

Homework 8

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I could not seem to get the IT_KEYBOARD to work and display the correct values with my code after working for a while on it. So, my screenshots may be incorrect

Start of code

Freescale HC12-Assembler

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Abs. Rel. Loc Obj. code Source line

```
-----
1 1      ,*****
2 2      ;* This stationery serves as the framework for a      *
3 3      ;* user application (single file, absolute assembly application) *
4 4      ;* For a more comprehensive program that              *
5 5      ;* demonstrates the more advanced functionality of this *
6 6      ;* processor, please see the demonstration applications *
7 7      ;* located in the examples subdirectory of the          *
8 8      ;* Freescale CodeWarrior for the HC12 Program directory *
9 9      ,*****
10 10
11 11      ; export symbols
12 12      XDEF Entry, _Startup      ; export 'Entry' symbol
13 13      ABSENTRY Entry      ; for absolute assembly: mark this as application entry point
14 14
15 15
16 16
17 17      ; Include derivative-specific definitions
18 18
19 19      0000 0800 RAMStart EQU $0800
20 20      0000 4000 ROMStart EQU $4000 ; absolute address to place my code/constant data
21 21      0000 2000 Stack EQU $2000
```

```

22 22      0000 001E  INTCR    EQU  $001E
23 23      0000 0040  IRQEN    EQU  $40
24 24      0000 0000  PORTA    EQU  $0000
25 25      0000 0002  DDRA     EQU  $0002
26 26      0000 0001  PORTB    EQU  $0001
27 27      0000 0003  DDRB     EQU  $0003
28 28      0000 0004  Num_col   EQU  4
29 29      0000 0005  Num_row   EQU  5
30 30
31 31
32 32          ; variable/data section
33 33
34 34          ORG RAMStart
35 35
36 36 a000800      Keys      ds.b  20
37 37 a000814      Key_value ds.b  1
38 38 a000815 FEFD FBF7  MaskP   dc.b  $FE,$FD,$FB,$F7,$EF
    000819 EF
39 39 a00081A      Pressed   ds.b  1
40 40
41 41
42 42          ORG ROMStart
43 43
44 44          Entry:
45 45          _Startup:
46 46
47 47 a004000 CF20 00      lds  #Stack      ;set up stack
48 48 a004003 180B 4000    movb #IRQEN, INTCR ;interrupt for IRQ
    004007 1E
49 49 a004008 180B FF00    movb #$FF, DDRA
    00400C 02
50 50 a00400D 180B 0000    movb #0, PORTA

```

004011 00

51 51

52 52 a004012 7908 1A clr Pressed

53 53

54 54 a004015 CD08 00 ldy #Keys

55 55 a004018 10EF cli ;enables all maskable interrupts

56 56

57 57

58 58 loop:

59 59 a00401A F708 1A tst Pressed ;tests press

60 60 a00401D 2708 beq skip

Freescale HC12-Assembler

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Abs. Rel. Loc Obj. code Source line

```
-----
61 61 a00401F 7908 1A    clr  Pressed
62 62 a004022 1809 7008    movb  Key_value, 1, y+ ;store key value
    004026 14
63 63
64 64          skip:
65 65 a004027 0703        bsr  delay      ;goes to subroutine
66 66 a004029 20EF        bra  loop      ;branches back to loop
67 67
68 68 a00402B 3D          rts
69 69
70 70          delay:
71 71 a00402C 8601        ldaa  #1B
72 72
73 73
74 74          out_loop:
75 75 a00402E CEF  FF      idx  #$FFFF
76 76
77 77          in_loop:
78 78 a004031 0435 FD      dbne  x, in_loop
79 79 a004034 0430 F7      dbne  a, out_loop
80 80
81 81
82 82 a004037 3D          rts
83 83
84 84          Key_ISR:
85 85 a004038 C7          clrb
```

```

86 86 a004039 CE08 15    ldx  #MaskP
87 87
88 88          begin:
89 89 a00403C 180D 3000    movb  1,x+,PORTA
    004040 00
90 90 a004041 9601        ldaa  PORTB
91 91 a004043 81FF        cmpa  #$FF
92 92 a004045 2607        bne   press
93 93 a004047 52          incb
94 94 a004048 C104        cmpb  #4
95 95 a00404A 26F0        bne   begin
96 96 a00404C 2019        bra   notPressed
97 97
98 98          press:
99 99 a00404E CE08 15    ldx  #MaskP
100 100 a004051 CD00 05    ldy  #5
101 101
102 102          next:      ;next row
103 103 a004054 A130        cmpa  1,x+
104 104 a004056 2707        beq   stop_add
105 105 a004058 CB04        addb  #4
106 106 a00405A 0436 F7    dbne  y, next
107 107 a00405D 2008        bra   notPressed
108 108
109 109          stop_add:
110 110 a00405F 7B08 14    stab  Key_value
111 111 a004062 180B 0108    movb  #1, Pressed
    004066 1A
112 112
113 113          notPressed:
114 114 a004067 180B 0000    movb  #0, PORTA
    00406B 00

```

115 115

116 116 a00406C 0B rti

117 117

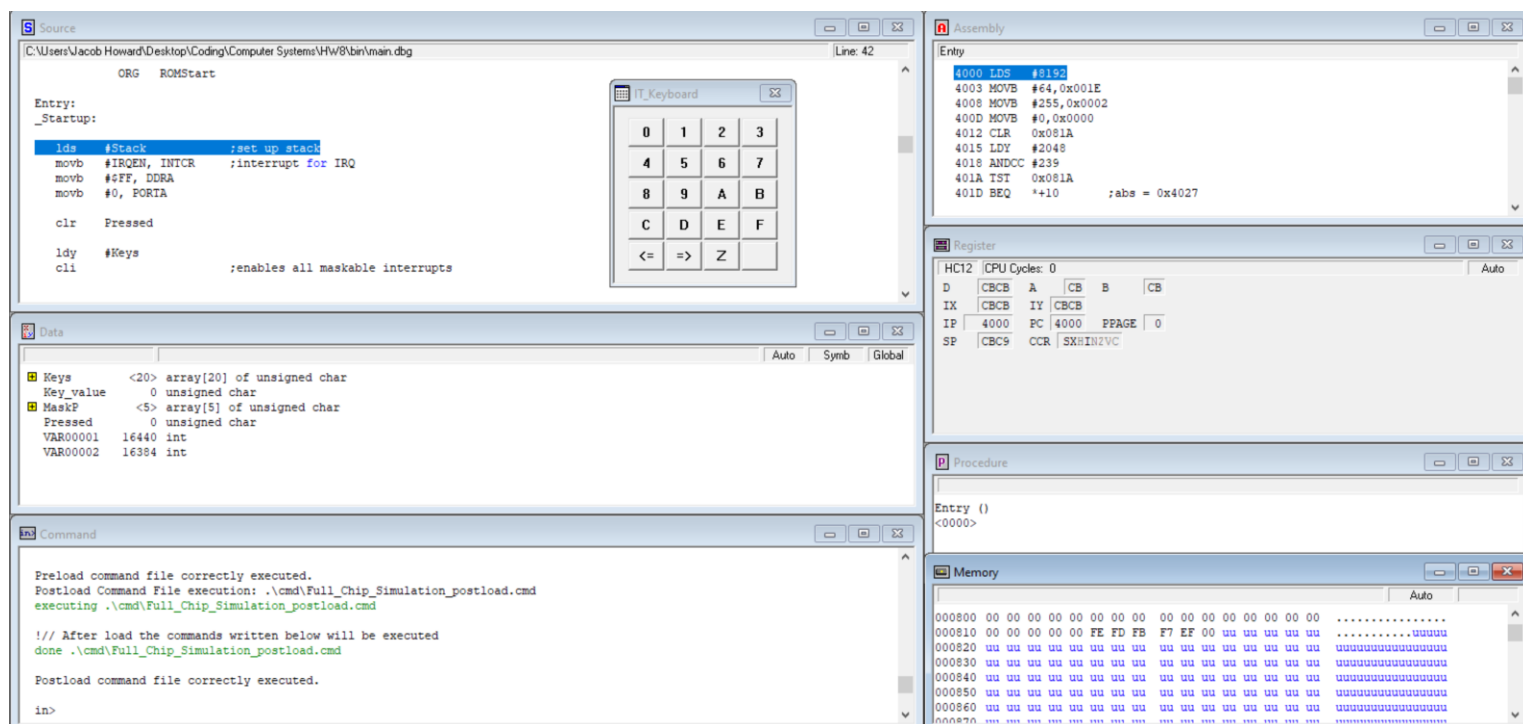
118 118

119 119

120 120

Abs. Rel.	Loc	Obj. code	Source line
-----	-----	-----	
121	121		
122	122		
123	123		
124	124		
125	125		; result in D
126	126		
127	127		;*****
128	128		;* Interrupt Vectors *
129	129		;*****
130	130		ORG \$FFF2
131	131	a00FFF2 4038	dc.w Key_ISR
132	132		
133	133		ORG \$FFFE
134	134	a00FFFE 4000	DC.W Entry ; Reset Vector
-----			End of code

Screenshot 1 (before any key is pressed)



Screenshot 2 (all keys pressed)

