|  |  |
| --- | --- |
| instruction | Opcode |
| nop | 000-0000 |
| ret | 000-1000 |
| Rlt –flag restore | 000-1001 |

1 reg instructions

|  |  |
| --- | --- |
| Instruction | Opcode |
| not | 001-0000 |
| Inc | 001-0001 |
| dec | 001-0010 |
| neg | 001-0011 |
| Out | 001-0100 |
| in | 001-0101 |
| pop | 001-0110 |
| push | 001-0111 |
| Protect | 001-1011 |
| Free | 001-1010 |
| Jz | 001-1101 |
| Call | 001-1110 |
| Jmp | 001-1100 |
| 2 reg instructions | |

|  |  |
| --- | --- |
| Instruction | Opcode |
| swap | 010-1111 |
| cmp | 010-1110 |
| 3 reg instructions |  |

|  |  |
| --- | --- |
| instruction | Opcode |
| add | 011-0001 |
| sub | 011-0010 |
| And | 011-0011 |
| Or | 011-0100 |
| Xor | 011-0101 |

2reg and immediate instructions:

|  |  |
| --- | --- |
| instruction | Opcode |
| addi | 110-0000 |

One-reg and immediate instructions:

|  |  |
| --- | --- |
| instruction | Opcode |
| bitset | 101-0000 |
| Ldm | 101-1111 |
| Rcl | 101-1101 |
| rcr | 101-1100 |
| Ldd | 101-1110 |
| Std | 101-0001 |

Op code bits indication:

|  |  |
| --- | --- |
| Bit number | Indication |
| 7th bit | Immediate instruction |
| 6th and 5th bit | Number of registers in the instruction |
| (4-1) bit | Counter for different instruction of same category |

000-xxxx:

Bit 4 is one if it a return.

001-xxxx:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4th bit | 3rd bit | 2nd bit | 1st bit | Instruction type |
| 1 | 1 | x | X | Branch instruction |
| 1 | 0 | x | X | Protect or free |
| 0 | 1 | 1 | x | Puch or pop |
| 0 | 1 | 0 | x | In or out |
| 0 | 0 | x | x | Alu operation |

010-xxxx

|  |  |
| --- | --- |
| 1st Bit | Instruction |
| 1 | Swap |
| 0 | Cmp |

Instruction bits details :

|  |  |  |  |
| --- | --- | --- | --- |
| Opcode 7bits | 3 bit -reg source1 | 3 bit -reg source2 | 3 bit -reg destination |

|  |  |  |  |
| --- | --- | --- | --- |
| Opcode 7bits | 3 bit -reg source1 | 3 bit -reg source2 | Xxx |

|  |  |  |
| --- | --- | --- |
| Opcode 7 bits | 3 bit -reg source1 | xxxxxx |

|  |
| --- |
| Immediate value 16 bit |