hw4.

T1 (1) 0101 011 010 1 00100

(2) 0101 011 010 1 01100

(3) 0101 ~~010~~ 011 010 0 00010.

(4) ~~A0.~~ 不行. 立即数只有5位, 无法判断第6位.

T2. LEA R1 #1
     LDR R2. R1 2.

Trap.
ADD R2 R1 R1
ADD R2 R2 R2.

其中 R2 = *(x3101) = x1482 = 5250.

T3. 1. STR SR , DR , #0.
     2. MAR ← DR.
        MDR ← SR.
        Memory [MAR] ← MDR.;
        store SR.

T4. x3001: 0101 100 010 000100
     x3003: 0101 011 001 000011

T5. operate : ADD、NOT、 LEA.

data movement: LDR.

control instructions: JMP.

其中: ADD: register , immediate.

NOT: register

LEA: register , PC-relative.

LDR: Base+offset, register.

JMP: Base + offset.

T6 1. ADD R4 R5 #0;

2. AND R3 R3 #0;

3. NOT R1, R7;

ADD R1 R9 #1;

ADD R1, R1, R6;

4. LDR R1 DATA #0;

ADD R1, R1, R1;

STR R1 DATA #0;

5. AND R1, R1, #-1;

T7 JMP、ADD: 0次.

LDI: 1次.

T8.   x3010: R3 ← x304F.
       x3011: R4 ← x3050
       x3012: R7 ← x3051
       x3013: R6 ← x3050.
         1. ⇒ R6 = x3050.
         2. x3010: LEA R6 #63.

T9.   x3000: AND R0, R0, #0 ; R0 = 0.
       x3001: AND R7, R7, #0 ; R7 = 0
       x3002: ADD R6 R0 #1 ; R6 = R0+1 = 1
       x3003: ADD R6 R6 R6 ; R6 *= 2.
       x3004   AND R4 R5 R6 ; R4 = R5 & R6.
       x3005: BRz   #1 ; if(R4==0) jump to x3007
       x3006: ADD R0 R0 #0 ; R0 = R0 + 3
       x3007: ADD R7 R7 #2 ; R7 = R7 + 2
       x3008: ADD R1 R7 #-0xe ; R1 = R7 - 0xe
       x3009: BRn #-7 ; if(R1<0) jump to x3003
       x300A: AND R7 R7 0 ; R7 = 0
       最终 R0 = 12,
       R5 从第 2 位到第 14 位有 9个1和9个0.

       LDI: 12.

T10   x3000 : $R_0 = \sim R_0$

x3001 : $R_0 = R_0 + 1$

x3002 : $R_2 = 0$

x3003 : $R_3 = R_1 + R_0$

x3004 :   BRz   #6 : if($R_3 == 0$) jump to x3011

x3005 : $R_2 = R_2 + 1$

x3006 : $R_3 = R_2 + (\sim 16)$

x3007 :   BRz   #7 : if($R_3 == 0$) jump to x300F

x3008 : R_1 (取 R_1 为后面判断用)

x3009 :   BRn   #2 : if($R_1 < 0$) jump to x300C

x300A : $R_1 = R_1 + R_1$

x300B :   jump to x3003

x300C : $R_1 = R_1 + R_1$

x300D : $R_1 = R_1 + 1$

x300E :   jump to x3003

x300F : $R_2 = 0$

x3010 : $R_2 = R_2 + (\sim 1)$

x3011 :   x3020 = R2

x3012 :   halt