

# Sheet1

\PH\* PH ^ currInt<<2  
 \PL\* PL ^ currInt<<2

test Din == 011xxxxx  
 math Din != x11xxxxx  
 jump Din == 111x11xx  
 imm Din == 111xxxxx & !jump  
 k Din == xxx1xxxx  
 zs Din == xxxx11xx  
 zd Din == xxxxxx11  
 jop Din[4,1:0]  
 aluOp Imm ? Din[4:2] : Din[7:5]  
 cond Din[3:0]  
 \fetch TZ?timer:fetcha

|                  | \decode | \decodeSkip |
|------------------|---------|-------------|
| test             | test    | fetch       |
| Math & zs & zf   | mathzz  | skip2       |
| Math & !zs & zd  | mathrz  | skip1       |
| Math & zs & !zd  | mathzr  | skip1       |
| Math & !zs & !zd | mathrr  | fetch       |
| Imm & zd         | mathiz  | skip2       |
| Imm & !zd        | mathir  | skip1       |
| Jump & jop == 0  | jump    | skip2       |
| Jump & jop == 1  | call    | skip2       |
| Jump & jop == 2  | fetch   | fetch       |
| Jump & jop == 3  | return  | fetch       |
| Jump & jop == 4  | jumpz   | skip1       |
| Jump & jop == 5  | callz   | skip1       |
| Jump & jop == 6  | fetch   | fetch       |
| Jump & jop == 7  | table   | skip1       |

\mA SvAluOp[2]?00:SvAluOp[1:0]  
 \mL SvAluOp[2]?svAluOp[1:0]:11  
 \mCin !svAluOp[2]&svAluOp[0]  
 \S {00,svS}  
 \D {00,svD}  
 \kD prevK ? 0011 : {00,svD}  
 \kD2 useK ? 0011 : {00,svD}

| label  | aAd | bAd | wAd | wReg | dIn | rMem | dOut | wMem | aSel | bSel | logSel | Cin |
|--------|-----|-----|-----|------|-----|------|------|------|------|------|--------|-----|
| reset  | x   | x   | PL  |      | 1 ? |      | 0 ?  |      | 0    | 0 B  | ^      | 0   |
| resetb | x   | x   | PH  |      | 1 ? |      | 0 ?  |      | 0    | 0 B  | ^      | 0   |
| resetc | x   | x   | TL  |      | 1 ? |      | 0 ?  |      | 0    | 0 B  | ^      | 0   |
| resetd | x   | x   | TH  |      | 1 ? |      | 0 ?  |      | 0    | 0 B  | ^      | 0   |
| timer  | x   | TL  | TL  |      | 1 ? |      | 0 ?  |      | 0    | -2 B | B      | 1   |
| timerb | x   | TH  | TH  |      | 1 ? |      | 0 ?  |      | 0    | -2 B | B      | 1   |

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|         |     |     |     |         |        |      |       |    |      |
|---------|-----|-----|-----|---------|--------|------|-------|----|------|
| timerc  | x   | TL  | TL  | 1 ?     | 0 ?    | 0    | -2 B  | B  | 0    |
| fetcha  | PH* | PL* | PL* | 1 ?     | 1 ?    | 0    | 0 B   | B  | 1    |
| fetchb  | x   | PH* | PH* | 1 Inst  | 0 ?    | 0    | 0 B   | B  | 1    |
| fetchc  | x   | x   | x   | 0 Inst  | 0 ?    | 0    | 0 B   | ^  | 0    |
| skipf   | PH* | PL* | PL* | 1 ?     | 1 ?    | 0    | 0 B   | B  | 1    |
| skipfb  | x   | PH* | PH* | 1 Inst  | 0 ?    | 0    | 0 B   | B  | 1    |
| skipfc  | x   | x   | x   | 0 Inst  | 0 ?    | 0    | 0 B   | ^  | 0    |
| skip2   | PH* | PL* | PL* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| skip2b  | x   | PH* | PH* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| skip1   | PH* | PL* | PL* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| skip1b  | x   | PH* | PH* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| test    | x   | x   | K   | 1 ?     | 0 ?    | 0    | 0 B   | ^  | tr   |
| mathrr  | S   | kD  | kD2 | 1 ?     | 0 ?    | 0 mA | B     | mL | mCir |
| call    | x   | PL* | LL  | 1 ?     | 0 ?    | 0    | 0 B   | B  | 0    |
| callb   | x   | PH* | LH  | 1 ?     | 0 ?    | 0    | 0 B   | B  | 0    |
| jump    | PH* | PL* | PL* | 1 ?     | 1 ?    | 0    | 0 B   | B  | 1    |
| jumpb   | x   | x   | ML  | 1 PCL   | 0 ?    | 0    | 0 mem | B  | 0    |
| jumpc   | x   | x   | ML  | 1 PCL   | 0 ?    | 0    | 0 mem | B  | 0    |
| jumpd   | x   | PH* | PH* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| jumpe   | PH* | PL* | x   | 0 ?     | 1 ?    | 0    | 0 B   | B  | 0    |
| jumpf   | x   | x   | PH* | 1 PCH   | 0 ?    | 0    | 0 mem | B  | 0    |
| jumpg   | x   | ML  | PL* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 0    |
| return  | x   | LL  | PL* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 0    |
| returnb | x   | LH  | PH* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 0    |
| mathir  | PH* | PL* | PL* | 1 ?     | 1 ?    | 0    | 0 B   | B  | 1    |
| mathirb | kD  | x   | D   | 1 #     | 0 ?    | 0 mA | mem   | mL | mCir |
| mathirc | kD  | x   | D   | 1 #     | 0 ?    | 0 mA | mem   | mL | mCir |
| mathird | x   | PH* | PH* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| zpa     | PH* | PL* | PL* | 1 ?     | 1 ?    | 0    | 0 B   | B  | 1    |
| zpab    | x   | x   | ZL  | 1 zpa   | 0 ?    | 0    | 0 mem | B  | 0    |
| zpac    | x   | x   | ZL  | 1 zpa   | 0 ?    | 0    | 0 mem | B  | 0    |
| zpad    | x   | PH* | PH* | 1 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| zpaе    | ZH  | ZL  | x   | 0 ?     | 1 ?    | 0    | 0 B   | B  | 0    |
| zpaф    | ZH  | ZL  | x   | 0 ?     | 1 ?    | 0    | 0 B   | B  | 0    |
| zpag    | x   | x   | ML  | 1 lowp  | 0 ?    | 0    | 0 mem | B  | 0    |
| zpah    | ZH  | ZL  | x   | 0 ?     | 1 ?    | 0    | 0 B   | B  | 0    |
| zpai    | x   | x   | MH  | 1 highp | 0 ?    | 0    | 0 mem | B  | 0    |
| zpaј    | x   | ML  | x   | 0 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| zpak    | ZH  | ZL  | x   | 0 ?     | 0 ML+1 | 1    | 0 B   | B  | 0    |
| zpal    | ZH  | ZL  | x   | 0 ?     | 0 ML+1 | 1    | 0 B   | B  | 0    |
| zпам    | x   | MH  | x   | 0 ?     | 0 ?    | 0    | 0 B   | B  | 1    |
| zpan    | ZH  | ZL  | x   | 0 ?     | 0 MH+1 | 1    | 0 B   | B  | 0    |
| zpaо    | MH  | ML  | x   | 0 ?     | 1 ?    | 0    | 0 B   | B  | 0    |

sA7 sA0 A0 wIR wFL next

|   |   |   |   |                              |           |
|---|---|---|---|------------------------------|-----------|
| x | x | x | 0 | 0 resetb                     | PH,PL = 0 |
| x | x | x | 0 | 0 resetc                     |           |
| x | x | x | 0 | 0 resetd                     | TH,TL = 0 |
| x | x | x | 0 | 0 fetch                      |           |
| x | x | x | 0 | 0 Z?(TZ?fetcha:timerb):timer | TL -= 1   |
| x | x | x | 0 | 0 timerc                     | TH -= 1   |

|   |   |     |   |                        |
|---|---|-----|---|------------------------|
| x | x | x   | 0 | 0 timer                |
|   | 0 | 0 x | 0 | 0 C?fetchb:fetchc      |
| x | x | x   | 1 | 0 decode               |
| x | x | x   | 1 | 0 decode               |
|   | 0 | 0 x | 0 | 0 C?skipfb:skipfc      |
| x | x | x   | 0 | 0 decodeSkip           |
| x | x | x   | 0 | 0 decodeSkip           |
| x | x | x   | 0 | 0 C?skip2b:skip1       |
| x | x | x   | 0 | 0 skip1                |
| x | x | x   | 0 | 0 C?skip1b:fetch       |
| x | x | x   | 0 | 0 fetch                |
| x | x | x   | 0 | 0 useK ltr?fetch:skipf |
| x | x | x   | 0 | 1 fetch                |
| x | x | x   | 0 | 0 callb                |
| x | x | x   | 0 | 0 jump                 |
|   | 0 | 0 x | 0 | 0 C?jumpb:jumpc        |
| x | x | x   | 0 | 0 jumpd                |
| x | x | x   | 0 | 0 jumpe                |
| x | x | x   | 0 | 0 jumpe                |
|   | 0 | 0 x | 0 | 0 jumpf                |
| x | x | x   | 0 | 0 jumpg                |
| x | x | x   | 0 | 0 fetch                |
| x | x | x   | 0 | 0 returnb              |
| x | x | x   | 0 | 0 fetch                |
|   | 0 | 0 x | 0 | 0 C?mathirb:mathirc    |
| x | x | x   | 0 | 1 mathird              |
| x | x | x   | 0 | 1 fetch                |
| x | x | x   | 0 | 0 fetch                |
|   | 0 | 0 x | 0 | 0 C?zpab:zpac          |
| x | x | x   | 0 | 0 zpad                 |
| x | x | x   | 0 | 0 svlnd?zpa:zpa        |
| x | x | x   | 0 | 0 svlnd?zpa:zpa        |
|   | 0 | 0 x | 0 | 0 rtn                  |
|   | 1 | 1 0 | 0 | 0 zpag                 |
| x | x | x   | 0 | 0 zpah                 |
|   | 1 | 1 1 | 0 | 0 zpai                 |
| x | x | x   | 0 | 0 svlnc?zpa:zpa        |
| x | x | x   | 0 | 0 C?zpak:zpal          |
|   | 1 | 1 0 | 0 | 0 zpam                 |
|   | 1 | 1 0 | 0 | 0 zpao                 |
| x | x | x   | 0 | 0 zpan                 |
|   | 1 | 1 1 | 0 | 0 zpao                 |
| x | x | x   | 0 | 0 rtn                  |