

```

1  GPIO_PORTB_DATA      EQU      0x400053FC      ;data address to all pins
2  GPIO_PORTB_DIR       EQU      0x40005400
3  GPIO_PORTB_AFSEL     EQU      0x40005420
4  GPIO_PORTB_AMSEL     EQU      0x40005428
5  GPIO_PORTB_DEN       EQU      0x4000551C
6  GPIO_PORTB_PUR       EQU      0x40005510
7  IOB                  EQU      0xF0
8  PUB                  EQU      0x0F
9
10 SYSCTL_RCGCGPIO      EQU      0x400FE608
11
12
13          AREA          main, READONLY, CODE
14          THUMB
15          EXTERN        delay
16          EXTERN        OutChar
17          EXPORT        __main ; Make available
18
19 __main      PROC
20          LDR            R1, =SYSCTL_RCGCGPIO
21          LDR            R0, [R1]
22          ORR            R0, #0x02
23          STR            R0, [R1]
24
25          NOP
26          NOP
27          NOP                                ;Stabilize clock
28
29          LDR            R1,=GPIO_PORTB_DIR
30          LDR            R0, [R1]
31          BIC            R0, #0xFF
32          ORR            R0, #IOB                                ;INPUTS      OUTPUTS
33                                     ;r1 pb3      11
34                                     ;r2 pb2      12 pb6
35                                     ;r3 pb1      13 pb5
36                                     ;r4 pb0      14 pb4
37          STR            R0, [R1]
38
39          LDR            R1,=GPIO_PORTB_AFSEL
40          LDR            R0, [R1]
41          BIC            R0, #0xFF
42          STR            R0, [R1]
43
44          LDR            R1,=GPIO_PORTB_DEN
45          LDR            R0, [R1]
46          MOV            R0, #0xFF
47          STR            R0, [R1]
48
49          LDR            R1,=GPIO_PORTB_AMSEL
50          LDR            R0, [R1]
51          BIC            R0, #0xFF
52          STR            R0, [R1]
53
54          LDR            R1,=GPIO_PORTB_PUR
55          MOV            R0, #PUB
56          STR            R0, [R1]
57
58          MOV            R11, #0x70
59          LDR            R1,=GPIO_PORTB_DATA
60          LDR            R0, [R1]
61          BIC            R0, #0xFF
62          ORR            R0, R11
63          STR            R0, [R1]
64
65          LDR            R1,=GPIO_PORTB_DATA
66          LDR            R10, [R1]
67          BL            delay
68          LDR            R1,=GPIO_PORTB_DATA
69          LDR            R9, [R1]
70          CMP            R9, R10
71          BEQ            rows
72          B              debnc_inp
73
74          CMP            R9, #0x77
75          MOVEQ           R10, #48
76          BEQ            cont
77          CMP            R9, #0x7B
78          MOVEQ           R10, #49
79          BEQ            cont
80          CMP            R9, #0x7D

```

;Debounce algorithm for pressing
;wait a delay between two data
;samples and if they are the same
;it continues to check columns
;it loads the data onto R9 reg.
;rows part checks each column
;it starts with the first row
;checks if the data in R9 is equal
;to any of the 16 keys by simply looking
;two hex numbers
;first one for the output in other
;word rows: 7: First row, B: Second

```

77      MOVEQ    R10,#50      ;D: Third, E: Fourth
78      BEQ      cont
79      CMP      R9,#0x7E     ;the second hex number is for the columns
80      MOVEQ    R10,#51     ;7: First and so on
81      BEQ      cont        ;then R10 is loaded with the corresponding
82                                     ;ASCII value of the pressed key
83      CMP      R9,#0xB7
84      MOVEQ    R10,#52
85      BEQ      cont
86      CMP      R9,#0xBB
87      MOVEQ    R10,#53
88      BEQ      cont
89      CMP      R9,#0xBD
90      MOVEQ    R10,#54
91      BEQ      cont
92      CMP      R9,#0xBE
93      MOVEQ    R10,#55
94      BEQ      cont
95
96      CMP      R9,#0xD7
97      MOVEQ    R10,#56
98      BEQ      cont
99      CMP      R9,#0xDB
100     MOVEQ    R10,#57
101     BEQ      cont
102     CMP      R9,#0xDD
103     MOVEQ    R10,#65
104     BEQ      cont
105     CMP      R9,#0xDE
106     MOVEQ    R10,#66
107     BEQ      cont
108
109     CMP      R9,#0xE7
110     MOVEQ    R10,#67
111     BEQ      cont
112     CMP      R9,#0xEB
113     MOVEQ    R10,#68
114     BEQ      cont
115     CMP      R9,#0xED
116     MOVEQ    R10,#69
117     BEQ      cont
118     CMP      R9,#0xEE
119     MOVEQ    R10,#70
120     BEQ      cont
121
122     CMP      R11,#0x70     ;This small block changes
                                ;one by one
123     rows    MOVEQ    R11,#0xB0
124     BEQ      checkrows
125     CMP      R11,#0xB0
126     MOVEQ    R11,#0xD0
127     BEQ      checkrows
128     CMP      R11,#0xD0
129     MOVEQ    R11,#0xE0
130     BEQ      checkrows
131     CMP      R11,#0xE0
132     BEQ      start
133
134     cont    debnc_out    LDR      R1,=GPIO_PORTB_DATA    ;This debounce part looks for the
135                                LDR      R8,[R1]            ;release of the key
136                                AND      R7,R8,#0xF        ;if it sees an input it loops until
137                                CMP      R7,#0xF          ;it does not see one.
138                                BNE      debnc_out         ;It also double checks with a delayed time
139                                BL        delay
140                                LDR      R1,=GPIO_PORTB_DATA
141                                LDR      R9,[R1]
142                                AND      R7,R9,#0xF
143                                CMP      R7,#0xF
144                                BNE      debnc_out
145                                MOV      R5,R10
146                                     ;if everything goes fine code prints the
147                                     ;key's character since it already holds
148                                     ;it as ASCII value
149     NOP
150     NOP
151     NOP
152     BL        OutChar

```

```
153
154          B          start                      ;code starts over
155
156          ENDP
157          ALIGN
158          END
159
```