

Total solder points: 271

Difficulty level: *beginner* 1 2 3 4 5 *advanced*

Advanced UP/DOWN counter



K8035

Handy for people counting, part
counting, score keeping, ...

Features:

- ☑ Count up or down.
- ☑ Count input trough on-board push buttons or by external pulses.
- ☑ Display modes : Normal or time (hh:mm and mm:ss).
- ☑ An internal oscillator allows time measurement.
- ☑ Programmable pre-set value with equal output.
- ☑ Self diagnostic at power up.
- ☑ Comes whit easy board to wire connector (20cm wire).
- ☑ Comes in handy for people counting, part counting, score keeping,

Specifications:

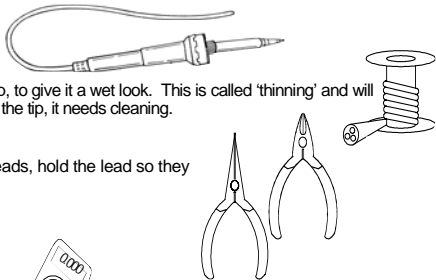
- Counter Input : 3...12 VDC (normal dry contact also possible)
- EQUAL Output : 5VDC / max 50mA
- Max. Counting speed : 200 / sec. (2 / sec. with long debounce delay)
- Max. Count : 4 Digits (9999 / 23h59m / 59m59s)
- Power supply : 9...12 VDC or transformer 2 x 9 VAC type : 209005
- Power consumption : 150mA max.
- Dimensions : 125 x 75 x 18mm (4,9"x3"x0,7")

1. Assembly (Skipping this can lead to troubles !)

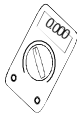
Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease.
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and Phillips screwdrivers. A basic range is fine.



For some projects, a basic multi-meter is required, or might be handy

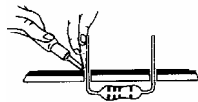


1.2 Assembly Hints :

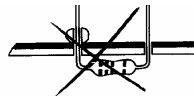
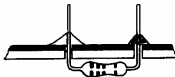
- ⇒ Make sure the skill level matches your experience, to avoid disappointments.
 - ⇒ Follow the instructions carefully. Read and understand the entire step before you perform each operation.
 - ⇒ Perform the assembly in the correct order as stated in this manual
 - ⇒ Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
 - ⇒ Values on the circuit diagram are subject to changes.
 - ⇒ Values in this assembly guide are correct*
 - ⇒ Use the check-boxes to mark your progress.
 - ⇒ Please read the included information on safety and customer service
- * Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

1.3 Soldering Hints :

1- Mount the component against the PCB surface and carefully solder the leads



2- Make sure the solder joints are cone-shaped and shiny

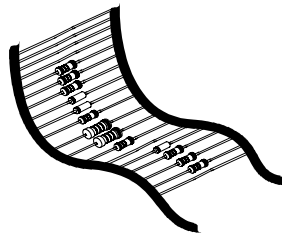


3- Trim excess leads as close as possible to the solder joint



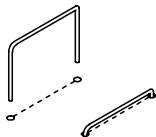
REMOVE THEM FROM THE TAPE ONE AT A TIME !

AXIAL COMPONENTS ARE TAPED IN THE CORRECT MOUNTING SEQUENCE !

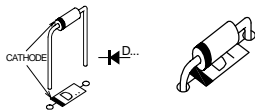


1. Jumpers

J : 10x

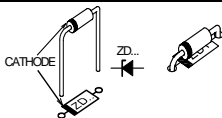


2. Diodes. Watch the polarity !



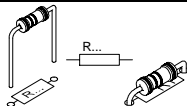
- D1: 1N4007
- D2: 1N4007
- D3: 1N4148
- D4: 1N4148
- D5: 1N4148
- D6: 1N4148
- D7: 1N4148

3. Zener diode. Watch the polarity !



- ZD1 : 4V7
- ZD2 : 4V7

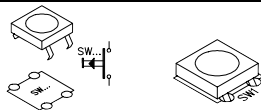
4. Resistors



- R9 : 10K (1-0-3-B)
- R10 : 10K (1-0-3-B)
- R11 : 10K (1-0-3-B)
- R12 : 10K (1-0-3-B)
- R13 : 10K (1-0-3-B)
- R14 : 2K2 (2-2-2-B)
- R15 : 2K2 (2-2-2-B)
- R16 : 2K2 (2-2-2-B)

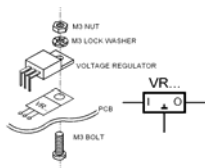
- R17 : 2K2 (2-2-2-B)
- R18 : 4K7 (4-7-2-B)
- R19 : 4K7 (4-7-2-B)
- R20 : 10K (1-0-3-B)
- R21 : 10K (1-0-3-B)
- R22 : 10K (1-0-3-B)
- R23 : 10K (1-0-3-B)
- R24 : 10K (1-0-3-B)
- R25 : 10K (1-0-3-B)
- R26 : 10K (1-0-3-B)
- R27 : 10K (1-0-3-B)
- R28 : 390 (3-9-1-B)

5. Pushbuttons.



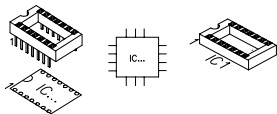
- SW1: KRS1243
- SW2: KRS1243
- SW3: KRS1243
- SW4: KRS1243

6. Voltage Regulator.



- VR1: UA7805

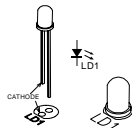
7. IC sockets. Watch the position of the notch!



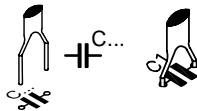
- IC1 : 28P
 DY1 : 14P
 DY2 : 14P
 DY3 : 14P
 DY4 : 14P

8. LED. Watch the polarity!

- LD1 : 3mm Red.



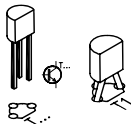
9. Ceramic Capacitors



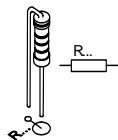
- C1 : 18pF (18,18J)
 C2 : 18pF (18,18J)
 C3 : 100nF (104)
 C4 : 100nF (104)
 C5 : 100nF (104)
 C6 : 1nF (102)
 C7 : 1nF (102)

10. Transistors.

- T1 : BC557C
 T2 : BC557C
 T3 : BC557C
 T4 : BC557C
 T5 : BC557C
 T6 : BC547
 T7 : BC547



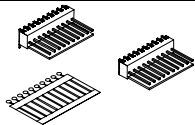
11. Resistors



- R1 : 150 (1-5-1-B)
 R2 : 150 (1-5-1-B)
 R3 : 150 (1-5-1-B)
 R4 : 150 (1-5-1-B)
 R5 : 150 (1-5-1-B)
 R6 : 150 (1-5-1-B)
 R7 : 150 (1-5-1-B)
 R8 : 150 (1-5-1-B)

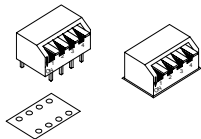
12. Connector

10p



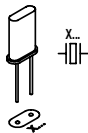
13. DIP Switch

DS - 4



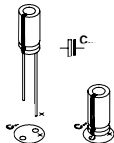
14. Quartz crystal

X1: 4,1943... MHz.

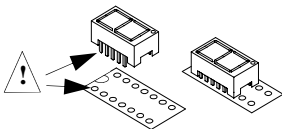


15. Electrolytic capacitor. Watch the polarity !

C8: 470 μ F
 C9: 10 μ F

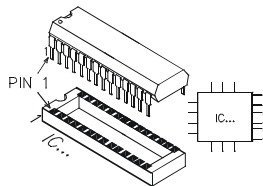


16. Display



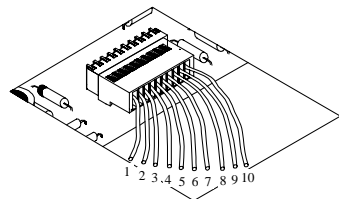
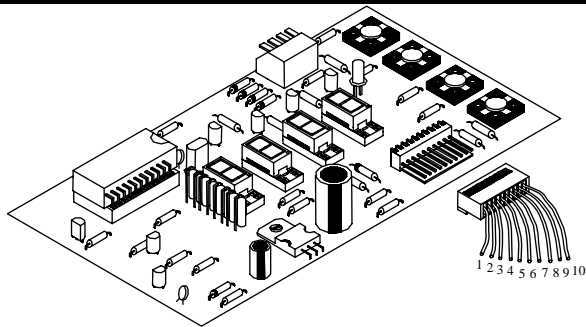
SA39-11EWA

17. IC, Check the position of the notch !



IC1: VK8035 (Programmed PIC16C57)

18. Connection



The grounds are internally connected.

* E.out : 5V / 50mA max. output at "equal" pre-set value

1	GND	6	GND
2	+ VA	7	+ 5V
3	+ VB	8	Count Down input (B)
4	GND	9	Count Up input (A)
5	E. OUT	10	GND

Inspect the complete assembly once more before applying power to the unit !

Hook-up when using an adaptor

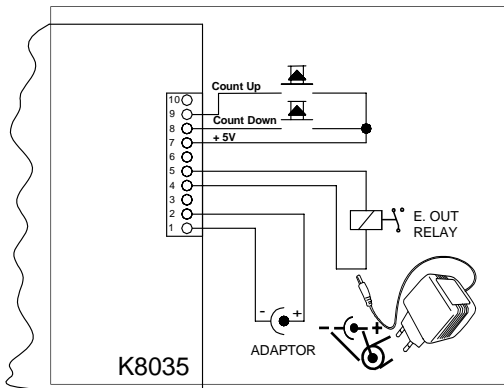


Fig. 1.0

Hook-up when using a transformer

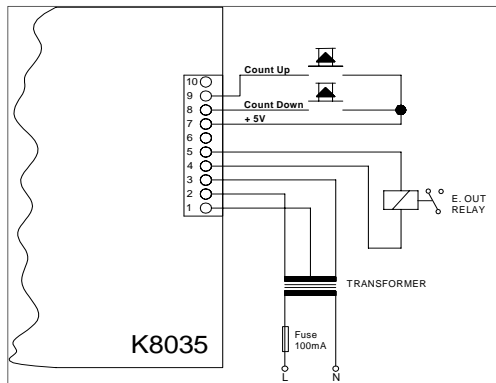


Fig. 2.0

19. Operation

When all connections are made, the four LED displays will light up and the Kit number will appear "8 0 3 5" after which following messages appear :

r x . x x	Version number
T E S T	Self-test is working
G O O D	Internal parts are working correctly

If an irregularity is found during the self-test, an error code will appear, when GOOD appears then the unit is ready for use.

Error code	Description
Err. 2	Error in the keyboard section.
Err. 3	The switches are in the wrong position. 'DIP SWITCH'
Err. 4	Input A and B are at the same time active
Err. 5	Input A is active during self-test or input A is possibly malfunctioning.
Err. 6	Input B is active during self-test or input B is possibly malfunctioning.

The errors 5 & 6 can appear when during the self-test counter pulses are received, this can be reset by pressing SW4 briefly.

Counting pulses can be applied to the unit in two different ways :

1. + 3V to 12V pulses with respect to ground.
2. Use the + 5V connection for push buttons or relay contacts when there is no power supply from an external source.

Press "Reset" button briefly to reset the readout. "0000".

Press the "UP" button to increase the actual value with one.

Press the "DOWN" button to decreases the actual value with one.

Setting the Pre-set value:

It is possible to set a number which will continuously be compared with the content of the counter. If both are equal, then the output (Equal OUT) is activated.

- Press Set/Run (set briefly appears).
- Press Up or Down to set the value.
- Press Set/Run to store the value (Run appears).

Counter settings :

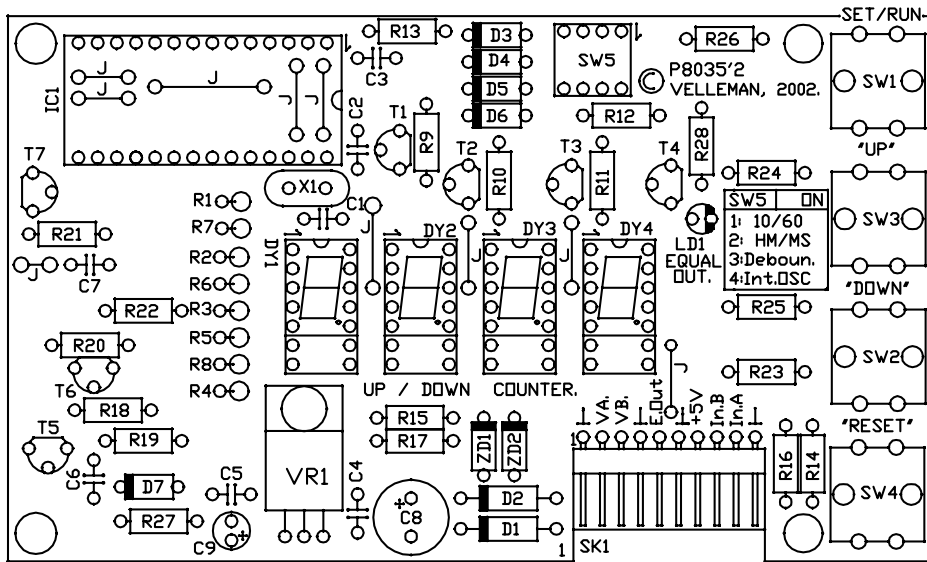
The counter can be used for decade or modulo 60 (clock) counting, an internal oscillator can be provided for use in modulo 60-mode

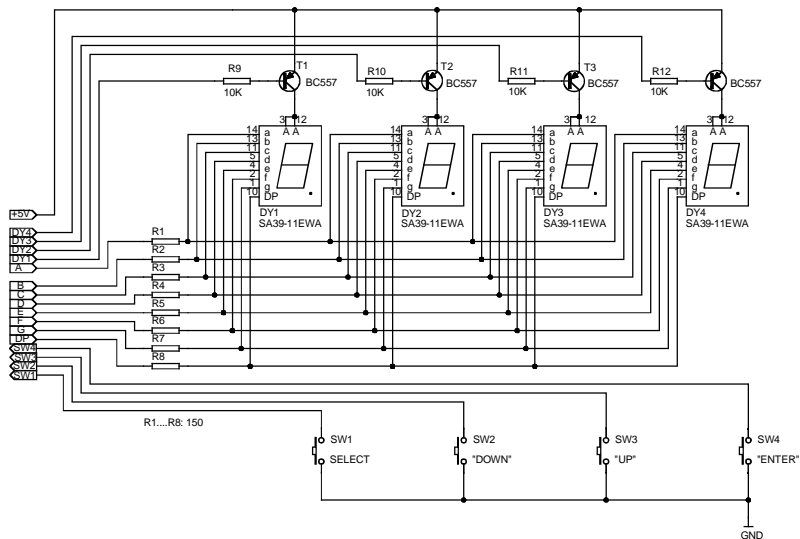
1. COUNTER SETTINGS		
FUNCTION	DIP SWITCH	
	OFF	ON
Decade counter	1	
Modulo 60 : hh:mm (23.59)	2	1
Modulo 60 : mm:ss. (59.59)		1 & 2
2. DEBOUNCE SETTING		
Normal debounce	3	
Long debounce		3
3. INPUT SETTING		
External pulses	4	
Internal oscillator		4

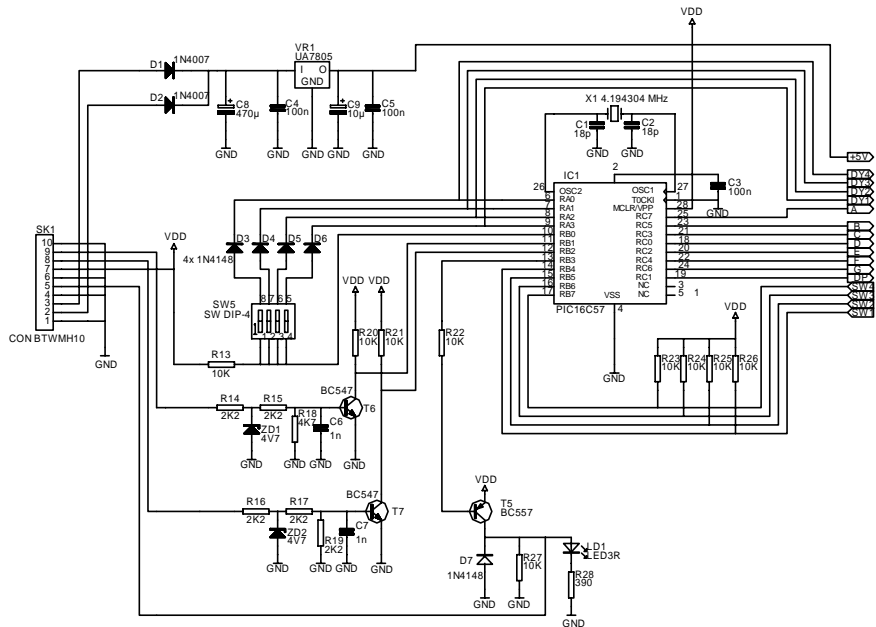


ATTENTION : When changing the position of one of the switches, the current counter value and the pre-set value will be erased. (0000)

20. PCB



21. Schematic diagram.





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