# LD commands

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Sub instruction | Register to write to (See Table 3) | Register to read from  (see table 4) | Not Used | Const/ram address as byte |
| 000 | 000 | 0000 | 000 | --- | 00000000 |

Table 1

LD: instruction mapping

|  |  |
| --- | --- |
| **Assembly** | **Binary** |
| LD A B | 000 000 |
| LD A &CONST | 000 001 |
| LD A &B | 000 001 |
| LD &CONST A | 000 010 |
| LD &A B | 000 010 |
| LD A CONST | 000 011 |
| CLR | 000 100 |

Table 2

Register to write to

NB this controls EW lines and MUX 3.1

|  |  |
| --- | --- |
| **Assembly** | **Binary** |
| Write A | 1000 |
| Write B | 0100 |
| Write C | 0010 |
| Write D | 0001 |
| Write A and C | 1010 |

Table 3

Register to read from

NB binary is encoding to set mux 1 and 2

|  |  |
| --- | --- |
| **Assembly** | **Binary** |
| Read From A | 010 |
| Read From B | 001 |
| Read From C | 011 |
| Read From D | 100 |

Table 4

# Addition Operations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Sub instruction | Register to write to (See Table 3) | Register 1 to read from  (see table 4) | Register 2 to read from  (see table 4) | Const as byte |
| 001 | 000 | 0000 | 000 | 000 | 00000000 |

Table 5

Addition: instruction mapping

|  |  |
| --- | --- |
| **Assembly** | **Binary** |
| ADD A B C | 001 000 |
| ADD A B Const | 001 001 |
| SUB A B C | 001 010 |
| SUB A B Const | 001 011 |
| LSH A B | 001 100 |
| RSH A B | 001 101 |
| LSH2S A B | 001 110 |
| RSH2S A B | 001 111 |

Table 6

# Logical operations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Sub instruction | Register to write to (See Table 3) | Register 1 to read from  (see table 4) | Register 2 to read from  (see table 4) | Const as byte |
| 010 | 000 | 0000 | 000 | 000 | 00000000 |

Table 7

Logical operations: instruction mapping

|  |  |
| --- | --- |
| **Assembly** | **Binary** |
| AND A B C | 010 000 |
| AND A B Const | 010 001 |
| OR A B C | 010 010 |
| OR A B Const | 010 011 |

Table 8

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Register to write to (See Table 3) | Not used | Register 1 to read from  (see table 4) | Const as byte |
| NOT A B | 010 | 100 | 0000 | --- | 000 | -------- |

Table 9

# Logical Comparison Operations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Sub instruction | Register to write to (See Table 3) | Register 1 to read from  (see table 4) | Register 2 to read from  (see table 4) | Const as byte |
| 011 | 000 | 0000 | 000 | 000 | 00000000 |

Table 10

Logical comparisons: instruction mapping

NB these store result as 1 or zero in specified register

|  |  |
| --- | --- |
| **Assembly** | **Binary** |
| GR A B C | 011 000 |
| GR A B Const | 011 001 |
| GEQ A B C | 011 010 |
| GEQ A B Const | 011 011 |
| EQ A B C | 011 100 |
| EQ A B Const | 011 101 |

Table 11

# Misc Operations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Not used | Not used | Not used | Const as byte |
| PCU | 100 | 000 | ---- | --- | --- | 00000000 |
| PCL | 100 | 001 | ---- | --- | --- | 00000000 |
| LDI | 100 | 010 | ---- | --- | ---- | -------- |

Table 12

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Not used | Register 1 to read from  (see table 4) | Not used | Const as byte |
| JNZ | 100 | 011 | ---- | 000 | --- | 00000000 |

Table 13

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Not used | Not used | Not used | Not used |
| NOP | 100 | 100 | ---- | --- | --- | -------- |

Table 14

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Not used | Const as 6 bits | Const as byte |
| OCL | 100 | 101 | ---- | 000000 | 00000000 |

Table 15

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Not used | Set 1 for disable | Not used | Not used |
| SIR | 100 | 111 | ---- | --0 | --- | -------- |

Table 16

# I/O Instructions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Register to write to (See Table 3) | Not used | Not used | Not used |
| RIR1 | 101 | 000 | 0000 | --- | --- | -------- |
| RIR2 | 101 | 001 | 0000 | --- | --- | -------- |
| RIO1 | 101 | 010 | 0000 | --- | --- | -------- |
| RIO2 | 101 | 011 | 0000 | --- | --- | -------- |

Table 17

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Instruction | Sub instruction | Not used | Register 1 to read from  (see table 4) | Not used | Const as byte |
| SIO1 | 101 | 100 | ---- | 000 | --- | 00000000 |
| SIO2 | 101 | 101 | ---- | 000 | --- | 00000000 |
| CIO1 | 101 | 110 | ---- | 000 | --- | 00000000 |
| CIO2 | 101 | 111 | ---- | 000 | --- | 00000000 |

Table 18