1:

We will be solving the Check Character for the sample bar code on Page 1:
 “12345678901”. Be sure to include the Number System Character.

1. Start at the left, add all the characters in the ODD positions, starting with the Number System Character.

(Ex: $1 + 3 + 5 + 7 + 9 + 1 = 26$)

2. Multiply the sum by 3.

(Ex: $26 \times 3 = 78$)

3. Again starting from the left, add all the characters in the EVEN positions.

(Ex: $2 + 4 + 6 + 8 + 0 = 20$)

4. Add the product of item 2 to the sum of item 3.

(Ex: $78 + 20 = 98$)

5. Modulo 10 Check Character value is the smallest number which when added to the sum of item 4 produces a multiple of 10.

(Ex: $98 + 2 = 100$)

The number 100 is a multiple of 10. Since the number 2 was added to item 4 to produce a multiple of 10, then 2 is the Check Character. The final UPC Version A bar code should look like this:

	start plus number system char.		Left Parity				center pattern		Right Parity				stop plus check char.	
Data	1	2	3	4	5	6	7	8	9	0	1	2		
Decimal	66	37	38	39	40	41	138	52	53	54	45	46	87	
Hex	42	25	26	27	28	29	8A	34	35	36	2D	2E	57	

How to encode Five-Character Supplemental for the Sample UPC-A Below



We will be encoding the Five-Character Supplemental for the following string:
 “12345678901 12345”

1. Starting at the left, add the first, third, and fifth numbers of the supplemental code;
 (Ex: $1 + 3 + 5 = 9$)
2. Multiply the sum by 3.
 (Ex: $9 \times 3 = 27$)
3. Starting at the left, add the second and fourth numbers of the supplemental code and multiply by 9.
 (Ex: $9 (2 + 4) = 54$)
4. Add steps 2 and 3 together. The last number of the sum determines the parity.
 (Ex: $27 + 54 = 81$)

The value (X) we are looking for is 1. See the Parity Chart below for the Supplemental Pattern.
 (Note: “E” is Even, “O” is Odd).

If X is "0", the parity is	E	E	O	O	O
If X is "1", the parity is	E	O	E	O	O
If X is "2", the parity is	E	O	O	E	O
If X is "3", the parity is	E	O	O	O	E
If X is "4", the parity is	O	E	E	O	O
If X is "5", the parity is	O	O	E	E	O
If X is "6", the parity is	O	O	O	E	E
If X is "7", the parity is	O	E	O	E	O
If X is "8", the parity is	O	E	O	O	E
If X is "9", the parity is	O	O	E	O	E

Since X = 1, then the Supplemental Pattern is EOEOO.

		1		2		3		4		5
	Start	Even	Delineator	Odd	Delineator	Even	Delineator	Odd	Delineator	Odd
Dec	125	106	126	117	126	108	126	119	126	120
Hex	7F	6A	7E	75	7E	6C	7E	77	7E	78

UPC Version E

A typical UPC version E encodes six digits and is suited for identifying products in small packages. Like the UPC-A, the version E consists of two halves representing a total of 6 numeric digits. Of the six digits, three have Even parity and three have Odd Parity. A Check Character is encoded in the parity of the six data digits. The UPC Version E Number System Character can only be “0”.



Character	Location	Representation
K	Dec 75/Hex 4B	0 (Number System + Start for Version E)
L	Dec 76/Hex 4C	1 (Number System + Start for Version E)
M	Dec 77/Hex 4D	2 (Number System + Start for Version E)
N	Dec 78/Hex 4E	3 (Number System + Start for Version E)
O	Dec 79/Hex 4F	4 (Number System + Start for Version E)
P	Dec 80/Hex 50	5 (Number System + Start for Version E)
Q	Dec 81/Hex 51	6 (Number System + Start for Version E)
R	Dec 82/Hex 52	7 (Number System + Start for Version E)
S	Dec 83/Hex 53	8 (Number System + Start for Version E)
T	Dec 84/Hex 54	9 (Number System + Start for Version E)

Character	Location	Representation
underscore	Dec 95/Hex 5F	0 (Check character + Stop for Version E)
accent	Dec 96/Hex 60	1 (Check character + Stop for Version E)
a	Dec 97/Hex 61	2 (Check character + Stop for Version E)
b	Dec 98/Hex 62	3 (Check character + Stop for Version E)
c	Dec 99/Hex 63	4 (Check character + Stop for Version E)
d	Dec 100/Hex 64	5 (Check character + Stop for Version E)
e	Dec 101/Hex 65	6 (Check character + Stop for Version E)
f	Dec 102/Hex 66	7 (Check character + Stop for Version E)
g	Dec 103/Hex 67	8 (Check character + Stop for Version E)
h	Dec 104/Hex 68	9 (Check character + Stop for Version E)

Character	Location	Representation
#	Dec 35/Hex 23	0 (Odd Parity for Version E)
\$	Dec 36/Hex 24	1 (Odd Parity for Version E)
%	Dec 37/Hex 25	2 (Odd Parity for Version E)
&	Dec 38/Hex 26	3 (Odd Parity for Version E)
s. quote	Dec 39/Hex 27	4 (Odd Parity for Version E)
(	Dec 40/Hex 28	5 (Odd Parity for Version E)
)	Dec 41/Hex 29	6 (Odd Parity for Version E)
*	Dec 42/Hex 2A	7 (Odd Parity for Version E)
+	Dec 43/Hex 2B	8 (Odd Parity for Version E)
comma	Dec 44/Hex 2C	9 (Odd Parity for Version E)

Character	Location	Representation
7	Dec 55/Hex 37	0 (Even Parity for Version E)
8	Dec 56/Hex 38	1 (Even Parity for Version E)
9	Dec 57/Hex 39	2 (Even Parity for Version E)
:	Dec 58/Hex 3A	3 (Even Parity for Version E)
;	Dec 59/Hex 3B	4 (Even Parity for Version E)
<	Dec 60/Hex 3C	5 (Even Parity for Version E)

=	Dec 61/Hex 3D	6 (Even Parity for Version E)
>	Dec 62/Hex 3E	7 (Even Parity for Version E)
?	Dec 63/Hex 3F	8 (Even Parity for Version E)
@	Dec 64/Hex 40	9 (Even Parity for Version E)

How to Calculate the Check Character for the Sample UPC-A bar code on page 1:

Example: Assume Code number 12300-00064 is number system "0". First compute the modulo Check Character.

1. Start at the left, add all the characters in the ODD positions, starting with the Number System Character/Left Guard Bar.
(Ex: $0 + 2 + 0 + 0 + 0 + 4 = 6$)
2. Multiply the sum by 3.
(Ex: $6 \times 3 = 18$)
3. Again starting from the left, add all the characters in the EVEN positions.
(Ex: $1 + 3 + 0 + 0 + 6 = 10$)
4. Add the product of item 2 to the sum of item 3.
(Ex: $18 + 10 = 28$)
5. Modulo 10 Check Character value is the smallest number which when added to the sum of item 4 produces a multiple of 10.
(Ex: $28 + 2 = 30$)

The number 30 is a multiple of 10. Since the number 2 was added to item 4 to produce a multiple of 10, then 2 is the Check Character. The coding of the UPC Version E is compressed into six characters of varying parity. To determine whether a character's parity is even or odd, see the following chart:

Check Character	6-character Data String					
	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

Since the Check Character is 2, then the Zero Suppression Parity Pattern is "EEOOEO". The final UPC Version E bar code should look like this:

Left Guard Bar/Number System Character		Even	Even	Odd	Odd	Even	Odd	Right Guard Bar/Check Character
Dec	75	56	57	38	41	59	38	97
Hex	4B	38	39	26	29	3B	26	61

European Article Number

UPC / EAN (European Article Number) is a variation of the US based UPC Version A bar coding scheme adopted for international marketplaces. EAN has two versions: EAN-13 and EAN-8, encoding 13 and 8 digits respectively.

EAN-13

EAN-13 contains the same number of bars as UPC Version A, but encodes a thirteenth digit in combination with the twelfth digit. It also defines two flag characters that represent a country code. Country codes assigned to the US are: 00, 01, 03, 04 and 06 through 09. Below is a break down of an EAN-13 bar code:



There are three Number Sets available to the EAN-13 bar code; one set of the Odd Parity, and two sets of the Even Parity. A listing of each is on the next column.

Character	Location	Representation
#	Dec 35/Hex 23	0 (Odd Parity for Number Set A)
\$	Dec 36/Hex 24	1 (Odd Parity for Number Set A)
%	Dec 37/Hex 25	2 (Odd Parity for Number Set A)
&	Dec 38/Hex 26	3 (Odd Parity for Number Set A)
s. quote	Dec 39/Hex 27	4 (Odd Parity for Number Set A)
(	Dec 40/Hex 28	5 (Odd Parity for Number Set A)
)	Dec 41/Hex 29	6 (Odd Parity for Number Set A)
*	Dec 42/Hex 2A	7 (Odd Parity for Number Set A)
+	Dec 43/Hex 2B	8 (Odd Parity for Number Set A)
comma	Dec 44/Hex 2C	9 (Odd Parity for Number Set A)

Character	Location	Representation
minus	Dec 45/Hex 2D	0 (Even Parity for Number Set C)
period	Dec 46/Hex 2E	1 (Even Parity for Number Set C)
/	Dec 47/Hex 2F	2 (Even Parity for Number Set C)
0	Dec 48/Hex 30	3 (Even Parity for Number Set C)
1	Dec 49/Hex 31	4 (Even Parity for Number Set C)
2	Dec 50/Hex 32	5 (Even Parity for Number Set C)
3	Dec 51/Hex 33	6 (Even Parity for Number Set C)
4	Dec 52/Hex 34	7 (Even Parity for Number Set C)
5	Dec 53/Hex 35	8 (Even Parity for Number Set C)
6	Dec 54/Hex 36	9 (Even Parity for Number Set C)

Character	Location	Representation
7	Dec 55/Hex 37	0 (Even Parity for Number Set B)
8	Dec 56/Hex 38	1 (Even Parity for Number Set B)
9	Dec 57/Hex 39	2 (Even Parity for Number Set B)
:	Dec 58/Hex 3A	3 (Even Parity for Number Set B)
;	Dec 59/Hex 3B	4 (Even Parity for Number Set B)

<	Dec 60/Hex 3C	5 (Even Parity for Number Set B)
=	Dec 61/Hex 3D	6 (Even Parity for Number Set B)
>	Dec 62/Hex 3E	7 (Even Parity for Number Set B)
?	Dec 63/Hex 3F	8 (Even Parity for Number Set B)
@	Dec 64/Hex 40	9 (Even Parity for Number Set B)

Character	Location	Representation
	Dec 128/Hex 80	0 (Number System + Start for EAN-13)
	Dec 129/Hex 81	1 (Number System + Start for EAN-13)
	Dec 130/Hex 82	2 (Number System + Start for EAN-13)
	Dec 131/Hex 83	3 (Number System + Start for EAN-13)
	Dec 132/Hex 84	4 (Number System + Start for EAN-13)
	Dec 133/Hex 85	5 (Number System + Start for EAN-13)
	Dec 134/Hex 86	6 (Number System + Start for EAN-13)
	Dec 135/Hex 87	7 (Number System + Start for EAN-13)
	Dec 136/Hex 88	8 (Number System + Start for EAN-13)
	Dec 137/Hex 89	9 (Number System + Start for EAN-13)
	Dec 138 / Hex 8A	Center Guard Bar for EAN-13
	Dec 34 / Hex 22	Stop Character for EAN-13

Character	Location	Representation
K	Dec 75/Hex 4B	0 (13 th character + Start for EAN-13)
L	Dec 76/Hex 4C	1 (13 th character + Start for EAN-13)
M	Dec 77/Hex 4D	2 (13 th character + Start for EAN-13)
N	Dec 78/Hex 4E	3 (13 th character + Start for EAN-13)
O	Dec 79/Hex 4F	4 (13 th character + Start for EAN-13)
P	Dec 80/Hex 50	5 (13 th character + Start for EAN-13)
Q	Dec 81/Hex 51	6 (13 th character + Start for EAN-13)
R	Dec 82/Hex 52	7 (13 th character + Start for EAN-13)
S	Dec 83/Hex 53	8 (13 th character + Start for EAN-13)
T	Dec 84/Hex 54	9 (13 th character + Start for EAN-13)

How to Calculate the Check Character:

1. Start at the left, add all the characters in the EVEN positions.
(Ex: 3 + 2 + 4 + 6 + 8 + 0 = 23)
2. Multiply the sum by 3.
(Ex: 23 x 3 = 69)
3. Again starting from the left, add all the characters in the ODD positions:
(Ex: 9 + 1 + 3 + 5 + 7 + 9 = 34)
4. Add the product of item 2 to the sum of item 3.
(Ex: 69 + 34 = 103)
5. The Check Character value is the smallest number which when added to the sum of item 4 produces a multiple of 10.

(Ex: $103 + 7 = 110$)

The number 110 is a multiple of 10. Since the number 7 was added to item 4 to produce a multiple of 10, then 7 is the Check Character.

Encoding

The coding of the EAN-13 bar code is comprised of two halves. A Manufacturer ID Number, and a Product ID Number, both separated by a Center Bar Pattern. The Right half of the EAN-13 bar code will draw characters from Number Set C. The Left half of the EAN-13 bar code will draw characters from either Number Set A (Odd Parity), or Number Set B (Even Parity). How the pattern is determined is by the 13th Character Value (first character on the Left).

13th Digit	Number Position											
13	12	11	10	9	8	7	6	5	4	3	2	1

Value of

13th Digit	12	11	10	9	8	7
0	A	A	A	A	A	A
1	A	A	B	A	B	B
2	A	A	B	B	A	B
3	A	A	B	B	B	A
4	A	B	A	A	B	B
5	A	B	B	A	A	B
6	A	B	B	B	A	A
7	A	B	A	B	A	B
8	A	B	A	B	B	A
9	A	B	B	A	B	A

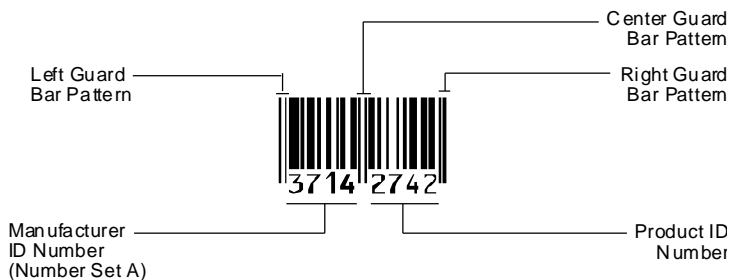
Since the 13TH character is 9, then the Number Set Pattern is “ABBABA”. The final EAN-13 bar code should look like this:

EAN-13 Input String: 9312345678907

	13 th Char. Plus Left Guard bar	Number Set A (Odd Parity) or Number Set B (Even Parity)							Center Guard Bar	Number Set C (Even Parity)					Check Char.	Right Guard bar
Data	9	3	1	2	3	4	5		6	7	8	9	0		7	
Decimal	84	38	56	57	38	59	40	138	51	52	53	54	45		52	34
Hex	54	26	38	39	26	3B	28	8A	33	34	35	36	2D		34	28

EAN-8

EAN-8 has a Left-Hand Guard Pattern, four Odd Parity digits, a Center Guard Pattern, four Even Parity digits, and a Right-Hand Guard Pattern. An EAN-8 bar code encodes two flag digits, five data digits, and one check digit. Below is a break down of an EAN-8 bar code:



There are two Number Sets available to the EAN-8 bar code; one set of the Odd Parity, and one set of an Even parity. A listing of each is on the next column.

Location of Even and Odd Parity Characters for EAN-8:

Character	Location	Representation
#	Dec 35/Hex 23	0 (Odd Parity for Number Set A)
\$	Dec 36/Hex 24	1 (Odd Parity for Number Set A)
%	Dec 37/Hex 25	2 (Odd Parity for Number Set A)
&	Dec 38/Hex 26	3 (Odd Parity for Number Set A)
s. quote	Dec 39/Hex 27	4 (Odd Parity for Number Set A)
(	Dec 40/Hex 28	5 (Odd Parity for Number Set A)
)	Dec 41/Hex 29	6 (Odd Parity for Number Set A)
*	Dec 42/Hex 2A	7 (Odd Parity for Number Set A)
+	Dec 43/Hex 2B	8 (Odd Parity for Number Set A)
comma	Dec 44/Hex 2C	9 (Odd Parity for Number Set A)

Character	Location	Representation
minus	Dec 45/Hex 2D	0 (Even Parity for Number Set C)
period	Dec 46/Hex 2E	1 (Even Parity for Number Set C)
/	Dec 47/Hex 2F	2 (Even Parity for Number Set C)
0	Dec 48/Hex 30	3 (Even Parity for Number Set C)
1	Dec 49/Hex 31	4 (Even Parity for Number Set C)
2	Dec 50/Hex 32	5 (Even Parity for Number Set C)
3	Dec 51/Hex 33	6 (Even Parity for Number Set C)
4	Dec 52/Hex 34	7 (Even Parity for Number Set C)
5	Dec 53/Hex 35	8 (Even Parity for Number Set C)
6	Dec 54/Hex 36	9 (Even Parity for Number Set C)

	Location	Representation
!	Dec 33/Hex 21	Start Character for EAN-8
Dbl Quote	Dec 34/Hex 22	Stop Character for EAN-8
	Dec 138/Hex 8A	Center Guard Bar for EAN-8

How to Calculate the Check Character for the Sample EAN-8 bar code on the preceding column:

1. Start at the left, add all the characters in the EVEN positions.
(Ex: $3 + 1 + 2 + 4 = 10$)

2. Multiply the sum by 3.
(Ex: $10 \times 3 = 30$)

3. Again starting from the left, add all the characters in the ODD positions:
(Ex: $7 + 4 + 7 = 18$)

4. Add the product of item 2 to the sum of item 3.
(Ex: $30 + 18 = 48$)

5. The Check Character value is the smallest number which when added to the sum of item 4 produces a multiple of 10.
(Ex: $48 + 2 = 50$)

The number 50 is a multiple of 10. Since the number 2 was added to item 4 to produce a multiple of 10, then 2 is the Check Character. The final EAN-8 bar code should be as follows:

	Left Guard	Number Set A (Odd Parity)				Center Guard	Number Set C (Even Parity)			Check Character	Right Guard
Dec	33	38	42	36	39	138	47	52	49	47	34
Hex	21	26	2A	24	27	8A	2F	34	31	2F	22