

Given: Using VMLAB, write AVR that generates a multiplication table for SRAM addresses 0x0100 to 0x01FF. The value at each address is the product of the two least significant nibbles of the address. For example, at address 0x0123 the multiplicand is 3 and the multiplier is 2. Calculate the product (6 in this case) and store it at address 0x0123.

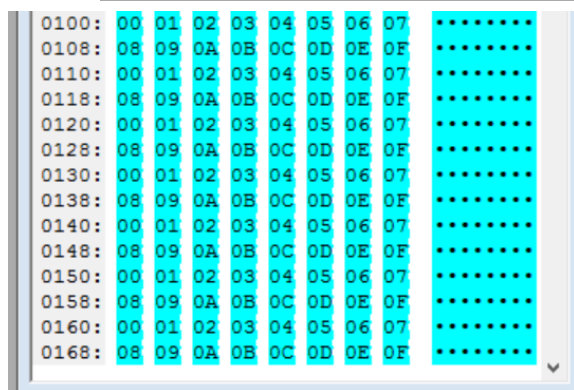
Find: AVR multiplication table described above

Solution:

AVR Code

```
.include "C:\VMLAB\include\m168def.inc"
ldi r27, 0x01
ldi r26, 0x00
ldi r30, 0xff
main:
mov r16, r26
andi r16, 0x0f
mov r17, r27
andi r17, 0xf0
swap r17
mul r17, r16
st x+, r16
dec r30
brne main
```

Screenshot of affected SRAM memory after code runs



The screenshot shows a memory window with addresses from 0100 to 0168. The data is organized into columns representing nibbles. The first two columns (00, 01) show a repeating pattern of 00, 08, 00, 08, etc. The next two columns (02, 03) show a repeating pattern of 01, 09, 01, 09, etc. The following columns (04, 05, 06, 07) show a repeating pattern of 02, 0A, 02, 0A, etc. The final column (08) shows a repeating pattern of 03, 0B, 03, 0B, etc. This indicates that the code is calculating the product of the two least significant nibbles of the address and storing the result in the next nibble.

Address	00	01	02	03	04	05	06	07	08
0100:	00	01	02	03	04	05	06	07	08
0108:	08	09	0A	0B	0C	0D	0E	0F	00
0110:	00	01	02	03	04	05	06	07	08
0118:	08	09	0A	0B	0C	0D	0E	0F	00
0120:	00	01	02	03	04	05	06	07	08
0128:	08	09	0A	0B	0C	0D	0E	0F	00
0130:	00	01	02	03	04	05	06	07	08
0138:	08	09	0A	0B	0C	0D	0E	0F	00
0140:	00	01	02	03	04	05	06	07	08
0148:	08	09	0A	0B	0C	0D	0E	0F	00
0150:	00	01	02	03	04	05	06	07	08
0158:	08	09	0A	0B	0C	0D	0E	0F	00
0160:	00	01	02	03	04	05	06	07	08
0168:	08	09	0A	0B	0C	0D	0E	0F	00

I cannot get it to work. I worked on this, with Ken and some others in the class, for multiple days and this is all we could come up with. It seems to multiply the 3rd and 1st least significant nibble in the first 2 rows, then repeat itself. We didn't do AVR in 2013/2014 when I took 171. It was not apart of the curriculum, so I tried my hardest on this and this is the farthest I could get.