2 ELMSWOOD DRIVE
GODLEY
CHESHIRE
SK14 3SE

28 January 1996

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Dear Jean

Enclosed is a copy of the software for the Microstim DB. I hope this format is adequate for your requirements.

Kind regards,

Colin

Colin Maxwell

```
C  OBJECT CODE     LINE SOURCE TEXT
VALUE

                   00001 ;//=============================================================
                   00002 ;//
                   00003 ;// msdb.asm    (PIC 16x84)
                   00004 ;//
                   00005 ;//=============================================================
                   00006
00000000           00007 INDIR    equ     H'00'
00000001           00008 RTCC     equ     H'01'
00000002           00009 PCL      equ     H'02'                ; Program counter low byte
00000003           00010 STATUS   equ     H'03'                ; Status register
00000000           00011 CY       equ     H'0'                 ; Carry / borrow bit
00000001           00012 DC       equ     H'1'                 ; Digit carry
00000002           00013 Z        equ     H'2'                 ; Zero flag
00000003           00014 PD       equ     H'3'                 ; Power down
00000004           00015 T0       equ     H'4'                 ; Time-out bit
00000005           00016 RP0      equ     H'5'                 ; Register page select bits
00000006           00017 RP1      equ     H'6'                 ; Not used in 16C84
00000007           00018 RP2      equ     H'7'                 ; Not used in 16C84
00000004           00019 FSR      equ     H'4'                 ; Indirect pointer
00000001           00020 OPTREG   equ     H'1'                 ; OPTION register
00000005           00021 PORTA    equ     H'5'                 ; PORT A
00000006           00022 PORTB    equ     H'6'                 ; PORT B
00000008           00023 EEDATA   equ     H'8'                 ; Eeprom data
00000009           00024 EEADR    equ     H'9'                 ; Eeprom address
0000000A           00025 PCLATH   equ     H'A'                 ; Program counter high byte
0000000B           00026 INTCON   equ     H'B'                 ; Interrupt control
00000085           00027 TRISA    equ     H'85'                ; Data direction port A
00000086           00028 TRISB    equ     H'86'                ; Data direction port B
00000088           00029 EECON1   equ     H'88'                ; Eeprom control
00000000           00030 W        equ     H'0'                 ; W reg. as destination
00000001           00031 F        equ     H'1'                 ; F file as destination
                   00032 ;
00000000           00033 LED      equ     H'0'                 ;  RA0...Led
00000002           00034 SNDR     equ     H'2'                 ;  RB2...sounder output
00000003           00035 OUTPUT   equ     H'3'                 ;  RB3...output pin
00000002           00036 FBACK    equ     H'2'                 ;  RA2...patient feedback
                   00037
                   00038
                   00039
                   00040
00                 00041          org     H'0000'
   1283            00042          bcf     3, 5
   0186            00043          clrf    PORTB
02 0185            00044          clrf    PORTA
03 1683            00045          bsf     STATUS , 5
04 3004            00046          movlw   4
05 0085            00047          movwf   PORTA
06 30F0            00048          movlw   H'F0'
07 0086            00049          movwf   PORTB
08 1283            00050          bcf     STATUS , 5
09 0806            00051 go       movf    PORTB,0
0A 39F0            00052          andlw   H'F0'                ;isolate switches
0B 009F            00053          movwf   H'1F'
0C 081F            00054          movf    H'1F',0
0D 3C40            00055          sublw   H'40'
0E 1903            00056          btfsc   STATUS,Z
0F 281D            00057          goto    tof
10 081F            00058          movf    H'1F',0
```

N/D

```
                00123 ;
                00124 ;
4  204B         00125 onehz   call    _1hz
4A 2849         00126         goto    onehz
                00127 ;
                00128 ;
4B 2069         00129 _1hz    call    pulse
4C 3005         00130         movlw   H'05'
4D 0096         00131         movwf   H'16'
4E 0197         00132 do3     clrf    H'17'
4F 30FE         00133 do2     movlw   H'FE'
50 0098         00134         Movwf   H'18'
51 0B98         00135 do1     decfsz  H'18',1
52 2851         00136         goto    do1
53 0B97         00137         decfsz  H'17',1
54 284F         00138         goto    do2
55 0B96         00139         decfsz  H'16',1
56 284E         00140         goto    do3
57 0008         00141         return
                00142 ;
                00143 ;
58 2069         00144 _2hz    call    pulse
   3005         00145         movlw   H'05'
   0096         00146         movwf   H'16'
5B 0197         00147 dt3     clrf    H'17'
5C 307C         00148 dt2     movlw   H'7C'
5D 0098         00149         Movwf   H'18'
5E 0B98         00150 dt1     decfsz  H'18',1
5F 285E         00151         goto    dt1
60 0B97         00152         decfsz  H'17',1
61 285C         00153         goto    dt2
62 0B96         00154         decfsz  H'16',1
63 285B         00155         goto    dt3
64 3005         00156         movlw   H'05'
65 0096         00157         movwf   H'16'
66 0008         00158         return
                00159 ;
                00160 ;
67 2069         00161 _50hz   call    pulse
68 0008         00162         return
                00163 ;
                00164 ;
69 1106         00165 pulse   bcf     PORTB,SNDR
6A 1586         00166         bsf     PORTB,OUTPUT
6B 1405         00167         bsf     PORTA, LED
6C 3021         00168         movlw   H'21'
6D 00A0         00169         movwf   H'20'
6E 0BA0         00170 l1      decfsz  H'20', 1
6F 286E         00171         goto    l1
70 1D05         00172         btfss   PORTA,2                 ;read patient
71 288D         00173         goto    pns
72 3020         00174 pws     movlw   H'20'
73 00A0         00175         movwf   H'20'                   ;20 for 200 microseconds
74 0BA0         00176 l2      decfsz  H'20', 1
75 2874         00177         goto    l2
76 1186         00178         bcf     PORTB,OUTPUT
77 304D         00179         movlw   H'4D'                   ;number of beeps
78 00A3         00180         movwf   H'23'
79 3004         00181 lp1     movlw   H'04'
7A 0686         00182         xorwf   PORTB,  1
7B 3028         00183         movlw   H'28'                   ;frequency
7C 00A2         00184         movwf   H'22'
7D 0BA2         00185 lp2     decfsz  H'22',1
7E 287D         00186         goto    lp2
```

```
7F 0BA3           00187         decfsz  H'23',1
   2879           00188         goto    lp1
                  00189 ;
81 1005           00190         bcf     PORTA,LED               ;led off
                  00191 ;
82 302D           00192         movlw   H'2D'                   ;number of beeps
83 00A3           00193         movwf   H'23'
84 3004           00194 lp3     movlw   H'04'
rning[202]: Argument out of range.  Least significant bits used.
85 0606           00195         xorwf   PORTB,  SNDR
86 3048           00196         movlw   H'48'                   ;frequency
87 00A2           00197         movwf   H'22'
88 0BA2           00198 lp4     decfsz  H'22',1
89 2888           00199         goto    lp4
8A 0BA3           00200         decfsz  H'23',1
8B 2884           00201         goto    lp3
8C 0008           00202         return
                  00203 ;
                  00204 ;
8D 3020           00205 pns     movlw   H'20'
8E 00A0           00206         movwf   H'20'                   ;20 for 200 microseconds
8F 0BA0           00207 lx2     decfsz  H'20', 1
   288F           00208         goto    lx2
   1186           00209         bcf     PORTB,OUTPUT
92 304D           00210         movlw   H'4D'                   ;number of beeps
93 00A3           00211         movwf   H'23'
94 3004           00212 lpx1    movlw   H'04'
rning[202]: Argument out of range.  Least significant bits used.
95 0606           00213         xorwf   PORTB,  SNDR;
96 3028           00214         movlw   H'28'                   ;frequency
97 00A2           00215         movwf   H'22'
98 0BA2           00216 lpx2    decfsz  H'22',1
99 2898           00217         goto    lpx2
9A 0BA3           00218         decfsz  H'23',1
9B 2894           00219         goto    lpx1
                  00220 ;
9C 1005           00221         bcf     PORTA,LED               ;led off
                  00222 ;
9D 302D           00223         movlw   H'2D'                   ;number of beeps
9E 00A3           00224         movwf   H'23'
9F 3004           00225 lpx3    movlw   H'04'
A0 1086           00226         bcf     PORTB,  1
A1 3048           00227         movlw   H'48'                   ;frequency
   2 00A2         00228         movwf   H'22'
   3 0BA2         00229 lpx4    decfsz  H'22',1
A4 28A3           00230         goto    lpx4
A5 0BA3           00231         decfsz  H'23',1
A6 289F           00232         goto    lpx3;
A7 0008           00233         return
                  00234         end
```

```
MBOL TABLE
LABEL                           VALUE

                                00000000
                                00000001
ADR                             00000009
CON1                            00000088
DATA                            00000008
                                00000001
ACK                             00000002
R                               00000004
```

```
DIR                             00000000
T[illegible]I                   0000000B
D[illegible]                    00000000
TREG                            00000001
TPUT                            00000003
L                               00000002
LATH                            0000000A
                                00000003

RTA                             00000005
RTB                             00000006
0                               00000005
1                               00000006
2                               00000007
CC                              00000001
DR                              00000002
ATUS                            00000003
                                00000004

ISA                             00000085
ISB                             00000086
                                00000000
                                00000002

hz                              0000004B
                                00000058
0hz                             00000067
16C84                           00000001
s                               00000022
sdone                           00000033
sl1                             0000002B
sl2                             00000029
sl3                             00000027
1                               00000051
2                               0000004F
3                               0000004E
1                               0000005E
2                               0000005C
3                               0000005B
                                00000009
                                0000006E
                                00000074

1                               00000079
2                               0000007D
3                               00000084
4                               00000088
                                00000094
x2                              00000098
x3                              0000009F
x4                              000000A3
2                               0000008F
ehz                             00000049
s                               0000008D
c                               00000034
c1                              00000036
c2                              00000047
cl1                             00000040
cl2                             0000003E
cl3                             0000003C
lse                             00000069
s                               00000072
f                               0000001D
fdone                           00000021


MORY USAGE MAP ('X' = Used,   '-' = Unused)
```

```
00 : XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX
40 : XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX
   : XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXX-------- ----------------

1 other memory blocks unused.

ogram Memory Words Used:   168
ogram Memory Words Free:   856


rors   :     0
rnings :     2 reported,     0 suppressed
ssages :     0 reported,     0 suppressed
```

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