Appendix B - Firmware For PIC 12C508A

```
                     00001         LIST    P=12C508A
0FFF   001A          00002         __CONFIG 0X1A   ; MCLR/ enabled - CP off - WDT disabled - internal RC osc
                     00003
                     00004
                     00005 ;==========================================================================
                     00006 ; These are the sixteen bit serial number to send
                     00007
                     00008         #DEFINE SN_MS   0X10    ; Version number one of board
                     00009         #DEFINE SN_LS   0X03    ; Three units built
                     00010 ;
                     00011 ;==========================================================================
                     00012
                     00013         #DEFINE OUTBIT  0       ; The bit in GPIO which we send it on
                     00014         #DEFINE OPTS    0XBF    ; Option to enable weak pull-ups
                     00015
                     00016         #DEFINE PW      6       ; Width of narrow pulse is 3*PW+7 cycles =25uS
                     00017
                     00018         #DEFINE GPIO    0X06
                     00019         #DEFINE TEMP    0X10
                     00020         #DEFINE BCNT    0X11    ; Register for counting the pulses
                     00021         #DEFINE PCNT    0X12    ; Register for counting the pulse width
                     00022         #DEFINE REG_MS  0X13    ; Registers to hold the serial number
                     00023         #DEFINE REG_LS  0X14    ;
                     00024         #DEFINE REG_WI  0X15    ; Working registers which store the pulse widths
                     00025         #DEFINE REG_NA  0X16    ;
                     00026
                     00027         #DEFINE CARRY   0X03,0  ; Carry is bit zero of status register
                     00028         #DEFINE OSCAL   0X05    ; Oscillator calibration register
                     00029
                     00030 ;==========================================================================
                     00031
0000                 00032         ORG     0
                     00033
0000   0025          00034         MOVWF   OSCAL           ; Calibrate the oscillator
0001   0CBF          00035         MOVLW   OPTS            ; Configure the options
0002   0002          00036         OPTION
                     00037
0003   0506          00038         BSF     GPIO,OUTBIT     ; Configure the TriState Register so one bit is an output
0004   0070          00039         CLRF    TEMP            ; and the bit is set
0005   0510          00040         BSF     TEMP,OUTBIT
0006   0250          00041         COMF    TEMP,W
0007   0006          00042         TRIS    6
                     00043
0008   0C03          00044         MOVLW   SN_LS           ; Load serial number to registers
0009   0034          00045         MOVWF   REG_LS
000A   0C10          00046         MOVLW   SN_MS
000B   0033          00047         MOVWF   REG_MS
                     00048
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000C   0C10           00049         MOVLW   10              ; Load bit counter
000D   0031           00050         MOVWF   BCNT
                      00051
000E   0C06           00052         MOVLW   PW              ; Pulse width in W
000F   0036           00053         MOVWF   REG_NA          ; Pulse width in REG_NA
0010   0035           00054         MOVWF   REG_WI
0011   0403           00055         BCF     CARRY
0012   0375           00056         RLF     REG_WI,F
0013   0375           00057         RLF     REG_WI,F        ; Four times pulse width in REG_WI
                      00058
0014                  00059 LOOP:
0014   0406           00060         BCF     GPIO,OUTBIT     ; Start the pulse
                      00061
0015   0374           00062         RLF     REG_LS,F        ; Shift code word left by one
0016   0373           00063         RLF     REG_MS,F        ; putting top bit in Carry
0017   0000           00064         NOP
                      00065
0018   0216           00066         MOVF    REG_NA,W
0019   0703           00067         BTFSS   CARRY           ; Test top bit of code word
001A   0215           00068         MOVF    REG_WI,W        ; If clear wide pulse time to PCNT
001B   0032           00069         MOVWF   PCNT            ; If set narrow pulse time to PCNT
                      00070
001C   02F2           00071 LAB1:   DECFSZ  PCNT,F          ; Delay loop of 3*6=18uS or 3*24=72uS
001D   0A1C           00072         GOTO    LAB1            ; adds to previous 7uS
                      00073
001E   0506           00074 BP:     BSF     GPIO,OUTBIT     ; Stop pulse - start gap
                      00075
001F   0216           00076         MOVF    REG_NA,W
0020   0603           00077         BTFSC   CARRY           ; Test top bit of code word again
0021   0215           00078         MOVF    REG_WI,W        ; If set wide pulse time to PCNT
0022   0032           00079         MOVWF   PCNT            ; If clear narrow pulse time to PCNT
                      00080
0023   02F2           00081 LAB0:   DECFSZ  PCNT,F          ; Delay loop of 3*6=18uS or 3*24=72uS
0024   0A23           00082         GOTO    LAB0            ; adds to previous 4uS and following 3uS
                      00083
0025   02F1           00084         DECFSZ  BCNT,F          ; Count 16 pulses in BCNT
0026   0A14           00085         GOTO    LOOP
                      00086
0027   0A27           00087 DONE:   GOTO    DONE            ; Our small but vital task is done and we
                      00088                                 ; may rest content awaiting the next call
                      00089
                      00090         END


MEMORY USAGE MAP ('X' = Used,  '-' = Unused)

0000 : XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXX XXXXXXXX-------- ----------------
0FC0 : ---------------- ---------------- ---------------- ---------------X

All other memory blocks unused.

Program Memory Words Used:    40
Program Memory Words Free:   472
```