AS61860 Assembler for SHARP Pocket Computers

Download Software: [ASxxxx Cross Assemblers Version 5.20](#) for SC61860 and others procesor:
- **[Cygwin executables as a zipped file (1384K)](#) or**
- **[DJGPP exectuables as a zipped file (2715K)](#)**
- **[reg_61860.asm = CPU registers SC61860](#) - written in AS61860 assembler**

SC-61860

|	0x	1x	2x	3x	4x	5x	6x	7x	8x-Bx	Cx	Dx	Ex-Fx
x0	LII n	LIDP nm	LDP	STP	INCI	INCP	ANIM n	ADIM n		INCJ	SC	
x1	LIJ n	LIDL n	LDQ	STQ	DECI	DECP	ORIM n	SBIM n		DECJ	RC	
x2	LIA n	LIP n	LDR	STR	INCA	STD	TSIM n	RZ n		INCB	SR	
x3	LIB n	LIQ n	CLRA	NOPT	DECA	MVDM	CPIM n	RZ n		DECB	NOPW	
x4	IX	ADB	IXL	PUSH	ADM	MVMP	ANIA n	ADIA n		ADCM	ANID n	
x5	DX	SBB	DXL	MVWP	SBM	MVMD	ORIA n	SBIA n		SBCM	ORID n	
x6	IY		IYS		ANMA	LDPC	TSIA n	RZ n		TSMA	TSID n	
x7	DY		DYS	RTN	ORMA	LDD	CPIA n	RZ n		CPMA	SZ n	
x8	MVW	MVWD	JRNZP n	JRZP n	INCK	SWP	NOPT	CALL nm	LP1	INCL	LEAVE	CAL 1n
x9	EXW	EXWD	JRNZM n	JRZM n	DECK	LDM	CASE	JP nm		DECL	NOPW	
xA	MVB	MVBD	JRNCP n	JRCP n	INCM	SL	NOPT	SET knm		INCN	EXAB	
xB	EXB	EXBD	JRNCM n	JRCM n	DECM	POP	TEST n			DECN	EXAM	
xC	ADN	SRW	JRP n		INA			JPNZ nm		INB		
xD	SBN	SLW	JRM n		NOPW	OUTA		JPNC nm		NOPW	OUTB	
xE	ADW	FILM			WAIT n			JPZ nm		NOPT		
xF	SBW	FILD	LOOP n		IPXL	OUTF	IPXH	JPC nm			OUTC	

Download:
- **[SC61860_SHARP_1.xls](#) - SC-61860 instruction set**
- **[AS61860_ASM.txt](#) - Manual for AS61860 assembler**

CPU SC81860A02 block diagram (PC-1250 service manual)
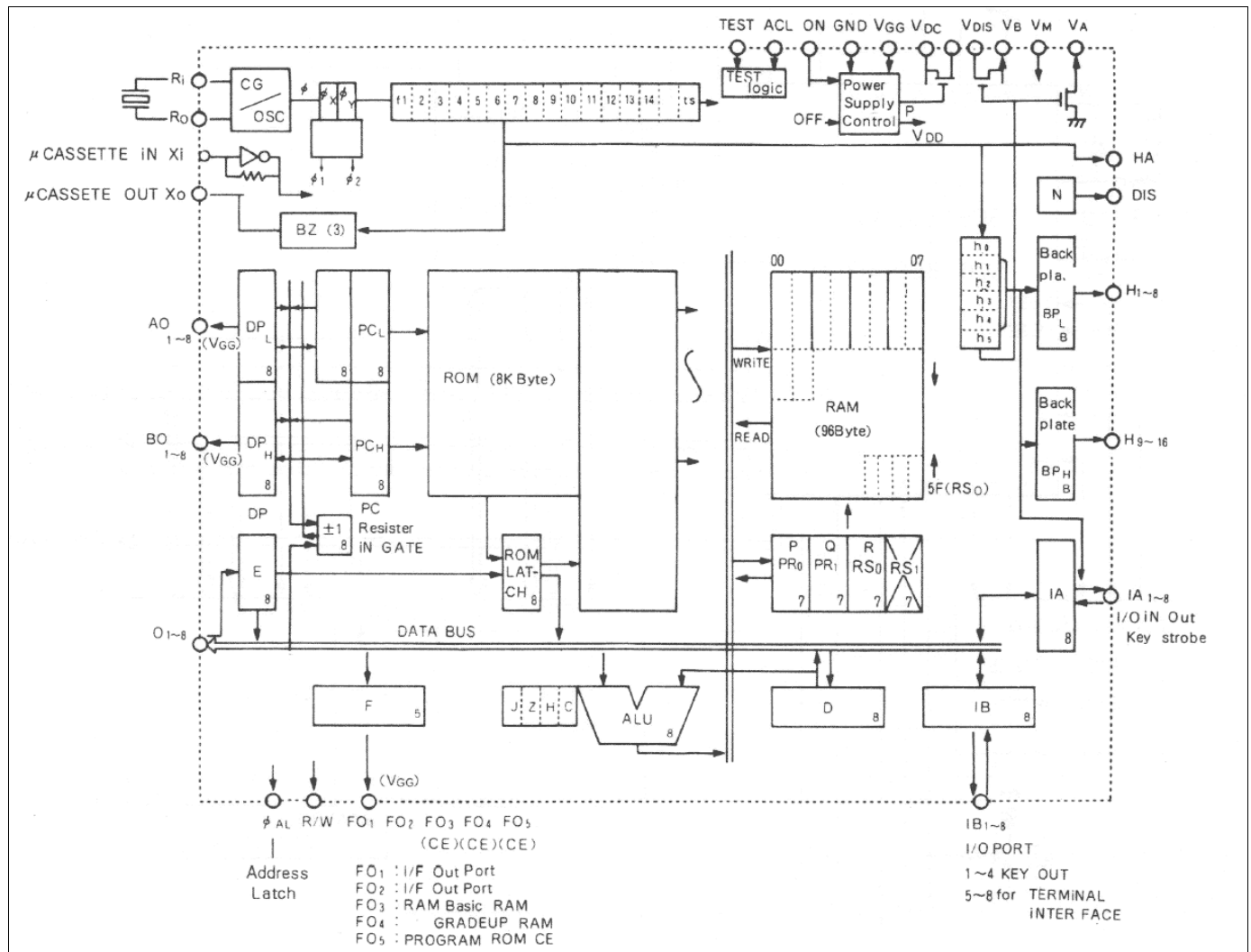
SHARP PC-1350 block diagram, Memory map (PC-1350 service manual)
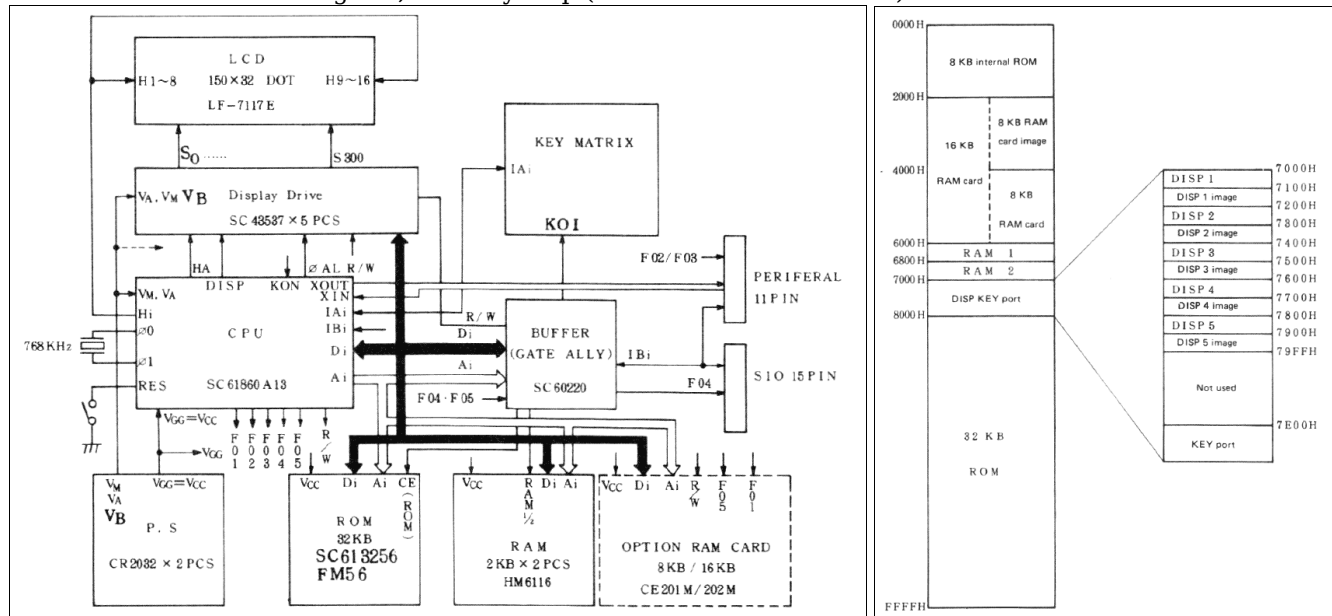
Sound

```
; sound.asm = Sound for SHARP PC-1350

  6038                    9        .ORG    0x6038
  6038 02 00      [ 4]   10        LIA     0x00            ; <== Length
  603A 34         [ 3]   11        PUSH                    ; A --> (R)
  603B 12 5F      [ 4]   12        LIP     REG_Cout
  603D 59         [ 2]   13        LDM                     ; (P) --> A
  603E 65 10      [ 4]   14        ORIA    0x10            ; A = A | 0x10
```

```
6040                      15 loop:
6040 DB          [ 3]  16        EXAM                    ; A <--> (P)
6041 DF          [ 2]  17        OUTC
6042 4E 00       [ 6]  18        WAIT    0x00            ; <== Frequency
6044 2F 05       [10]  19        LOOP    loop
6046 37          [ 4]  20        RTN
```
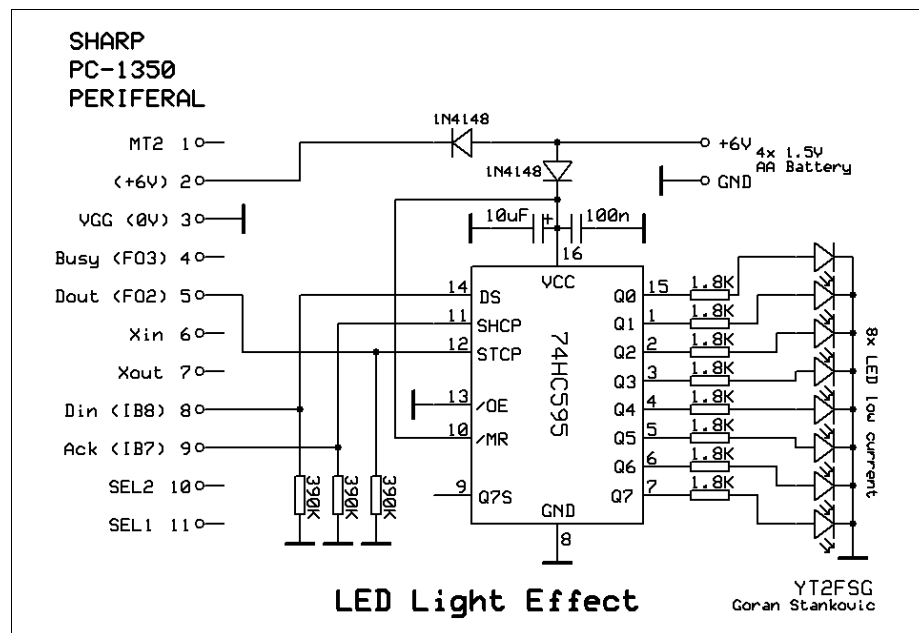
Download Software:
- **sound.asm = Sound for SHARP PC-1350** - written in AS61860 assembler
- **_AS_sound.BAT** - script, to run the AS61860 assembler in the Windows environment
- **sound.txt = Sound for SHARP PC-1350** - written in BASIC

LED Light Effect


```
; led.asm = LED Light Effect for PC-1350
; IB8 = data  74HC595
; IB7 = clock 74HC595
; FO2 = lach  74HC595

6700                      13        .ORG    0x6700
6700 02 00       [ 4]  14        LIA     0x00    ;A=0
6702 88          [ 2]  15        LP      REG_K
6703 60 00       [ 4]  16        ANIM    0x00
6705 61 08       [ 4]  17        ORIM    0x08    ;K=8
6707                      18 Loop:
6707 12 5D       [ 4]  19        LIP     REG_IB
6709 60 3F       [ 4]  20        ANIM    0x3F    ;IB=00111111
670B DD          [ 2]  21        OUTB
670C D2          [ 2]  22        SR              ;A>>1,C
670D 2A 03       [ 7]  23        JRNCP   Jump
670F 61 80       [ 4]  24        ORIM    0x80    ;IB=10111111
6711                      25 Jump:
6711 DD          [ 2]  26        OUTB
6712 61 40       [ 4]  27        ORIM    0x40    ;IB=X1111111
6714 DD          [ 2]  28        OUTB
6715 49          [ 4]  29        DECK
6716 29 10       [ 7]  30        JRNZM   Loop
6718 12 5E       [ 4]  31        LIP     REG_FO
671A 61 02       [ 4]  32        ORIM    0x02    ;FO=00000010
671C 5F          [ 3]  33        OUTF
671D 60 FD       [ 4]  34        ANIM    0xFD    ;FO=11111101
671F 5F          [ 3]  35        OUTF
6720 37          [ 4]  36        RTN
```
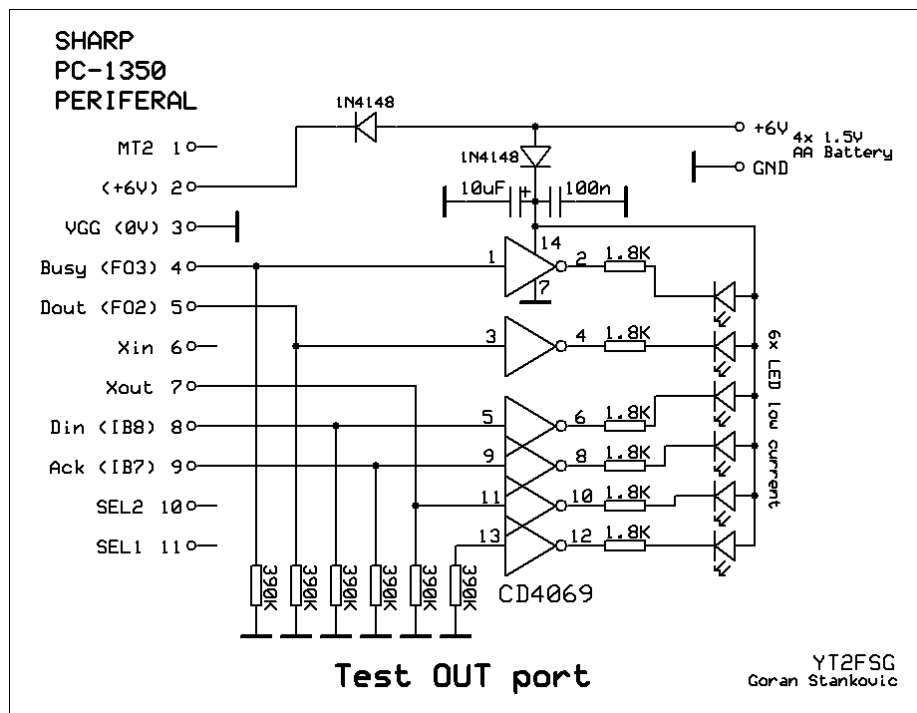
Download Software:
- **led.asm = LED Light Effect for SHARP PC-1350** - written in AS61860 assembler
- **_AS_sound.BAT** - script, to run the AS61860 assembler in the Windows environment
- **led.txt = LED Light Effect for SHARP PC-1350** - written in BASIC


Test OUT port

```
; out.asm = Test OUT port for SHARP PC-1350
; AS61860 assembler, port IB,FO,Cout

  6038                          9          .ORG    0x6038
  6038 12 5D        [ 4]   10          LIP     REG_IB
  603A 10 60 36     [ 8]   11          LIDP    0x6036  ;DP = 0x6036
  603D 55           [ 3]   12          MVMD            ;(DP) --> (P)
  603E DD           [ 2]   13          OUTB
  603F 37           [ 4]   14          RTN
                         15
  6040 12 5E        [ 4]   16          LIP     REG_FO
  6042 10 60 36     [ 8]   17          LIDP    0x6036  ;DP = 0x6036
  6045 55           [ 3]   18          MVMD            ;(DP) --> (P)
  6046 5F           [ 3]   19          OUTF
  6047 37           [ 4]   20          RTN
                         21
  6048 12 5F        [ 4]   22          LIP     REG_Cout
  604A 10 60 36     [ 8]   23          LIDP    0x6036  ;DP = 0x6036
  604D 55           [ 3]   24          MVMD            ;(DP) --> (P)
  604E DF           [ 2]   25          OUTC
  604F 37           [ 4]   26          RTN
```

Download Software:
- **out.asm = Test OUT port for SHARP PC-1350** - written in AS61860 assembler
- **_AS_out.BAT** - script, to run the AS61860 assembler in the Windows environment
- **out.txt - Test OUT port for SHARP PC-1350** - written in BASIC

Motor Control
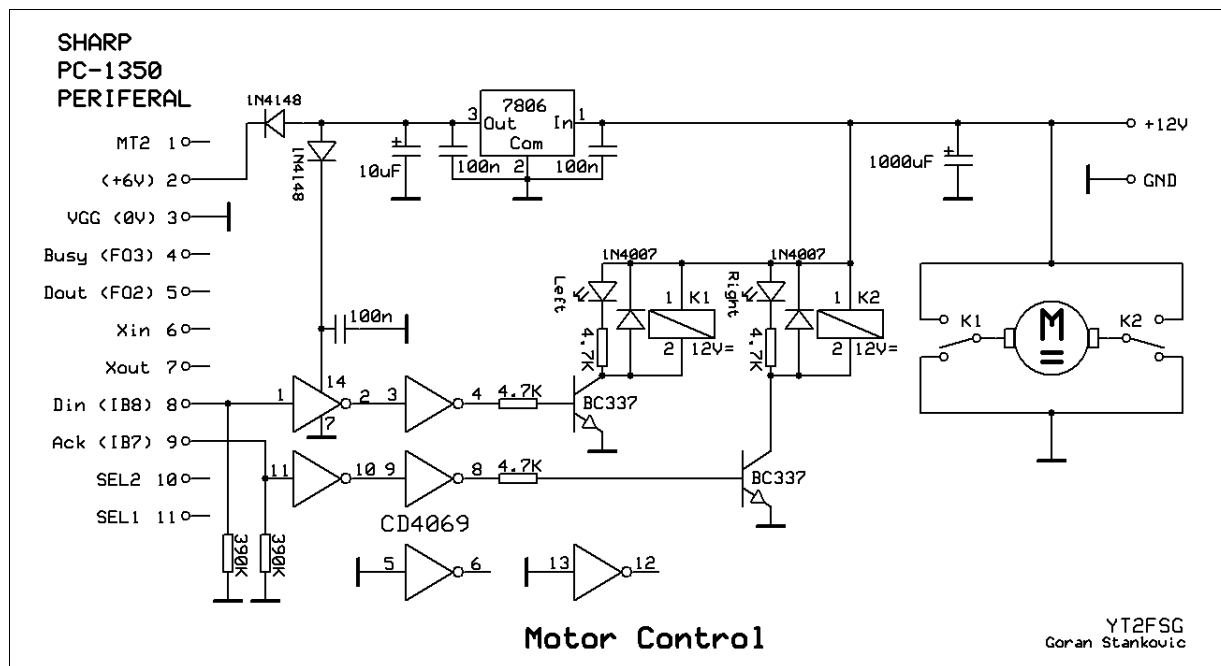
```
; motor.asm = Motor Control for SHARP PC-1350
; AS61860 assembler, port IB7,IB8

   6038                        9         .ORG    0x6038
                              10 ; Motor Left
   6038 12 5D        [ 4]     11         LIP     REG_IB
   603A 60 7F        [ 4]     12         ANIM    0x7F    ;IB = IB & 0x7F
   603C 61 80        [ 4]     13         ORIM    0x80    ;IB = IB | 0x80
   603E DD           [ 2]     14         OUTB
   603F 37           [ 4]     15         RTN
                              16
                              17 ; Motor Right
   6040 12 5D        [ 4]     18         LIP     REG_IB
   6042 60 BF        [ 4]     19         ANIM    0xBF    ;IB = IB & 0xBF
   6044 61 40        [ 4]     20         ORIM    0x40    ;IB = IB | 0x40
   6046 DD           [ 2]     21         OUTB
   6047 37           [ 4]     22         RTN
                              23
                              24 ; Motor Stop
   6048 12 5D        [ 4]     25         LIP     REG_IB
   604A 60 3F        [ 4]     26         ANIM    0x3F    ;IB = IB & 0x3F
   604C DD           [ 2]     27         OUTB
   604D 37           [ 4]     28         RTN
```
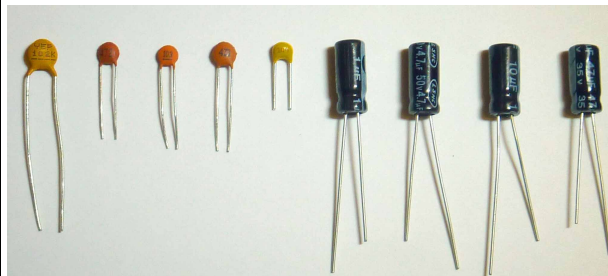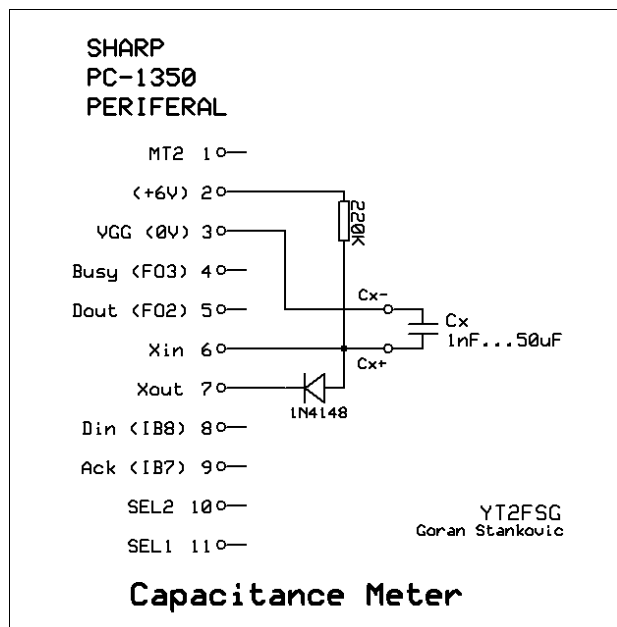
Download Software:
- **[motor.asm = Motor control for SHARP PC-1350](#) - written in AS61860 assembler**
- **[_AS_motor.BAT](#) - script, to run the AS61860 assembler in the Windows environment**
- **[motor.asm = Motor control for SHARP PC-1350](#) - written in BASIC**

Capacitance Meter

```
; cap.asm = Capacitance Meter for SHARP PC-1350
; AS61860 assembler, port Xout,Xin

  6038                       9          .ORG    0x6038
  6038 84           [ 2]   10          LP      REG_XL
  6039 60 00        [ 4]   11          ANIM    0x00
  603B 85           [ 2]   12          LP      REG_XH
  603C 60 00        [ 4]   13          ANIM    0x00
  603E 12 5F        [ 4]   14          LIP     REG_Cout
  6040 61 50        [ 4]   15          ORIM    0x50    ; Xout
  6042 DF           [ 2]   16          OUTC
  6043                     17 loop1:
  6043 04           [ 6]   18          IX              ; X + 1 --> X, X --> DP
  6044 6B 80        [ 4]   19          TEST    0x80    ; Xin --> z
  6046 39 04        [ 7]   20          JRZM    loop1
  6048 10 60 36     [ 8]   21          LIDP    0x6036  ; DP = 0x6036
  604B 1D           [ 5]   22          SLW             ; [SHIFT4LEFT(P); P-1 --> P] * I
  604C 84           [ 2]   23          LP      REG_XL
  604D 53           [ 3]   24          MVDM            ; (P) --> (DP)
  604E 10 60 37     [ 8]   25          LIDP    0x6037  ; DP = 0x6037
  6051 85           [ 2]   26          LP      REG_XH
  6052 53           [ 3]   27          MVDM            ; (P) --> (DP)
  6053 37           [ 4]   28          RTN
```
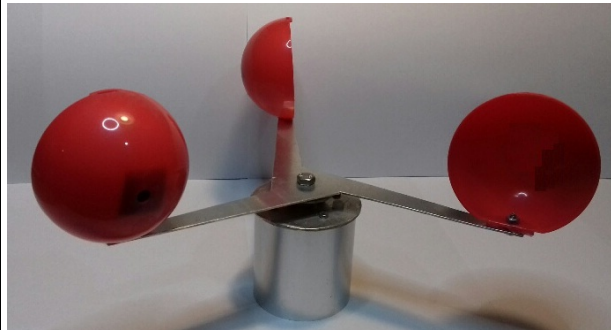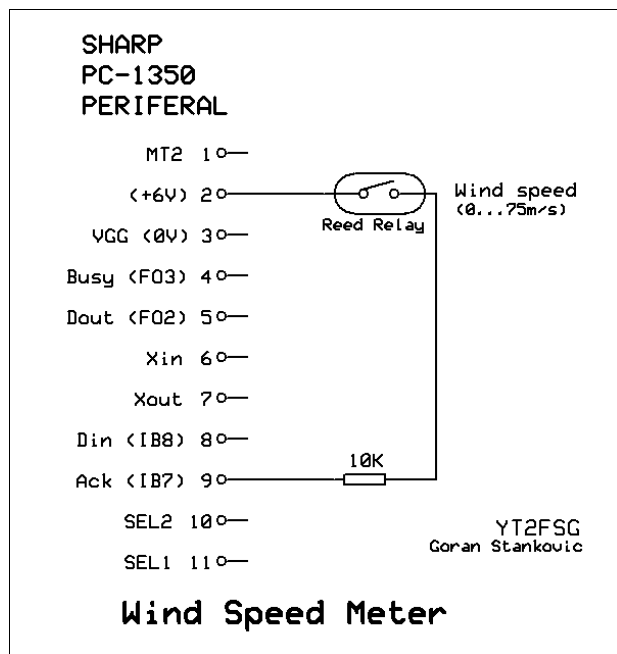
Download Software:
- **[cap.asm = Capacitance Meter for SHARP PC-1350](#) - written in AS61860 assembler**
- **[_AS_cap.BAT](#) - script, to run the AS61860 assembler in the Windows environment**
- **[cap.txt = Capacitance Meter for SHARP PC-1350](#) - written in BASIC**

Wind Speed Meter

```
; wsm.asm = Wind Speed Meter for SHARP PC-1350
; AS61860 assembler, port IB7

  6038                       9          .ORG   0x6038
  6038 84           [ 2]    10          LP     REG_XL
  6039 60 00        [ 4]    11          ANIM   0x00
  603B 85           [ 2]    12          LP     REG_XH
  603C 60 00        [ 4]    13          ANIM   0x00
  603E 86           [ 2]    14          LP     REG_YL
  603F 60 00        [ 4]    15          ANIM   0x00
  6041 87           [ 2]    16          LP     REG_YH
  6042 60 00        [ 4]    17          ANIM   0x00
  6044                      18 loop0:
  6044 04           [ 6]    19          IX                      ; X + 1 --> X, X --> DP
  6045                      20 loop1:
  6045 63 71        [ 4]    21          CPIM   0x71             ; (P) - 0x71 --> c,z
  6047 38 18        [ 7]    22          JRZP   jump1
  6049 06           [ 6]    23          IY                      ; Y + 1 --> Y, Y --> DP
  604A CC           [ 2]    24          INB                     ; Port B --> A
  604B 66 40        [ 4]    25          TSIA   0x40             ; A & 0x40 --> z
  604D 28 04        [ 7]    26          JRNZP  jump2
  604F 87           [ 2]    27          LP     REG_YH
  6050 2D 0C        [ 7]    28          JRM    loop1
  6052                      29 jump2:
  6052 04           [ 6]    30          IX                      ; X + 1 --> X, X --> DP
  6053                      31 loop2:
  6053 63 71        [ 4]    32          CPIM   0x71             ; (P) - 0x71 --> c,z
  6055 38 0A        [ 7]    33          JRZP   jump1
  6057 06           [ 6]    34          IY                      ; Y + 1 --> Y, Y --> DP
  6058 CC           [ 2]    35          INB                     ; Port B --> A
  6059 66 40        [ 4]    36          TSIA   0x40             ; A & 0x40 --> z
  605B 39 18        [ 7]    37          JRZM   loop0
  605D 87           [ 2]    38          LP     REG_YH
  605E 2D 0C        [ 7]    39          JRM    loop2
  6060                      40 jump1:
  6060 05           [ 6]    41          DX                      ; X - 1 --> X, X --> DP
  6061 84           [ 2]    42          LP     REG_XL
  6062 10 60 36     [ 8]    43          LIDP   0x6036
  6065 53           [ 3]    44          MVDM                    ; (P) --> (DP)
  6066 85           [ 2]    45          LP     REG_XH
  6067 10 60 37     [ 8]    46          LIDP   0x6037
  606A 53           [ 3]    47          MVDM                    ; (P) --> (DP)
  606B 37           [ 4]    48          RTN
```

Download Software:
- **wsm.asm = Wind Speed Meter for SHARP PC-1350** - written in AS61860 assembler
- **_AS_wsm.BAT** - script, to run the AS61860 assembler in the Windows environment
- **wsm.txt = Wind Speed Meter for SHARP PC-1350** - written in BASIC

Link: SHARP Pocket Computers

Link:
- **Sharp Pocket Computers - Manuals**
- **Pocket Emulator**

- **The pocket computer museum**
- **SHARP Museum**
- **The machine language of SC-61860**
- **ASxxxx Cross Assemblers**