```
\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?fetcha:timer
```

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

```
\memz       svZInd?mem:(svZReg?(svZIO?{1,reg[0]}:B):mem)
\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 |
| 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 | x | x | x | x |
| | | | | | | | | | | | | |
| 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 | x | x | x | x |
| skip2 | x | PL* | PL* | 1 | ? | 0 | ? | 0 | 0 | B | B | 1 |
| skip2b | x | PH* | PH* | 1 | ? | 0 | ? | 0 | 0 | B | B | 1 |
| skip1 | x | 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 | x | x | x | x |
| 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 |
| zpae | ZH | ZL | x | 0 | ? | 1 | ? | 0 | x | x | x | x |
| zpaf | ZH | ZL | x | 0 | ? | 1 | ? | 0 | x | x | x | x |
| zpag | x | x | ML | 1 | lowp | 0 | ? | 0 | 0 | mem | B | 0 |
| zpah | ZH | ZL | x | 0 | ? | 1 | ? | 0 | x | x | x | x |
| zpai | x | x | MH | 1 | highp | 0 | ? | 0 | 0 | mem | B | 0 |
| zpaj | x | ML | x | 0 | ? | 0 | ? | 0 | 0 | B | B | 1 |
| zpak | ZH | ZL | x | 0 | ? | 0 | ML+1 | 1 | x | x | x | x |
| zpal | ZH | ZL | x | 0 | ? | 0 | ML+1 | 1 | x | x | x | x |
| zpam | x | MH | x | 0 | ? | 0 | ? | 0 | 0 | B | B | 1 |
| zpan | ZH | ZL | x | 0 | ? | 0 | MH+1 | 1 | x | x | x | x |
| zpao | MH | ML | x | 0 | ? | 1 | ? | 0 | x | x | x | x |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| mathiz | PH* | PL* | PL* | 1 ? | 1 ? | 0 | 0 | B | B | 1 |
| mathizb | x | reg | K | 1 # | 0 ? | 0 | 0 | memz | B | 0 |
| mathizc | x | reg | K | 1 # | 0 ? | 0 | 0 | memz | B | 0 |
| mathizd | K | reg | K | 1 # | 0 ? | 0 | mA | memz | mL | mCir |
| mathize | K | reg | K | 1 # | 0 ? | 0 | mA | memz | mL | mCir |
| mathizf | x | PH* | PH* | 1 ? | 0 ? | 0 | 0 | B | B | 1 |
| mathizg | x | PH* | PH* | 1 ? | 0 ? | 0 | 0 | B | B | 1 |
| mathizo | K | reg | K | 1 value | 0 ? | 0 | mA | memz | mL | mCir |
| mathizp | x | K | x | 0 ? | 0 ? | 0 | 0 | B | B | 0 |
| mathizq | MH | ML | x | 0 ? | 0 K | 1 | x | x | x | x |
| mathizr | x | K | reg | 1 ? | 0 K | 0 | 0 | B | B | 0 |
| mathizs | x | K | reg | 0 ? | 0 K | 0 | 0 | B | B | 0 |
| | | | | | | | | | | |
| callz | x | PL* | LL | 1 ? | 0 ? | 0 | 0 | B | B | 0 |
| callzb | x | PH* | LH | 1 ? | 0 ? | 0 | 0 | B | B | 0 |
| jumpz | x | ML | PL* | 1 ? | 0 ? | 0 | 0 | B | B | 0 |
| jumpzb | x | MH | PH* | 1 ? | 0 ? | 0 | 0 | B | B | 0 |
| | | | | | | | | | | |
| table | LL | reg | ML | 1 ? | 0 ? | 0 | 0 | memz | B | 0 |
| tableb | x | LH | MH | 1 ? | 0 ? | 0 | 0 | B | B | 1 |
| tablec | x | LH | MH | 1 ? | 0 ? | 0 | 0 | B | B | 0 |
| tabled | MH | ML | ML | 1 ? | 1 ? | 0 | 0 | B | B | 1 |
| tablee | x | x | PL | 1 newPL | 0 ? | 0 | 0 | mem | B | 0 |
| tablef | x | x | PL | 1 newPL | 0 ? | 0 | 0 | mem | B | 0 |
| tableg | MH | ML | x | 0 ? | 1 ? | 0 | x | x | x | x |
| tableh | x | MH | MH | 1 ? | 0 ? | 0 | 0 | B | B | 1 |
| tablei | x | x | PH | 1 newPL | 0 ? | 0 | 0 | mem | B | 0 |
| | | | | | | | | | | |
| mathzr | kD | reg | kD2 | 1 value | 0 ? | 0 | mA | memz | mL | mCir |
| | | | | | | | | | | |
| mathrz | S | reg | K | 1 value | 0 ? | 0 | mA | memz | mL | mCir |
| mathrzb | MH | ML | x | 0 ? | 0 K | 1 | x | x | x | x |
| mathrzc | x | K | reg | 1 ? | 0 K | 0 | 0 | B | B | 0 |
| mathrzd | x | K | reg | 0 ? | 0 K | 0 | 0 | B | B | 0 |
| kmathrz | S | K | K | 1 ? | 0 ? | 0 | mA | B | mL | mCir |
| | | | | | | | | | | |
| mathzz | x | reg | K | 1 value | 0 ? | 0 | 0 | memz | B | 0 |
| mathzzb | K | x | K | 1 value | 0 ? | 0 | mA | memz | mL | mCir |
| mathzzc | MH | ML | x | 0 ? | 0 K | 1 | x | x | x | x |
| mathzzd | x | K | reg | 1 ? | 0 K | 0 | 0 | B | B | 0 |
| mathzze | x | K | reg | 0 ? | 0 K | 0 | 0 | B | B | 0 |

| | | | |
|---|---|---|---|
| 15: PH | PH* | PH* | PH* |
| 14: PL | ? | PL* | PL* |
| 13: MH | MH | MH | MH |
| 12: ML | ? | ML | ML |
| 11: iH | ? | ? | ? |
| 10: iL | ? | ? | ? |
| 9:  LH | ? | LH | LH |

| # |    |     |     |     |
|---|----|-----|-----|-----|
| 8: | LL | LL | LL | LL |
| 7: | ZH | ZH | ? | ? |
| 6: | ZL | ? | ZL | ZL |
| 5: | TH | ? | TH | TH |
| 4: | TL | ? | TL | TL |
| 3: | K | K | K | K |
| 2: | Y | ? | ? | kD2 |
| 1: | X | kD | kD | D |
| 0: | W | S | reg | reg |

| | aSel | bSel | logSel | Cin |
|---|------|------|--------|-----|
| 3: | x | x | x | tr |
| 2: | mA | memz | ^ | mCir |
| 1: | -2 | mem | mL | 1 |
| 0: | 0 | B | B | 0 |

: useK will become prevK at the end of this clock cycle

| 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 |

Microcode

| | | | | | | |
|---|---|---|---|---|---|---|
| x | x | x | 0 | 0 | timerc | TH -= 1 |
| x | x | x | 0 | 0 | timer | TL -= 2 |
| | | | | | | |
| 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|tr?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 | svInd?zpaf:zpae | |
| x | x | x | 0 | 0 | svInd?zpaf:zpae | |
| 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 | svInc?zpaj:zpao | |
| 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 | |

```
    0    0 x     0    0 prevK?(C?mathizd:mathize):(C?mathizb:mathizc)
    0    0 x     0    0 $zpa,mathizo
    0    0 x     0    0 mathizf
x   x    x       0    1 $zpa,mathizp
x   x    x       0    1 mathizg
x   x    x       0    0 $zpa,mathizo
x   x    x       0    0 $zpa,mathizp
x   x    x       0    1 mathizp
x   x    x       0    0 svZReg?(svZIO?mathizs:mathizr):mathizq
x   x    x       0    0 fetch
x   x    x       0    0 fetch
x   x    x       0    0 fetch

x   x    x       0    0 callzb
x   x    x       0    0 $zpa,jumpz
x   x    x       0    0 jumpzb
x   x    x       0    0 fetch

x   x    x       0    0 C?tableb:tablec
x   x    x       0    0 tabled
x   x    x       0    0 tabled
x   x    x       0    0 C?tablee:tablef
x   x    x       0    0 tableg
x   x    x       0    0 tableh
x   x    x       0    0 tablei
x   x    x       0    0 tableg
x   x    x       0    0 fetch

x   x    x       0    1 fetch

x   x    x       0    1 svZReg?(svZIO?mathrzd:mathrzc):mathrzb
x   x    x       0    0 fetch
x   x    x       0    0 fetch
x   x    x       0    0 fetch
x   x    x       0    1 svZReg?(svZIO?mathrzd:mathrzc):mathrzb

x   x    x       0    0 $zpa,mathzzb
x   x    x       0    1 svZReg?(svZIO?mathzze:mathzzd):mathzzc
x   x    x       0    0 fetch
x   x    x       0    0 fetch
x   x    x       0    0 fetch
```

ו

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | E3308801 | 3811608577 | reset | K | 3 K | 3 PL | 14 | 1 |
| 1 | 1 | F3308801 | 4080044033 | resetb | K | 3 K | 3 PH | 15 | 1 |
| 2 | 2 | 43308801 | 1127254017 | resetc | K | 3 K | 3 TL | 4 | 1 |
| 3 | 3 | 53308800 | 1395689472 | resetd | K | 3 K | 3 TH | 5 | 1 |
| 4 | 4 | 0 | 0 | | | | | | |
| 5 | 5 | 0 | 0 | | | | | | |
| 6 | 6 | 0 | 0 | | | | | | |
| 7 | 7 | 0 | 0 | | | | | | |
| 8 | 8 | 44311800 | 1144068096 | timer | K | 3 TL | 4 TL | 4 | 1 |
| 9 | 9 | 55311801 | 1429280769 | timerb | K | 3 TH | 5 TH | 5 | 1 |
| 10 | A | 44310800 | 1144064000 | timerc | K | 3 TL | 4 TL | 4 | 1 |
| 11 | B | 0 | 0 | | | | | | |
| 12 | C | EEF01C05 | 4008713221 | fetcha | PH* | 15 PL* | 14 PL* | 14 | 1 |
| 13 | D | FF30190F | 4281342223 | fetchb | K | 3 PH* | 15 PH* | 15 | 1 |
| 14 | E | 3330010F | 858784015 | fetchc | K | 3 K | 3 K | 3 | 0 |
| 15 | F | 0 | 0 | | | | | | |
| 16 | 10 | EEF01C05 | 4008713221 | skipf | PH* | 15 PL* | 14 PL* | 14 | 1 |
| 17 | 11 | FF30180E | 4281341966 | skipfb | K | 3 PH* | 15 PH* | 15 | 1 |
| 18 | 12 | 3330000E | 858783758 | skipfc | K | 3 K | 3 K | 3 | 0 |
| 19 | 13 | EE301805 | 3996129285 | skip2 | K | 3 PL* | 14 PL* | 14 | 1 |
| 20 | 14 | FF301801 | 4281341953 | skip2b | K | 3 PH* | 15 PH* | 15 | 1 |
| 21 | 15 | EE301800 | 3996129280 | skip1 | K | 3 PL* | 14 PL* | 14 | 1 |
| 22 | 16 | FF301800 | 4281341952 | skip1b | K | 3 PH* | 15 PH* | 15 | 1 |
| 23 | 17 | 0 | 0 | | | | | | |
| 24 | 18 | 3330B800 | 858830848 | test | K | 3 K | 3 K | 3 | 1 |
| 25 | 19 | 0 | 0 | | | | | | |
| 26 | 1A | 21026810 | 553805840 | mathrr | S | 0 kD | 1 kD2 | 2 | 1 |
| 27 | 1B | 0 | 0 | | | | | | |
| 28 | 1C | 8E300801 | 2385512449 | call | K | 3 PL* | 14 LL | 8 | 1 |
| 29 | 1D | 9F300801 | 2670725121 | callb | K | 3 PH* | 15 LH | 9 | 1 |
| 30 | 1E | EEF01C05 | 4008713221 | jump | PH* | 15 PL* | 14 PL* | 14 | 1 |
| 31 | 1F | C3340802 | 3274967042 | jumpb | K | 3 K | 3 ML | 12 | 1 |
| 32 | 20 | C3340802 | 3274967042 | jumpc | K | 3 K | 3 ML | 12 | 1 |
| 33 | 21 | FF301801 | 4281341953 | jumpd | K | 3 PH* | 15 PH* | 15 | 1 |
| 34 | 22 | 3EF00401 | 1055917057 | jumpe | PH* | 15 PL* | 14 K | 3 | 0 |
| 35 | 23 | F3340801 | 4080273409 | jumpf | K | 3 K | 3 PH* | 15 | 1 |
| 36 | 24 | EC300800 | 3962570752 | jumpg | K | 3 ML | 12 PL* | 14 | 1 |
| 37 | 25 | 0 | 0 | | | | | | |
| 38 | 26 | E8300801 | 3895461889 | return | K | 3 LL | 8 PL* | 14 | 1 |
| 39 | 27 | F9300800 | 4180674560 | returnb | K | 3 LH | 9 PH* | 15 | 1 |
| 40 | 28 | 0 | 0 | | | | | | |
| 41 | 29 | EEF01C05 | 4008713221 | mathir | PH* | 15 PL* | 14 PL* | 14 | 1 |
| 42 | 2A | 13166812 | 320235538 | mathirb | kD | 1 K | 3 D | 1 | 1 |
| 43 | 2B | 13166810 | 320235536 | mathirc | kD | 1 K | 3 D | 1 | 1 |
| 44 | 2C | FF301800 | 4281341952 | mathird | K | 3 PH* | 15 PH* | 15 | 1 |
| 45 | 2D | 0 | 0 | | | | | | |
| 46 | 2E | 0 | 0 | | | | | | |
| 47 | 2F | 0 | 0 | | | | | | |
| 48 | 30 | 0 | 0 | | | | | | |
| 49 | 31 | 0 | 0 | | | | | | |
| 50 | 32 | 0 | 0 | | | | | | |
| 51 | 33 | 0 | 0 | | | | | | |
| 52 | 34 | 0 | 0 | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 53 | 35 | 0 | 0 | | | | | | | |
| 54 | 36 | 0 | 0 | | | | | | | |
| 55 | 37 | 0 | 0 | | | | | | | |
| 56 | 38 | 0 | 0 | | | | | | | |
| 57 | 39 | 0 | 0 | | | | | | | |
| 58 | 3A | 0 | 0 | | | | | | | |
| 59 | 3B | 0 | 0 | | | | | | | |
| 60 | 3C | 0 | 0 | | | | | | | |
| 61 | 3D | 0 | 0 | | | | | | | |
| 62 | 3E | #N/A | #N/A | mathiz | PH* | 15 | PL* | 14 | PL* | 14 | 1 |
| 63 | 3F | #N/A | #N/A | mathizb | K | 3 | reg | 0 | K | 3 | 1 |
| 64 | 40 | 30380803 | 808978435 | mathizc | K | 3 | reg | 0 | K | 3 | 1 |
| 65 | 41 | #N/A | #N/A | mathizd | K | 3 | reg | 0 | K | 3 | 1 |
| 66 | 42 | 303A6812 | 809134098 | mathize | K | 3 | reg | 0 | K | 3 | 1 |
| 67 | 43 | FF30180A | 4281341962 | mathizf | K | 3 | PH* | 15 | PH* | 15 | 1 |
| 68 | 44 | FF30180A | 4281341962 | mathizg | K | 3 | PH* | 15 | PH* | 15 | 1 |
| 69 | 45 | 303A6811 | 809134097 | mathizo | K | 3 | reg | 0 | K | 3 | 1 |
| 70 | 46 | #N/A | #N/A | mathizp | K | 3 | K | 3 | K | 3 | 0 |
| 71 | 47 | 3CD00200 | 1020264960 | mathizq | MH | 13 | ML | 12 | K | 3 | 0 |
| 72 | 48 | 3300800 | 53479424 | mathizr | K | 3 | K | 3 | reg | 0 | 1 |
| 73 | 49 | 3300000 | 53477376 | mathizs | K | 3 | K | 3 | reg | 0 | 0 |
| 74 | 4A | 0 | 0 | | | | | | | |
| 75 | 4B | 8E300801 | 2385512449 | callz | K | 3 | PL* | 14 | LL | 8 | 1 |
| 76 | 4C | 9F300809 | 2670725129 | callzb | K | 3 | PH* | 15 | LH | 9 | 1 |
| 77 | 4D | EC300801 | 3962570753 | jumpz | K | 3 | ML | 12 | PL* | 14 | 1 |
| 78 | 4E | FD300800 | 4247783424 | jumpzb | K | 3 | MH | 13 | PH* | 15 | 1 |
| 79 | 4F | 0 | 0 | | | | | | | |
| 80 | 50 | C0880805 | 3230140421 | table | LL | 8 | reg | 0 | ML | 12 | 1 |
| 81 | 51 | D9301802 | 3643807746 | tableb | K | 3 | LH | 9 | MH | 13 | 1 |
| 82 | 52 | D9300801 | 3643803649 | tablec | K | 3 | LH | 9 | MH | 13 | 1 |
| 83 | 53 | CCD01C05 | 3436190725 | tabled | MH | 13 | ML | 12 | ML | 12 | 1 |
| 84 | 54 | E3340802 | 3811837954 | tablee | K | 3 | K | 3 | PL | 14 | 1 |
| 85 | 55 | E3340802 | 3811837954 | tablef | K | 3 | K | 3 | PL | 14 | 1 |
| 86 | 56 | 3CD00402 | 1020265474 | tableg | MH | 13 | ML | 12 | K | 3 | 0 |
| 87 | 57 | DD301802 | 3710916610 | tableh | K | 3 | MH | 13 | MH | 13 | 1 |
| 88 | 58 | F3340800 | 4080273408 | tablei | K | 3 | K | 3 | PH | 15 | 1 |
| 89 | 59 | 3CD00401 | 1020265473 | tablej | MH | 13 | ML | 12 | K | 3 | 0 |
| 90 | 5A | F3340800 | 4080273408 | tablek | K | 3 | K | 3 | PH | 15 | 1 |
| 91 | 5B | 0 | 0 | | | | | | | |
| 92 | 5C | 201A6810 | 538601488 | mathzr | kD | 1 | reg | 0 | kD2 | 2 | 1 |
| 93 | 5D | 0 | 0 | | | | | | | |
| 94 | 5E | #N/A | #N/A | mathrz | S | 0 | reg | 0 | K | 3 | 1 |
| 95 | 5F | 3CD00200 | 1020264960 | mathrzb | MH | 13 | ML | 12 | K | 3 | 0 |
| 96 | 60 | 3300800 | 53479424 | mathrzc | K | 3 | K | 3 | reg | 0 | 1 |
| 97 | 61 | 3300000 | 53477376 | mathrzd | K | 3 | K | 3 | reg | 0 | 0 |
| 98 | 62 | #N/A | #N/A | kmathrz | S | 0 | K | 3 | K | 3 | 1 |
| 99 | 63 | 0 | 0 | | | | | | | |
| 100 | 64 | 30380809 | 808978441 | mathzz | K | 3 | reg | 0 | K | 3 | 1 |
| 101 | 65 | #N/A | #N/A | mathzzb | K | 3 | K | 3 | K | 3 | 1 |
| 102 | 66 | 3CD00200 | 1020264960 | mathzzc | MH | 13 | ML | 12 | K | 3 | 0 |
| 103 | 67 | 3300800 | 53479424 | mathzzd | K | 3 | K | 3 | reg | 0 | 1 |
| 104 | 68 | 3300000 | 53477376 | mathzze | K | 3 | K | 3 | reg | 0 | 0 |
| 105 | 69 | 0 | 0 | | | | | | | |

| address | hex | data | | label | aAd | | bAd | | wAd | | wReg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 106 | 6A | 0 | 0 | | | | | | | | |
| 107 | 6B | 0 | 0 | | | | | | | | |
| 108 | 6C | 0 | 0 | | | | | | | | |
| 109 | 6D | 0 | 0 | | | | | | | | |
| 110 | 6E | 0 | 0 | | | | | | | | |
| 111 | 6F | 0 | 0 | | | | | | | | |
| 112 | 70 | EEF01C05 | 4008713221 | zpa | PH* | 15 | PL* | 14 | PL* | 14 | 1 |
| 113 | 71 | 63340802 | 1664354306 | zpab | K | 3 | K | 3 | ZL | 6 | 1 |
| 114 | 72 | #N/A | #N/A | zpac | K | 3 | K | 3 | ZL | 6 | 1 |
| 115 | 73 | #N/A | #N/A | zpad | K | 3 | PH* | 15 | PH* | 15 | 1 |
| 116 | 74 | 36700408 | 913310728 | zpae | ZH | 7 | ZL | 6 | K | 3 | 0 |
| 117 | 75 | 367004C1 | 913310913 | zpaf | ZH | 7 | ZL | 6 | K | 3 | 0 |
| 118 | 76 | C3340801 | 3274967041 | zpag | K | 3 | K | 3 | ML | 12 | 1 |
| 119 | 77 | 367004E1 | 913310945 | zpah | ZH | 7 | ZL | 6 | K | 3 | 0 |
| 120 | 78 | #N/A | #N/A | zpai | K | 3 | K | 3 | MH | 13 | 1 |
| 121 | 79 | 3C301005 | 1009782789 | zpaj | K | 3 | ML | 12 | K | 3 | 0 |
| 122 | 7A | 367002C2 | 913310402 | zpak | ZH | 7 | ZL | 6 | K | 3 | 0 |
| 123 | 7B | 367002C3 | 913310403 | zpal | ZH | 7 | ZL | 6 | K | 3 | 0 |
| 124 | 7C | 3D301001 | 1026560001 | zpam | K | 3 | MH | 13 | K | 3 | 0 |
| 125 | 7D | 367002E1 | 913310433 | zpan | ZH | 7 | ZL | 6 | K | 3 | 0 |
| 126 | 7E | 3CD00408 | 1020265480 | zpao | MH | 13 | ML | 12 | K | 3 | 0 |
| 127 | 7F | 0 | 0 | | | | | | | | |

| address | hex | data | label | aAd | bAd | wAd | wReg |
|---|---|---|---|---|---|---|---|
| | | | | 23:20 | 27:24 | 31:28 | 11 |

| | | | |
|---|---|---|---|
| 15: PH | PH* | PH* | PH* |
| 14: PL | ? | PL* | PL* |
| 13: MH | MH | MH | MH |
| 12: ML | ? | ML | ML |
| 11: iH | ? | ? | ? |
| 10: iL | ? | ? | ? |
| 9:  LH | ? | LH | LH |

| | | | | |
|---|---|---|---|---|
| 8: | LL | LL | LL | LL |
| 7: | ZH | ZH | ? | ? |
| 6: | ZL | ? | ZL | ZL |
| 5: | TH | ? | TH | TH |
| 4: | TL | ? | TL | TL |
| 3: | K | K | K | K |
| 2: | Y | ? | ? | kD2 |
| 1: | X | kD | kD | D |
| 0: | W | S | reg | reg |

| | |
|---|---|
| \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?fetcha:timer |

\decode

| | |
|---|---|
| test | fetch |
| Imm & !zd | skip1 |
| Imm & zd | skip2 |
| Math & !zs & !zd | fetch |
| Math & !zs & zd | skip1 |
| Math & zs & !zd | skip1 |
| Math & zs & zd | skip2 |
| Jump & jop == 0 | skip2 |
| Jump & jop == 1 | skip2 |
| Jump & jop == 2 | fetch |
| Jump & jop == 3 | fetch |
| Jump & jop == 4 | skip1 |
| Jump & jop == 5 | skip1 |
| Jump & jop == 6 | fetch |
| Jump & jop == 7 | skip1 |

| | |
|---|---|
| \memz | svZInd?mem:(svZReg?(svZIO?{1,reg[0]}:B):mem |
| \mA | SvAluOp[2]?00:SvAluOp[1:0] |

ROM

| | |
|---|---|
| \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} |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 B | 0 ^ | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 ^ | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 ^ | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 ^ | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | -2 | 1 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | -2 | 1 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | -2 | 1 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 dec |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 dec |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 decSkip |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 decSkip |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 ^ | 2 tr | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 mA | | 2 B | 0 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | | 1 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 mA | | 2 mem | 1 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | | 1 +2 |
| 0 | 0 mA | | 2 mem | 1 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | | 1 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 tf |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +3,+4,+1,+ |
| 0 | 0 | 0 | 0 memz | 2 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 $+6 |
| 0 | 0 | 0 | 0 memz | 2 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +3 |
| 0 | 0 mA | | 2 memz | 2 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | $+5 |
| 0 | 0 mA | | 2 memz | 2 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | +2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 $+2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 $+2 |
| 0 | 0 mA | | 2 memz | 2 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +3,+2,+1,+ |
| 0 | 1 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 $+1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 memz | 2 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +2 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| | | | | | | | | | | | | |
| 0 | 0 mA | | 2 memz | 2 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | tf |
| | | | | | | | | | | | | |
| 0 | 0 mA | | 2 memz | 2 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | +3,+2,+1,+ |
| 0 | 1 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 mA | | 2 B | 0 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | -1,-2,-3,-3 |
| | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 memz | 2 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 $+1 |
| 0 | 0 mA | | 2 memz | 2 mL | 1 mCir | 2 | 0 | 0 | 0 | 0 | 1 | +3,+2,+1,+ |
| 0 | 1 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 tf |

| rMem | wMem | aSel | bSel | logSel | Cin | sA7 | sA0 | A0 | wIR | wFL | relJump |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 +2 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 +3,+2 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 +2,+1 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 rtn |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 1 | 1 | 0 | 0 +1 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 1 | 1 | 1 | 0 +1 |
| 0 | 0 | 0 | 0 mem | 1 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 +1,+5 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 +1,+2 |
| 0 | 1 | 0 | 0 B | 0 B | 0 | 0 | 0 | 1 | 1 | 0 | 0 +2 |
| 0 | 1 | 0 | 0 B | 0 B | 0 | 0 | 0 | 1 | 1 | 0 | 0 +3 |
| 0 | 0 | 0 | 0 B | 0 B | 0 | 1 | 1 | 0 | 0 | 0 | 0 +1 |
| 0 | 1 | 0 | 0 B | 0 B | 0 | 0 | 0 | 1 | 1 | 1 | 0 +1 |
| 1 | 0 | 0 | 0 B | 0 B | 0 | 0 | 0 | 0 | 0 | 0 | 0 rtn |

| rMem | wMem | aSel | bSel | logSel | Cin | sA7 | sA0 | A0 | wIR | wFL | relJump |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 09 | 17:16 | 19:18 | 15:14 | 13:12 | 07 | 06 | 05 | 08 | 04 | 03:00 |

```
                                                        0
                                                        1
                                                        2
Z?(TZ?fetcha:timerb):timer                              3
C?b:c                                                   4
useK|tr?fetch:skipf                                     5
svInd?b:c                                               6
prevK?(C?mathizd:mathize):(C?mathizb                    7
$zpa,mathzzb                                            8
rtn                                                     9
decode                                                 10
decodeSkip                                             11
                                                       12
                                                       13
                                                       14
                                                       15
```

| aSel | bSel | logSel | Cin |
|---|---|---|---|
| x | x | x | tr |
| mA | memz | ^ | mCin |
| -2 | mem | mL | 1 |
| 0 | B | B | 0 |

\decode

test
mathir
mathiz
mathrr
useK?$zpa,kmathrz:$zpa,mathrz
$zpa,mathzr
useK?$zpa,mathzzb:$zpa,mathzz          note: useK will become prevK at the end of this clock cycle
jump
call
fetch
return
$zpa,jumpz
callz
fetch
$zpa,table


n)

```
 1 resetb
 1 resetc
 1 resetd
 0 fetch
 0
 0
 0
 0
 0 Z?(TZ?fetcha:timerb):timer
 1 timerc
 0 timer (fetch with TZ=0)
 0
 5 C?fetchb:fetchc
15 decode
15 decode
 0
 5 C?skipfb:skipfc
14 decodeSkip
14 decodeSkip
 5 C?skip2b:skip1
 1 skip1
 0 C?skip1b:fetch
 0 fetch
 0
 0 useK|tr?fetch:skipf
 0
 0 fetch
 0
 1 callb
 1 jump
 5 C?jumpb:jumpc
 2 jumpd
 2 jumpe
 1 jumpe
 1 jumpf
 1 jumpg
 0 fetch
 0
 1 returnb
 0 fetch
 0
 5 C?mathirb:mathirc
 2 mathird
 0 fetch
 0 fetch
 0
 0
 0
 0
 0
 0
 0
 0
 0
```

```
    0
    0
    0
    0
    0
    0
    0
    0
    0
#N/A prevK?(C?mathizd:mathize):(C?mathizb:mathizc)
#N/A $zpa,mathizo
    3 mathizf
#N/A $zpa,mathizp
    2 mathizg
   10 $zpa,mathizo
   10 $zpa,mathizp
    1 mathizp
#N/A svZReg?(svZIO?mathizs:mathizr):mathizq
    0 fetch
    0 fetch
    0 fetch
    0
    1 callzb
    9 $zpa,jumpz
    1 jumpzb
    0 fetch
    0
    5 C?tableb:tablec
    2 tabled
    1 tabled
    5 C?tablee:tablef
    2 tableg
    2 tableh
    2 tablei
    2 tablej
    0 fetch
    1 tablek
    0 fetch
    0
    0 fetch
    0
#N/A svZReg?(svZIO?mathrzd:mathrzc):mathrzb
    0 fetch
    0 fetch
    0 fetch                                               rtn
#N/A svZReg?(svZIO?mathrzd:mathrzc):mathrzb              rtn
    0
    9 $zpa,mathzzb
#N/A svZReg?(svZIO?mathzze:mathzzd):mathzzc
    0 fetch
    0 fetch
    0 fetch
    0
```

```
    0
    0
    0
    0
    0
    0
    5 C?zpab:zpac
    2 zpad
#N/A svInd?zpaf:zpae
#N/A svInd?zpaf:zpae
    8 rtn
    1 zpag
    1 zpah
    1 zpai
#N/A svInc?zpaj:zpao
    5 C?zpak:zpal
    2 zpam
    3 zpao
    1 zpan
    1 zpao
    8 rtn
    0
```

next

```
    tf              timer+(TZ<<2)
    +1
    +2
    +3

    +1,+2


    rtn
    $+1
    $+2



    decSkip

    dec
```

ROM

 background

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