Check digit calculation for LRN

In connection with printouts and transfers, the Local Reference Number (LRN) is to be presented completely with 10 characters in a fixed format (an alphabetic portion, a numeric portion and the check digit). Thus, the initial zeros in the numeric portion must be entered in the computer file that is transmitted to Swedish Customs.

For example, LRN SBA with serial number 456 and check digit 4 is written as follows: SBA0004564.

The check digit is to be generated in the company's system based on Modulus 10 with the weights 1 and 2, split add. The alphabetic characters in the LRN are converted on the basis of the decimal value of the ASCII code for each letter.

A particular combination of letters always has the same values when calculating the check digit. However, the letters have different values depending on whether the LRN contains 1, 2 or 3 alphabetic characters. See the table below.

Sample calculation of the check digit for LRN (SBA000456).

Step 1 - Write the weights under the digits - always with weight 2 under the last digit
(start from the right)

S	B	A	0	0	0	4	5	6	LRN
83	66	65							ASCII-värden
8 3	6 6	6 5	0	0	0	4	5	6	Split the values of the letters into single digits
1 2	1 2	1 2	1	2	1	2	1	2	weight

Step 2 - Multiply each digit by the weight

8 6	6 12	6 10	0	0	0	8	5	12	
8 6	6 3	6 1	0	0	0	8	5	3	If greater than 9, add the digits together

Step 3 - Add up each individual digit (position) of the products

8+6+ 6+3+ 6+1+ 0+   0+   0+   8+   5+   3 = 46

Step 4 - Subtract the result (46) from the next multiple of 10: 50 - 46 = 4

Thus, the check digit for this LRN is 4.

Store the LRN as SBA0004564 (Note: 10 characters, fixed format)

The check digit calculation may be illustrated as follows:

```
S   8 * 1 = 8              = 8
    3 * 2 = 6              = 6
B   6 * 1 = 6              = 6
    6 * 2 =12 (12-9)       = 3
A   6 * 1 = 6              = 6
    5 * 2 =10 (10-9)       = 1
0   0 * 1 = 0              = 0
0   0 * 2 = 0              = 0
0   0 * 1 = 0              = 0
4   4 * 2 = 8              = 8
5   5 * 1 = 5              = 5
6   6 * 2 =12 (12-9)       = 3
            -----------------------
                TOTAL 46
```

The next multiple of 10 is 50. The check digit is 4.

As regards the letters, proceed from the ASCII values and perform the calculation in two steps for each letter. Depending on whether the LRN has 1, 2 or 3 alphabetic characters, the letters have certain values that you can use to make the check digit calculation easier. The table below demonstrates that the letters have the same total value if the LRN contains 1 or 3 alphabetic characters, whereas they have another value if it contains 2 alphabetic characters. The columns in the table below represent the following:

A contains the letter (A-Z)
B contains the ASCII value of the letter
C contains the value of the letter when calculating the check digit if the LRN has 1 or 3 alphabetic characters
D contains the value of the letter when calculating the check digit if the LRN has 2 alphabetic characters

A	B	C	D		A	B	C	D
A	65	7	8		N	78	14	13
B	66	9	9		O	79	16	14
C	67	11	10		P	80	8	7
D	68	13	11		Q	81	10	8
E	69	15	12		R	82	12	9
F	70	7	5		S	83	14	10
G	71	9	6		T	84	16	11

H	72	11	7		U	85	9	12
I	73	13	8		V	86	11	13
J	74	15	9		W	87	13	14
K	75	8	10		X	88	15	15
L	76	10	11		Y	89	17	16
M	77	12	12		Z	90	9	9

The above example of a LRN gives the following values for the letters: S=14, B=9, A=7, for a total of 30.

A traditional check digit calculation for the numeric portion gives the values 8+5+3 = 16. 30+16 = 46, generating a check digit of 4.