```
.ORIG x3000        ;Start Program at x3000
LEA R1, x0FF       ;Load x3100 into R1
AND R2, R2, #0     ;Clear R2
AND R5, R2, #0     ;Clear R5
LDR R4, R1, #0     ;Load the value from the address listed in R1
ADD R4, R4, #0     ;Add 0 to R4 and store in R4 to check if it is 0
BRz #05            ;Check if R4 is 0 yet
ADD R2, R2, #1     ;Increment the counter
ADD R5, R4, #-1    ;Store R4 - 1 in R5
AND R4, R4, R5     ;Hamming Weight
BRnzp #-6          ;Keep going back to (ADD R4, R4, #0) until R4 = 0

ST R2, x0F7        ;Store R2 (Counter) in x3102
HALT

.END
```