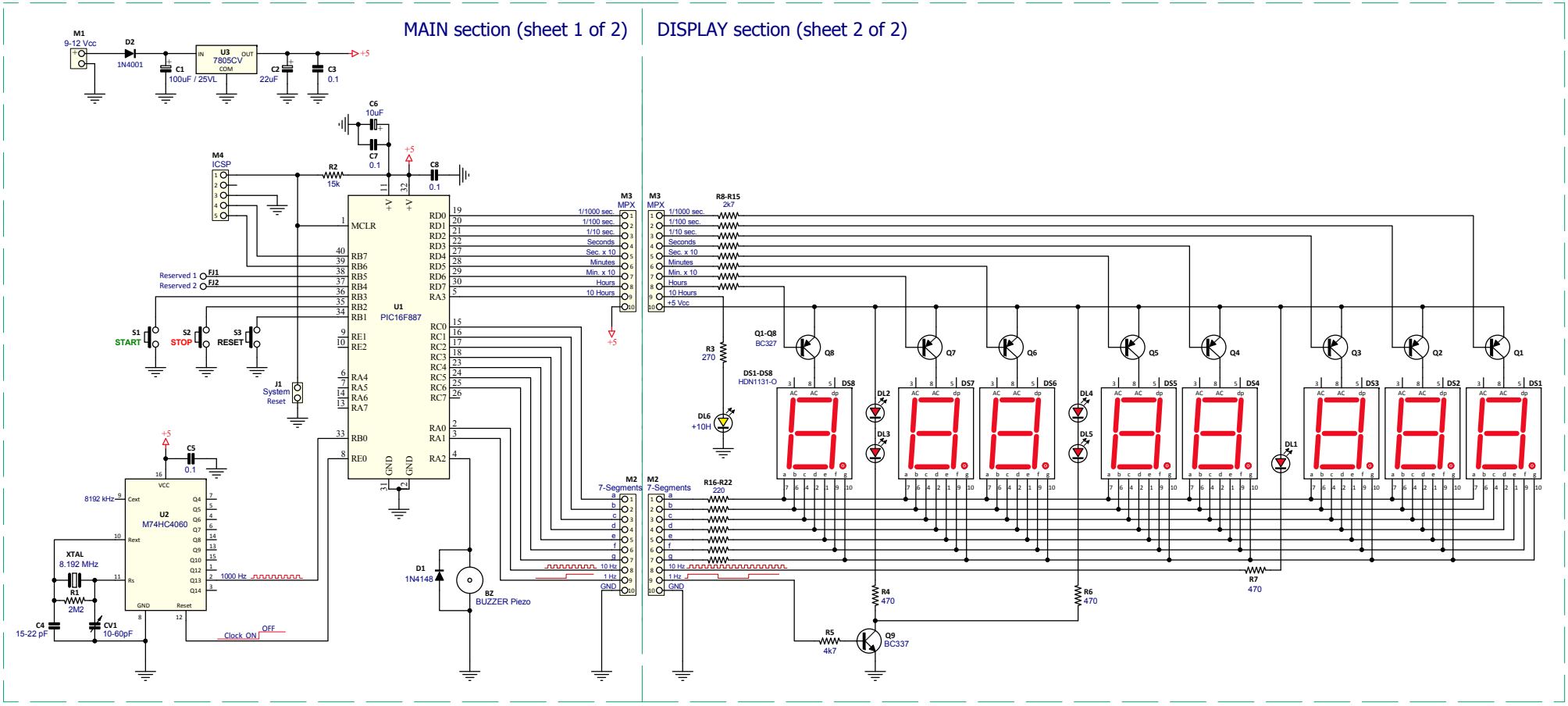
SERVICE MANUAL and INSTRUCTIONS
MANUALE TECNICO e ISTRUZIONI
(Firmware ver. 2.0)

1/1000 second STOPWATCH

CRONOMETRO DIGITALE
H:MM:SS.ddd
CON PIC 16F887
e DISPLAY
a 7 SEGMENTI

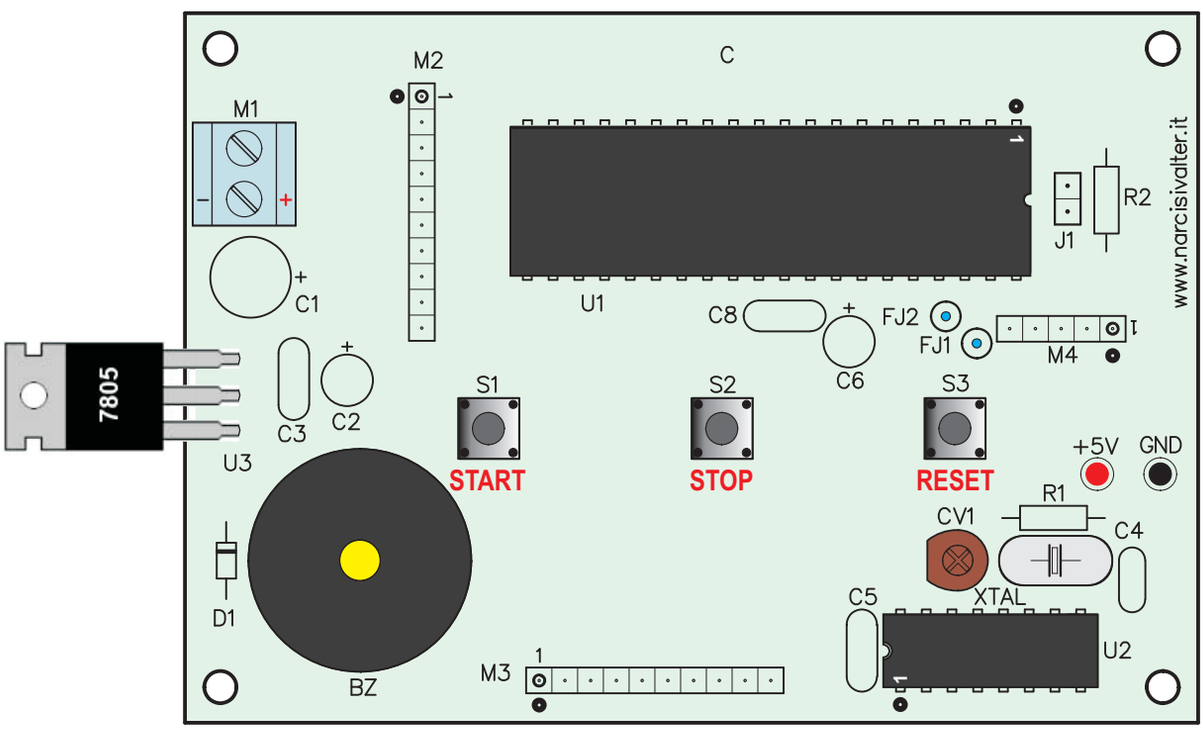
www.narcisivalter.it

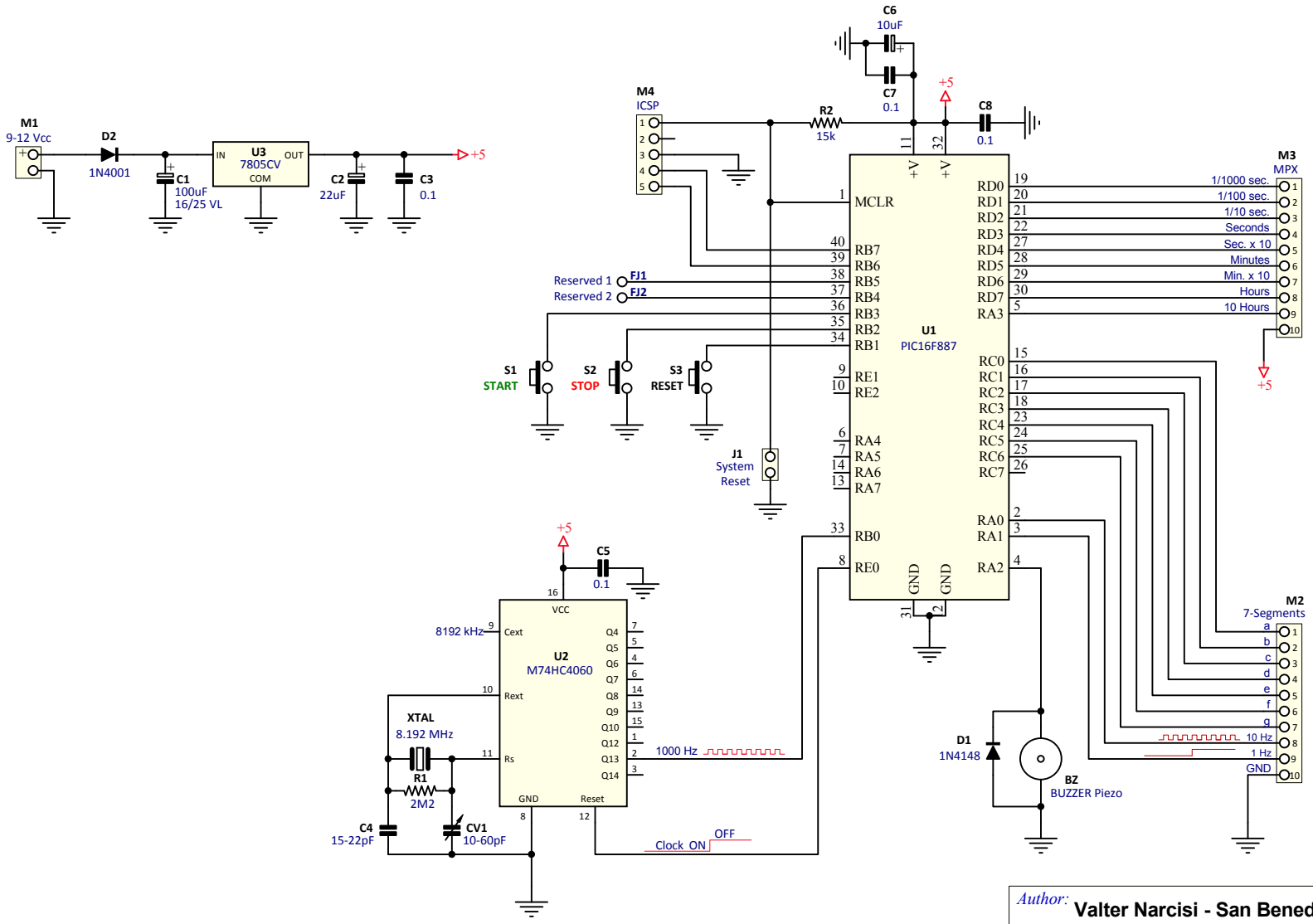


Author: Valter Narcisi - San Benedetto del Tronto (AP)					
Project: 1/1000 Stopwatch based on PIC microcontroller				*Year:*	2017
Size: -	*DWG no.* 1	*Rev.:* 1	*Scale:* 1:1	*Sheet:*	1 of 1
Note: www.narcisivalter.it/progetti/stopwatch-PIC-1000.html					

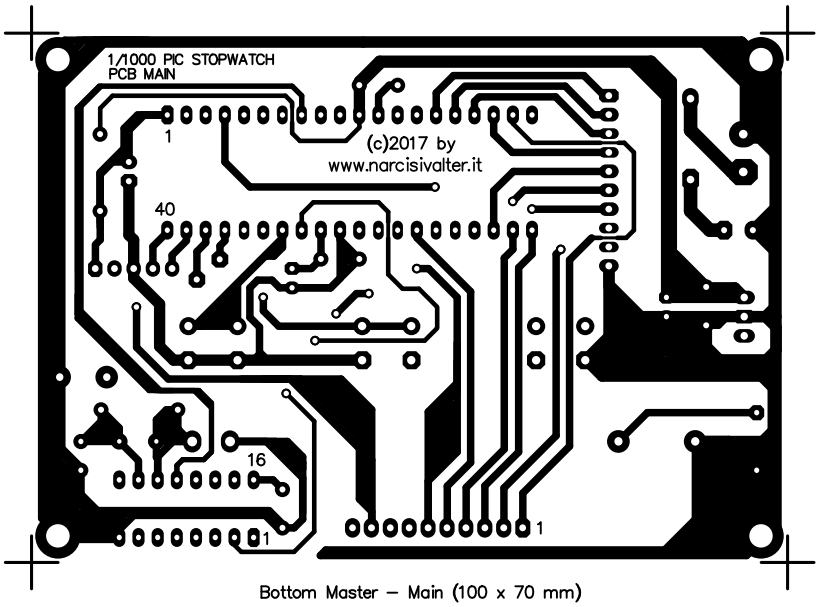
COMPONENTS LIST - ELENCO COMPONENTI		
Component	*Value*	*Description*
R1	2M2	1/4 watt Resistor
R2	15k	1/4 watt Resistor
R3	470	1/4 watt Resistor
R4	470	1/4 watt Resistor
R5	4k7	1/4 watt Resistor
R6 - R7	470	1/4 watt Resistor
R8 - R15	2k7	1/4 watt Resistor
R16 - R22	220	1/4 watt Resistor
C1	100uF / 16-25VL	Electrolytic capacitor
C2	22uF	Electrolytic capacitor
C3	0.1	Ceramic capacitor
C4	15-22pF	Ceramic capacitor (NPO)
C5	0.1	Ceramic capacitor
C6	10uF	Electrolytic capacitor
C7 - C8	0.1	Ceramic capacitor
CV1	10-60pF	Variable capacitor (Murata TZ03P600FR169)
D1	1N4148	Diode
D2	1N4001	Diode 1A
DL1 - DL5	Dots	3mm RED Led
DL6	10-Hour	3mm YELLOW Led
DS1 - DS8	HDN1131-O	Display AC - Siemens (Low Current)
Q1 - Q8	BC327	Transistor PNP (500mA)
Q9	BC337	Transistor NPN (500mA)
U1	PIC16F887	PIC 16F887 Microcontroller
U2	M74HC4060	14-stage / Counter / Divider chip
U3	7805CV	Pos. Reg. 7805 (1A)
XTAL	8.192 MHz	Crystal HC-49/S
BZ	BUZZER Piezo	PKM-22EPP (4kHz - max 25V)
S1	START	Tactile switch N.O.
S2	STOP	Tactile switch N.O.
S3	RESET	Tactile switch N.O.
M1	9-12 Vcc input	2-way screw terminal (5mm pitch)
M2	7-Segments	10-way male strip line (2.54 pitch)
M3	MPX	10-way male strip line (2.54 pitch)
M4	ICSP	5-way male strip line (2.54 pitch)
J1	System Reset	2-way male strip line (2.54 pitch)
FJ1	Reserved 1	Test-Point
FJ2	Reserved 2	Test-Point

MAIN section

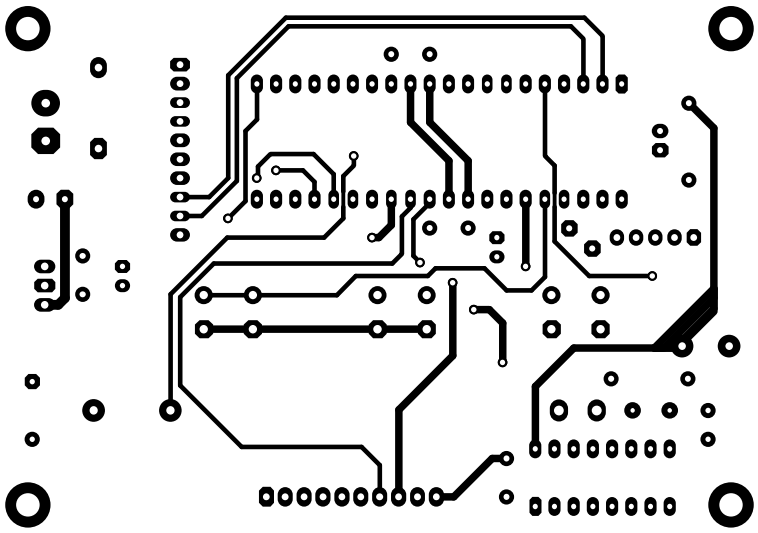




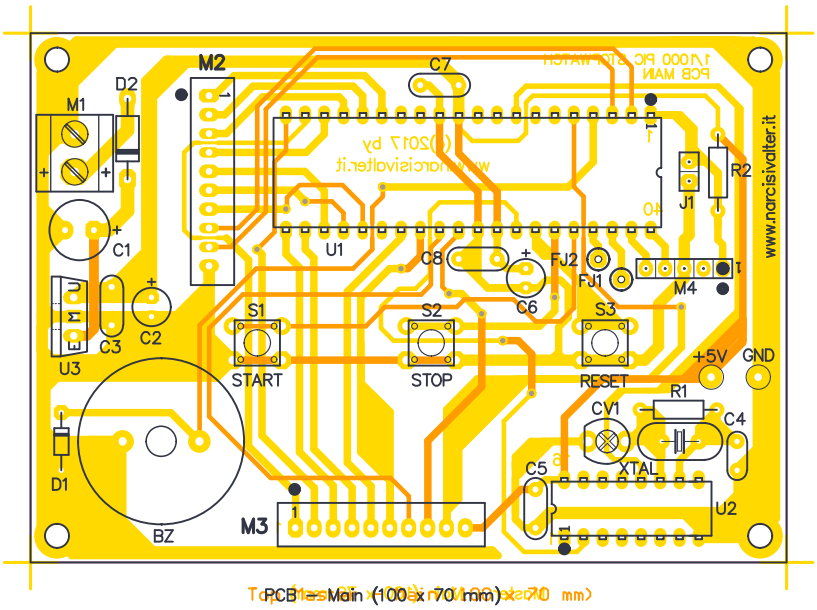
Author: **Valter Narcisi - San Benedetto del Tronto (AP)**					
Project: **1/1000 Stopwatch with PIC (Main section)**				*Year:* 2017	
Size: A4	*DWG no.* 1	*Rev.:* 1	*Scale:* 1:1	*Sheet:* 1 of 2	
Note: **www.narcisivalter.it/progetti/stopwatch-PIC-1000.html**					



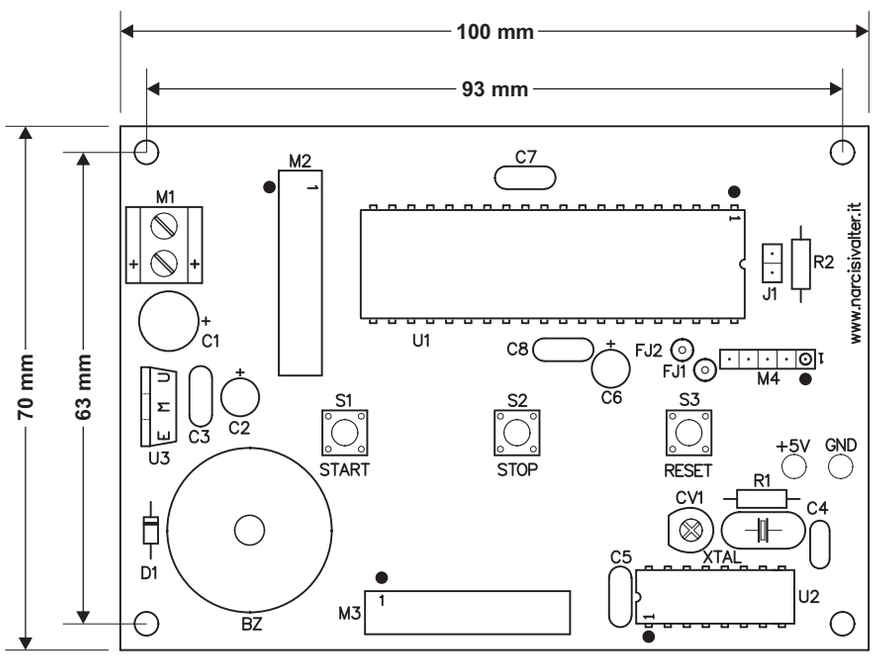
Bottom Master – Main (100 x 70 mm)



Top Master - Main (100 x 70 mm)

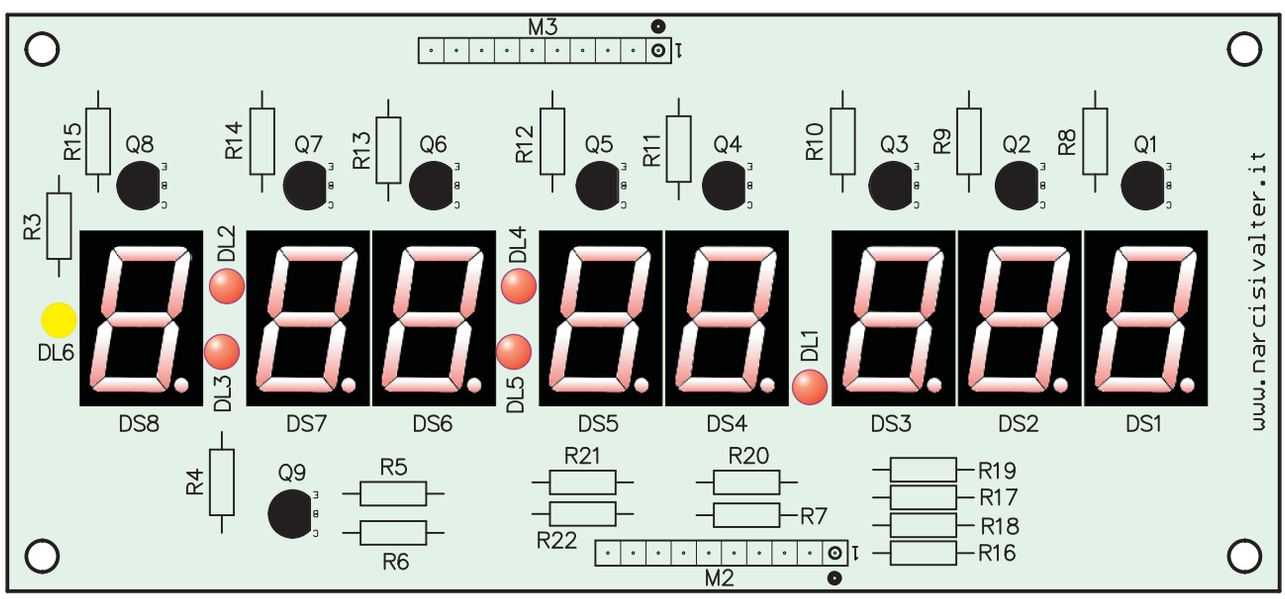


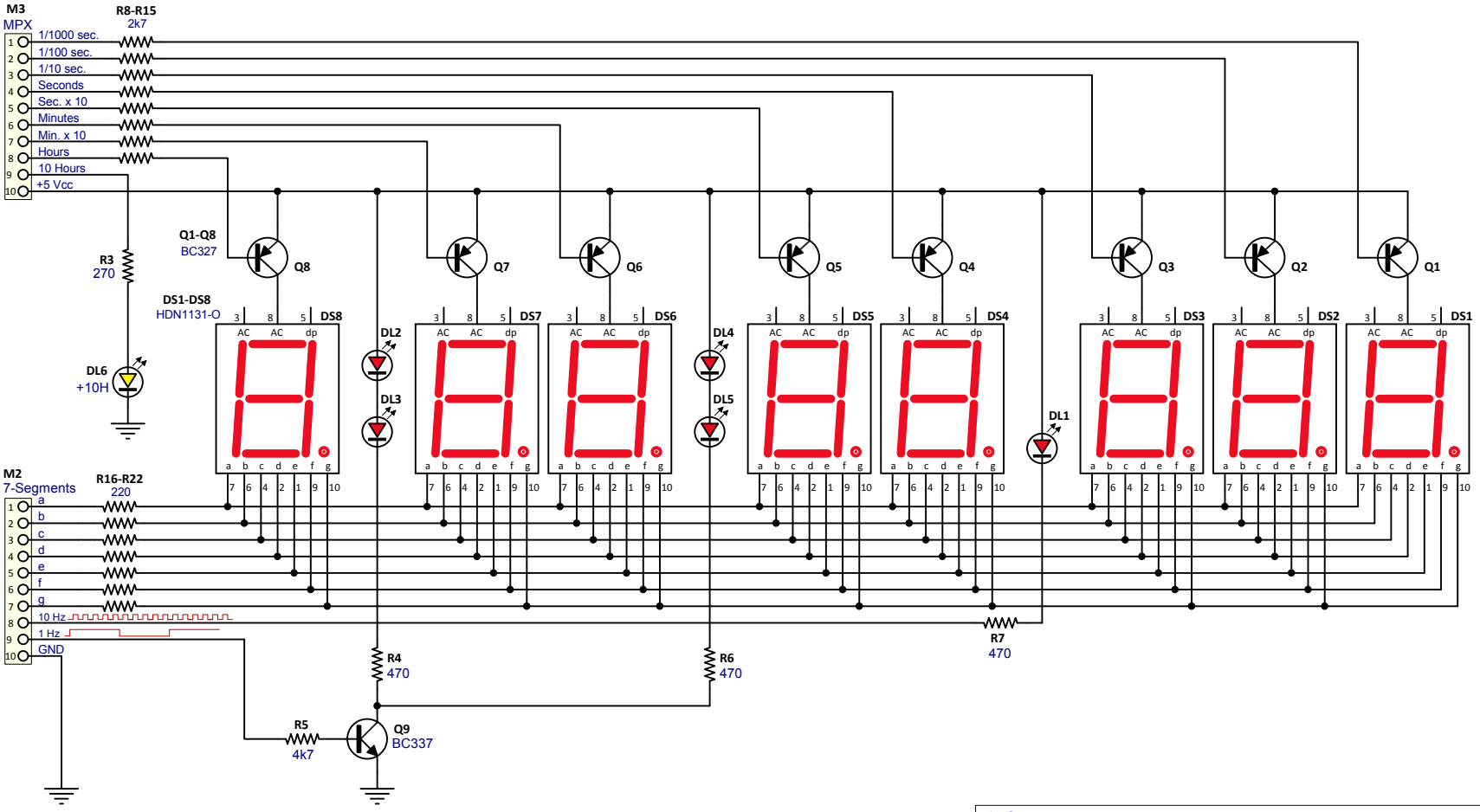
PCB Main (100 x 70 mm)



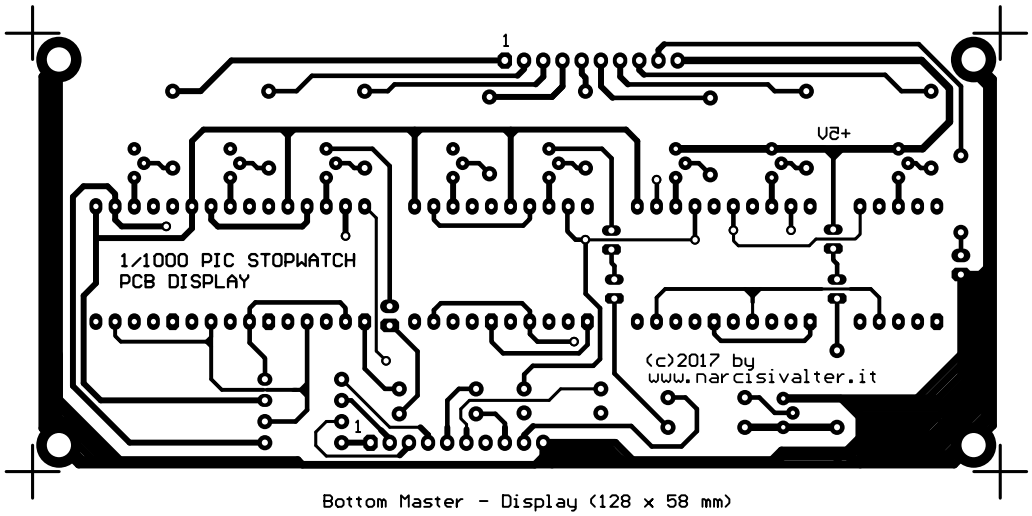
PCB – Main (100 x 70 mm)

DISPLAY section

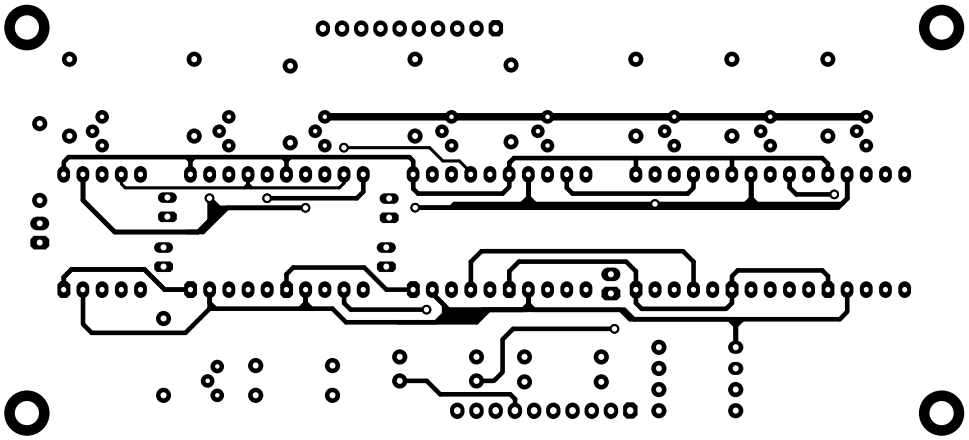




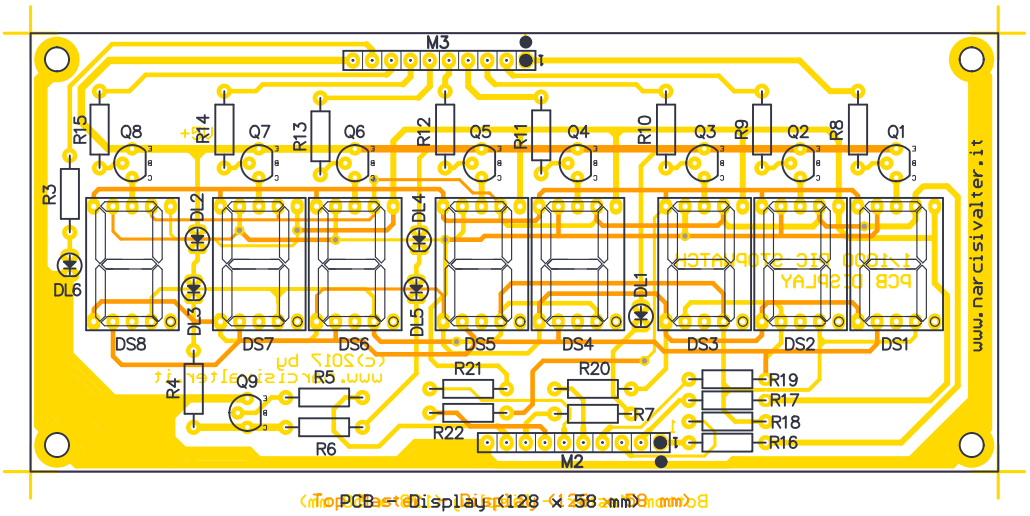
Author: **Valter Narcisi - San Benedetto del Tronto (AP)**					
Project: **1/1000 Stopwatch with PIC (Display section)**				*Year:* 2017	
Size: A4	*DWG no.* 1	*Rev.:* 1	*Scale:* 1:1	*Sheet:* 2 of 2	
Note: **www.narcisivalter.it/progetti/stopwatch-PIC-1000.html**					

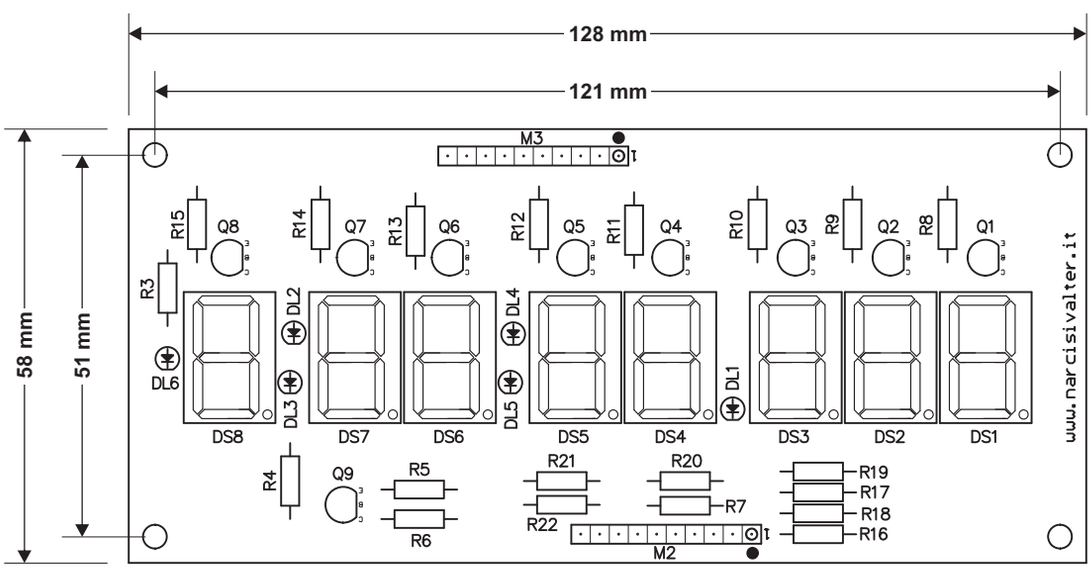


Bottom Master - Display (128 x 58 mm)



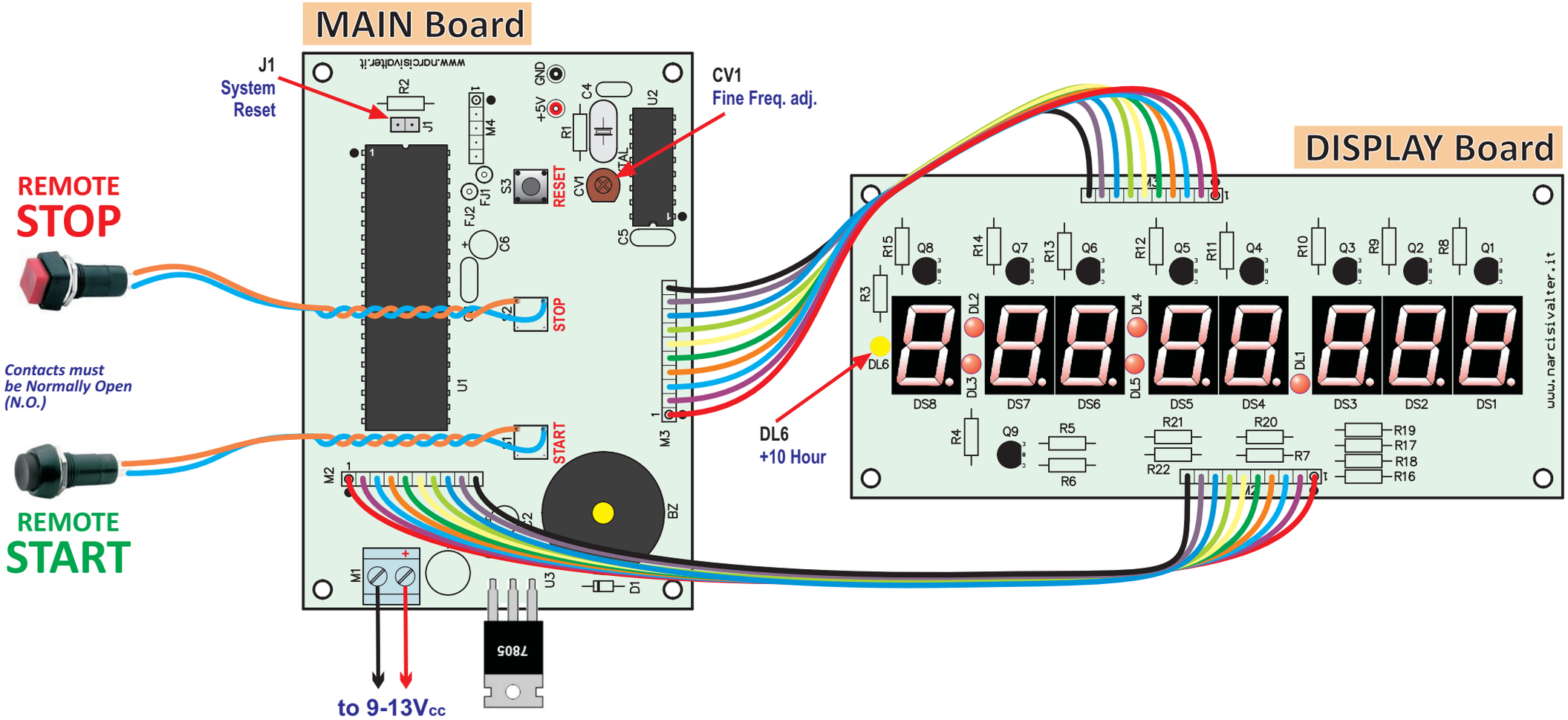
Top Master - Display (128 x 58 mm)





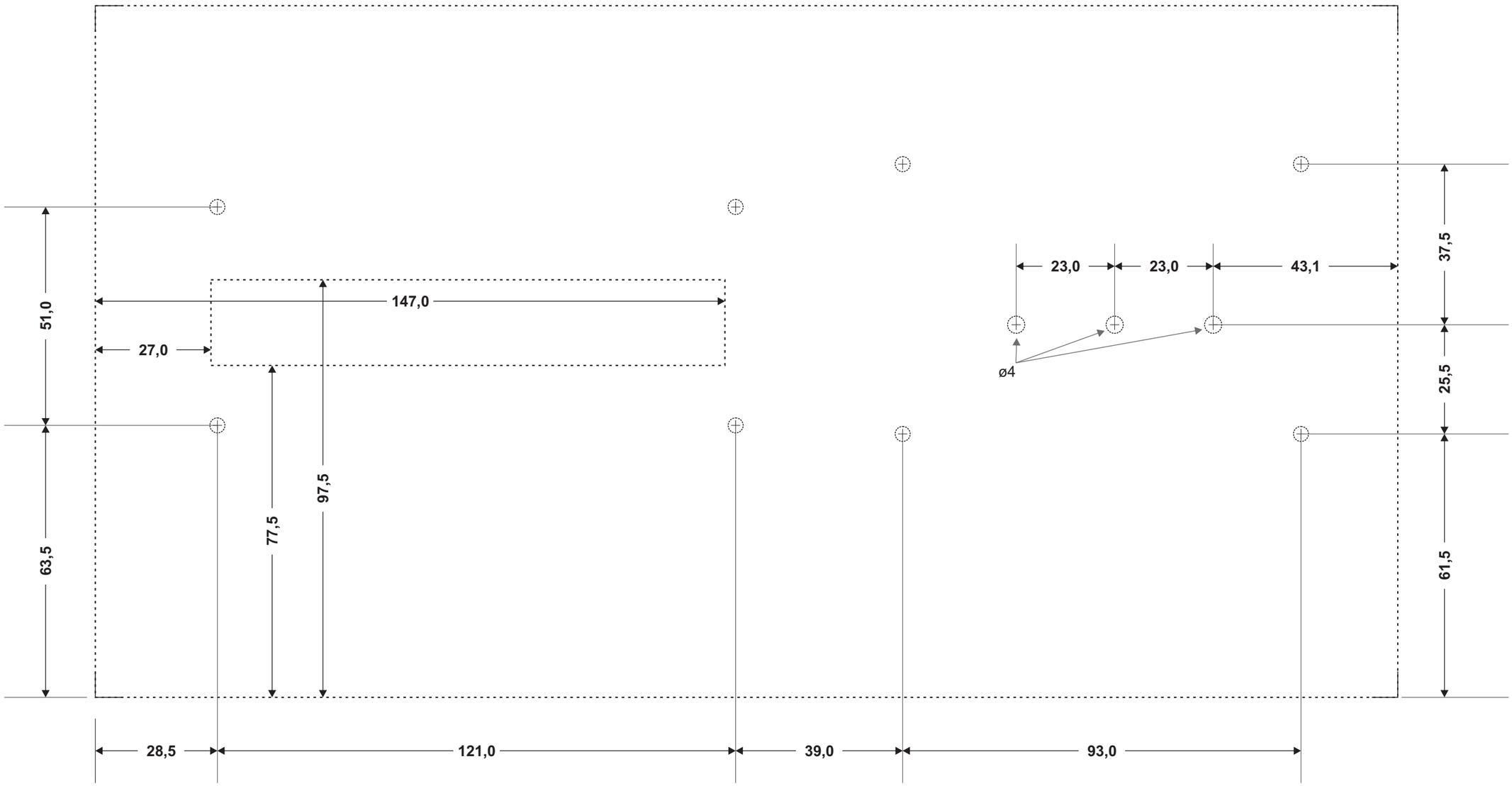
PCB - Display (128 x 58 mm)

WIRING / COLLEGAMENTI

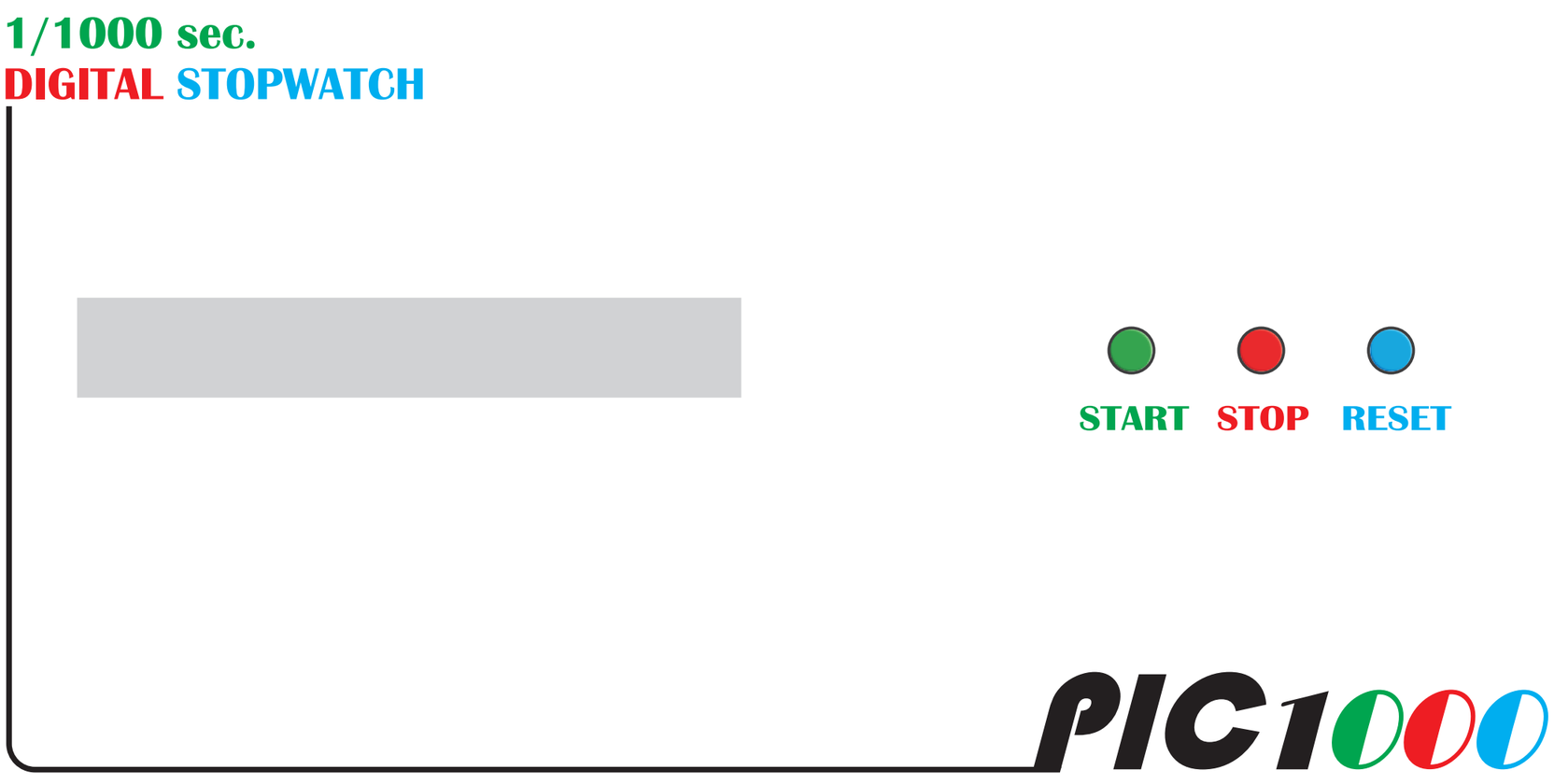


PANEL HOLES / PIANO FORATURA PANNELLO FRONTALE

Pannello TEKO Pult mod. 364
FRONT PANEL: dimensions 304.1 x 161.5
Dimensions in mm



PANEL SILK-SCREEN PRINTING - SERIGRAFIA PANNELLO FRONTALE



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COMANDI e USO

Il cronometro rileva tempi nel range compreso fra "**0:00:00.000**" e "**9:59:59.999**" e l'accensione del **LED** (DL6) aggiunge altre **10 ore** al conteggio.

L'uso del cronometro è molto semplice ed intuitivo.

- All'accensione, dopo il **TEST dei DISPLAY**, il cronometro visualizza il valore '**0:00:00.000**'.
- Per **avviare il conteggio**, premere il pulsante **START**.
- Per **visualizzare i tempi intermedi** premere il pulsante **STOP**.
- Per tornare alla visualizzazione in tempo reale del conteggio, premere di nuovo il pulsante **START** e così via.
- Per **azzerare il conteggio**, premere il pulsante **RESET**: il display tornerà in modalità stand-by e visualizzerà il valore '**0:00:00.000**'.
- Quando il conteggio supera il valore '**9:59:59.999**' il **LED** (DL6) si accende ed il cronometro continua il conteggio ripartendo da zero ('**0:00:00.000**').

(N.B. - In qualsiasi situazione, quando si preme il pulsante **RESET** il cronometro si resetta e il display visualizza il valore '**0:00:00.000**').

Il cronometro può essere avviato anche da remoto per mezzo di attuatori da collegare in parallelo ai pulsanti i cui contatti devono essere di tipo Normalmente Aperto (**N.O.** - **N**ormally **O**pen) e gli impulsi di comando attivano il cronometro quando i contatti stessi si chiudono a massa.