

## Instruction set of the Mic1 Macro Language

Binary	Mnemonic	Instruction	Meaning
0000xxxxxxxxxxx	LODD	Load direct	$ac := m[x]$
0001xxxxxxxxxxx	STOD	Store direct	$m[x] := ac$
0010xxxxxxxxxxx	ADDD	Add direct	$ac := ac + m[x]$
0011xxxxxxxxxxx	SUBD	Subtract direct	$ac := ac - m[x]$
0100xxxxxxxxxxx	JPOS	Jump positive	if $ac \geq 0$ then $pc := x$
0101xxxxxxxxxxx	JZER	Jump zero	if $ac = 0$ then $pc := x$
0110xxxxxxxxxxx	JUMP	Jump	$pc := x$
0111xxxxxxxxxxx	LOCO	Load constant	$ac := x$ ( $0 \leq x \leq 4095$ )
1000xxxxxxxxxxx	LODL	Load local	$ac := m[sp + x]$
1001xxxxxxxxxxx	STOL	Store local	$m[x + sp] := ac$
1010xxxxxxxxxxx	ADDL	Add local	$ac := ac + m[sp + x]$
1011xxxxxxxxxxx	SUBL	Subtract local	$ac := ac - m[sp + x]$
1100xxxxxxxxxxx	JNEG	Jump negative	if $ac < 0$ then $pc := x$
1101xxxxxxxxxxx	JNZE	Jump nonzero	if $ac \neq 0$ then $pc := x$
1110xxxxxxxxxxx	CALL	Call procedure	$sp := sp - 1; m[sp] := pc; pc := x$
111100000000000	PSHI	Push indirect	$sp := sp - 1; m[sp] := m[ac]$
111100100000000	POPI	Pop indirect	$m[ac] := m[sp]; sp := sp + 1$
111101000000000	PUSH	Push onto stack	$sp := sp - 1; m[sp] := ac$
111101100000000	POP	Pop from stack	$ac := m[sp]; sp := sp + 1$
111110000000000	RETN	Return	$pc := m[sp]; sp := sp + 1$
111110100000000	SWAP	Swap ac, sp	$tmp := ac; ac := sp; sp := tmp$
11111100yyyyyyy	INSP	Increment sp	$sp := sp + y$ ( $0 \leq y \leq 255$ )
11111110yyyyyyy	DESP	Decrement sp	$sp := sp - y$ ( $0 \leq y \leq 255$ )

xxxxxxxxxxx is a 12-bit machine address; in column 4 it is called  $x$ .  
 yyyyyyy is an 8-bit constant; in column 4 it is called  $y$ .

#### Powers of 2:

2 to the 10<sup>th</sup> : 1024  
2 to the 11<sup>th</sup> : 2048  
2 to the 12<sup>th</sup> : 4096  
2 to the 13<sup>th</sup> : 8192  
2 to the 14<sup>th</sup> : 16384  
2 to the 15<sup>th</sup> : 32768  
2 to the 16<sup>th</sup> : 65536

#### Floating Point Formats:

IEEE 754 Single Precision: 1 Sign bit, 8 bits Base 2 Exponent, 23 bits Mantissa  
IEEE 754 Double Precision: 1 Sign bit, 11 bits Base 2 Exponent, 52 bits Mantissa  
IBM Single Precision: 1 Sign bit, 7 bits Base 16 Exponent, 24 bits Mantissa



