CRONOMETRO MILLESIMALE C/MOS
1/1000 MINUTE STOPWATCH

MANUALE TECNICO

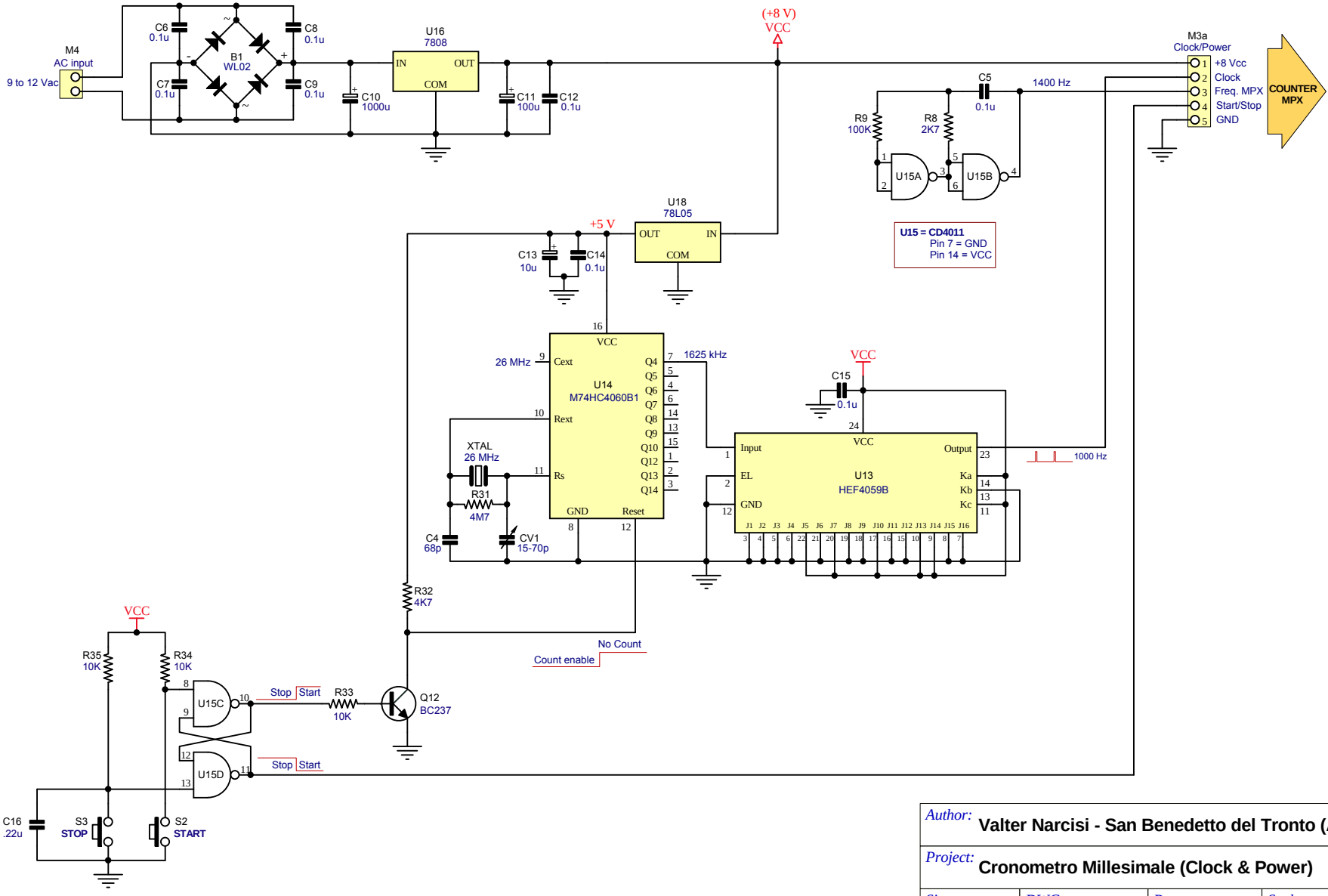
PWR & CLOCK section (sheet 3 of 3)

COUNTER section (sheet 1 of 3)

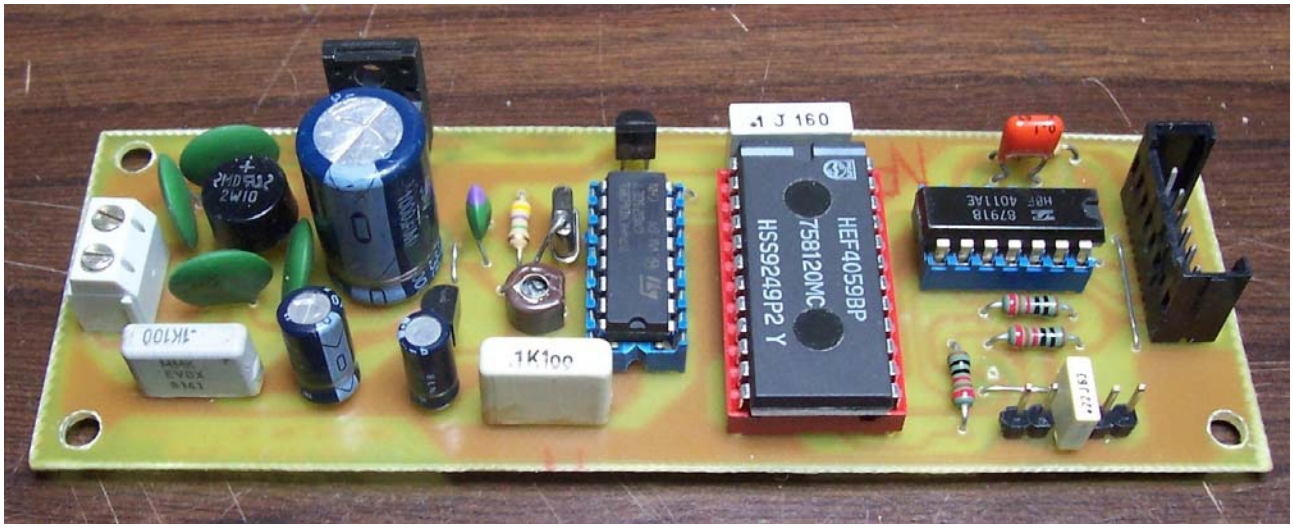
DISPLAY section (sheet 2 of 3)

M4 AC input
9 to 12 Vac
B1 WL02
C6 0.1u
C7 0.1u
C8 0.1u
C9 0.1u
C10 1000u
C11 100u
C12 0.1u
U16 7808
VCC (+8 V)
U18 78L05
+5 V
C13 10u
C14 0.1u
C2 100u
M3a
M3b
U14 M74HC4060B1
26 MHz
1625 kHz
XTAL 26 MHz
R31 4M7
C4 68p
CV1 15-70p
U13 HEF4059B
C15 0.1u
1000 Hz
R32 4K7
No Count
Count enable
Q12 BC237
R33 10K
R35 10K
R34 10K
U15C
U15D
Stop
Start
S3 STOP
S2 START
C16 .22u
U15 = CD4011
R9 100K
R8 2K7
C5 0.1u
U15A
U15B
1400 Hz
C1 0.1u
U10 CD4017
M1a MPX
+8Vcc
Decimal Comma
Dots
1/1000 sec.
1/100 sec.
1/10 sec.
Seconds
Seconds x 10
Minutes
Minutes x 10
Hours
Hours x 10
M1
R4 10K
R5 10K
R6 10K
R7 10K
10 Hz
1 Hz
C3 0.1u
U11 = CD4073
C17 .47u
S1 RESET
U11C
R3 10K
U1 CD4026
U2 CD4026
U3 CD4026
U4 CD4026
U5 CD4026
U6 CD4026
U7 CD4026
U8 CD4026
U9 CD4026
Clock IN
Ung C Out
DS EN IN
DS EN OUT
Reset
CLK Inh
Carry Out
D1-D7 1N4148
D8-D14 1N4148
D15-D21 1N4148
D22-D28 1N4148
D29-D35 1N4148
D36-D42 1N4148
D43-D49 1N4148
D50-D56 1N4148
D57-D63 1N4148
D64 1N4148
D65 1N4148
R1 22K
R2 22K
1/1000 sec.
1/100 sec.
1/10 sec.
Seconds
Min. x 10
Hours
Hours x 10
Sec. x 10
7-Segment M2a M2b
U17 ULN2004
Com
In1 In2 In3 In4 In5 In6 In7
Out1 Out2 Out3 Out4 Out5 Out6 Out7
Gnd
R24-R30 220
DS1-DS9 TDSR5150
Q1-Q9 MPSA-42
Q11 BC337
Q10 BC237
R12 270
R11 270
R10 470
DL1 DL2 DL3 DL4 DL5
R15-R23 (*) 100
R13 and R14 = Not mounted

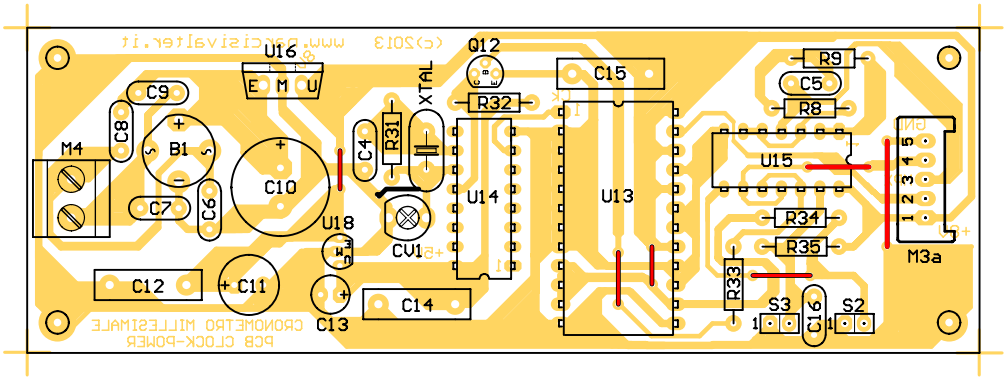
Author: Valter Narcisi - San Benedetto del Tronto (AP)				
Project: Cronometro Millesimale (ALL Schematics)				Year: 2013
Size: A2	DWG no. 1	Rev.: 1	Scale: 1:1	Sheet: 1 of 1
Note: www.narcisivalter.it - info@narcisivalter.it				



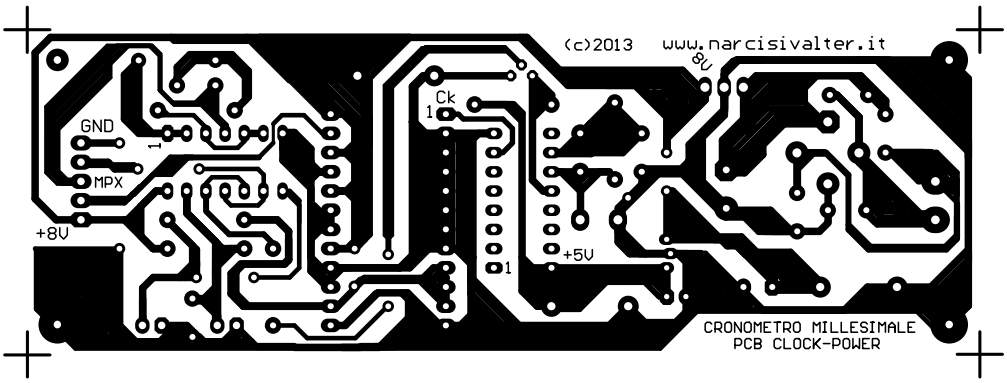
Author: **Valter Narcisi - San Benedetto del Tronto (AP)**					
Project: **Cronometro Millesimale (Clock & Power)**				*Year:* 2013	
Size: A4	*DWG no.* 3	*Rev.:* 1	*Scale:* 1:1	*Sheet:* 3 of 3	
Note: **www.narcisivalter.it - info@narcisivalter.it**					



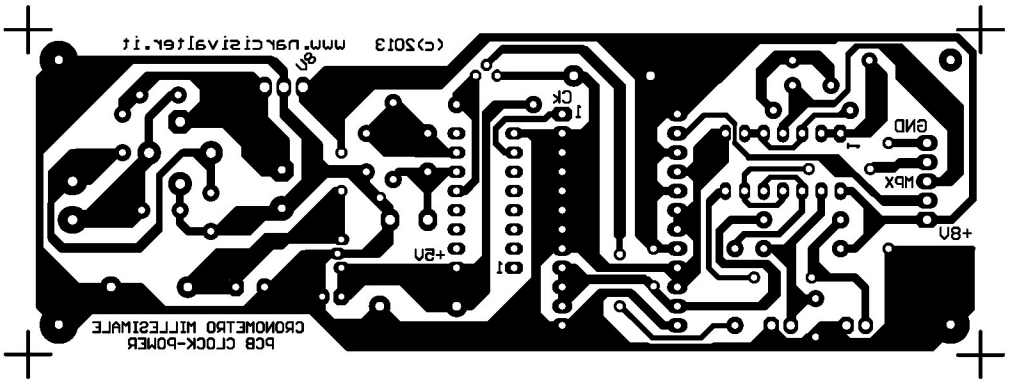
LA SEZIONE POWER SUPPLY e BASE DEI TEMPI
POWER SUPPLY and TIMEBASE



PCB - Power Supply & Clock Generation (126 x 43 mm)

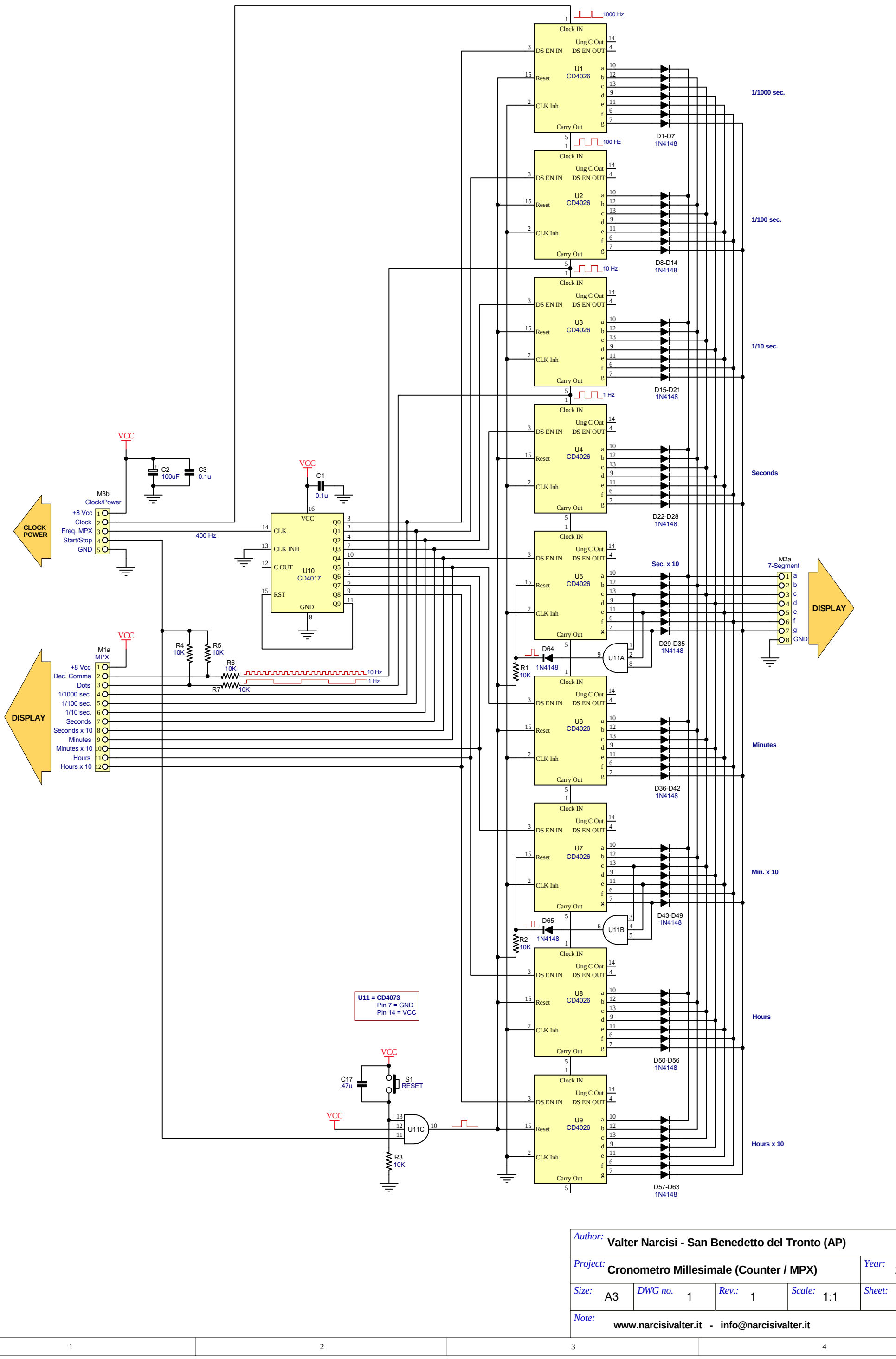


Master - Power Supply & Clock Generation (126 x 43 mm)

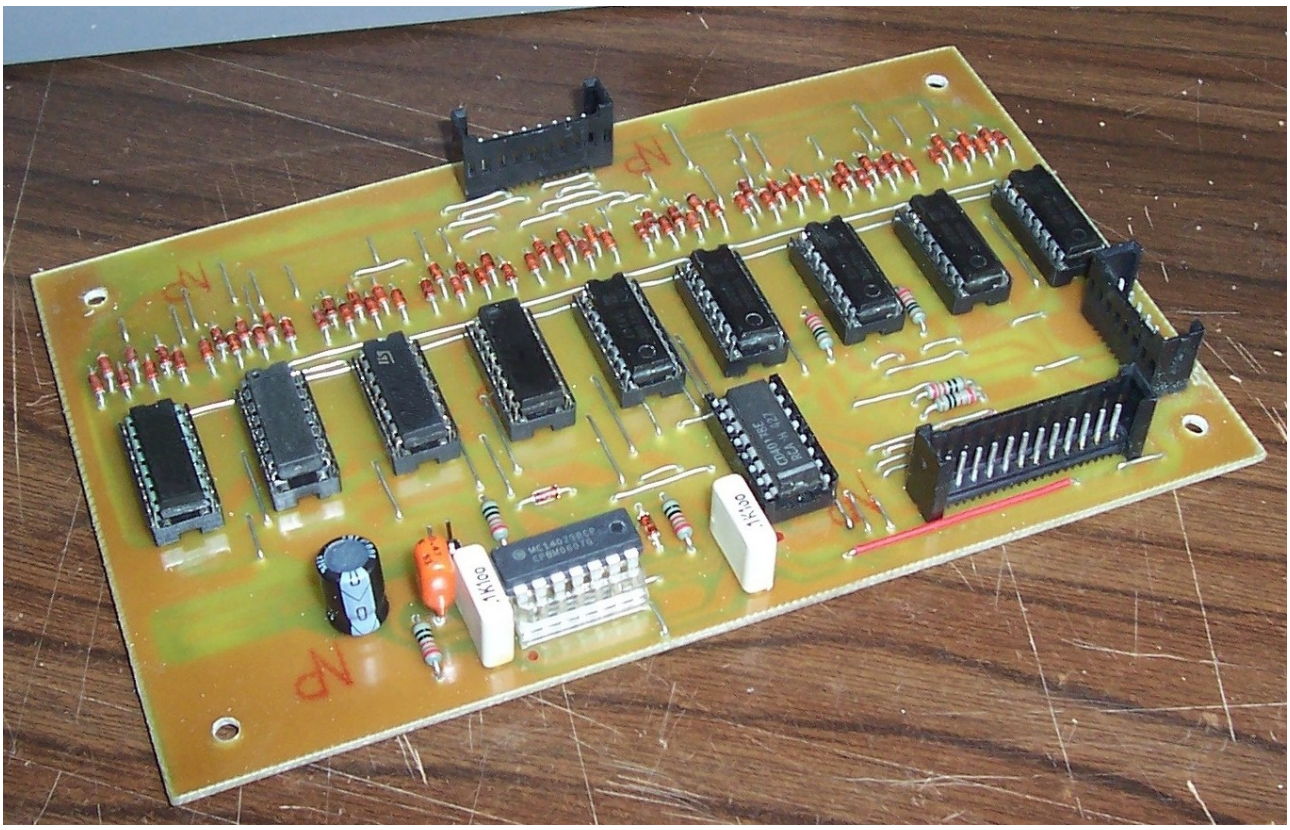


MIRROR Side version

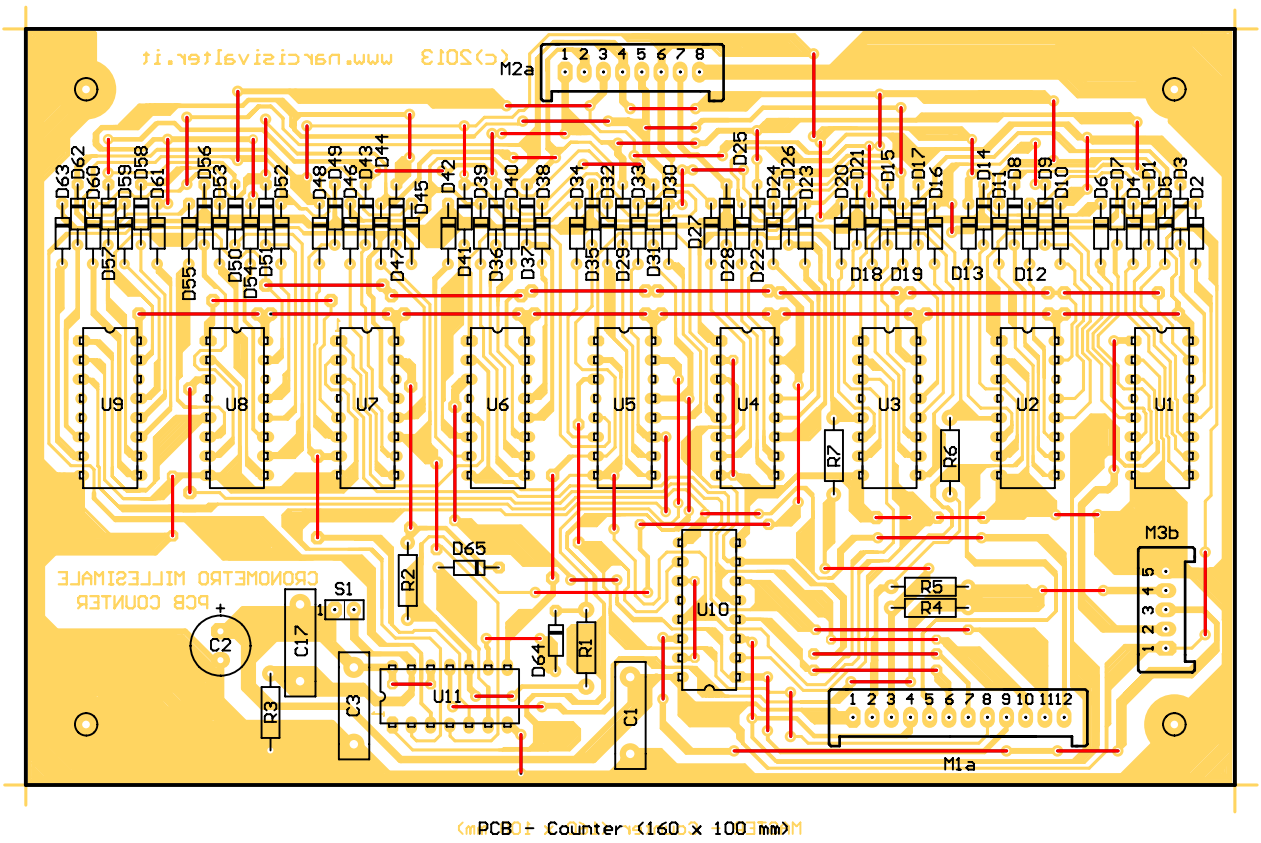
POWER & CLOCK GENERATION		
Designator	*Part Type*	*Description*
R8	2K7	Resistenza 1/4 W
R9	100K	Resistenza 1/4 W
R31	4M7	Resistenza 1/4 W
R32	4K7	Resistenza 1/4 W
R33	10K	Resistenza 1/4 W
R34	10K	Resistenza 1/4 W
R35	10K	Resistenza 1/4 W
C4	68p	Condensatore Ceramico/Poliestere
C5	0.1u	Condensatore Ceramico/Poliestere
C6	0.1u	Condensatore Ceramico/Poliestere
C7	0.1u	Condensatore Ceramico/Poliestere
C8	0.1u	Condensatore Ceramico/Poliestere
C9	0.1u	Condensatore Ceramico/Poliestere
C10	1000u	Condensatore Elettrolitico
C11	100u	Condensatore Elettrolitico
C12	0.1u	Condensatore Ceramico/Poliestere
C13	10u	Condensatore Elettrolitico
C14	0.1u	Condensatore Ceramico/Poliestere
C15	0.1u	Condensatore Ceramico/Poliestere
C16	.22 u	Condensatore Ceramico/Poliestere
U15	CD4011	Quad 2-Input NAND (CD4011)
U16	7808 (stab. 1 A)	Stab. Pos. 7808 (8V - 1A)
U18	78L05 (stab. 100 mA)	Stab. Pos. 78L05 (5V - 100mA)
Q12	BC237	Transistor NPN
U13	HEF4059B	Integrato CD4059 - Programmable Divide-by-n Counter
U14	M74HC4060B1	Integrato CD4060 - Contatore 14 Stadi + Oscillatore
XTAL	26 MHz	Cristallo al Quarzo
B1	WL02	Ponte Raddrizzatore Integrato
CV1	15-70p	Compensatore
S2	START	Pulsante N.A.
S3	STOP	Pulsante N.A.
M3a	Clock/Power	Connettore/Morsettiera 5 vie
M4	AC input	Connettore/Morsettiera 2 vie

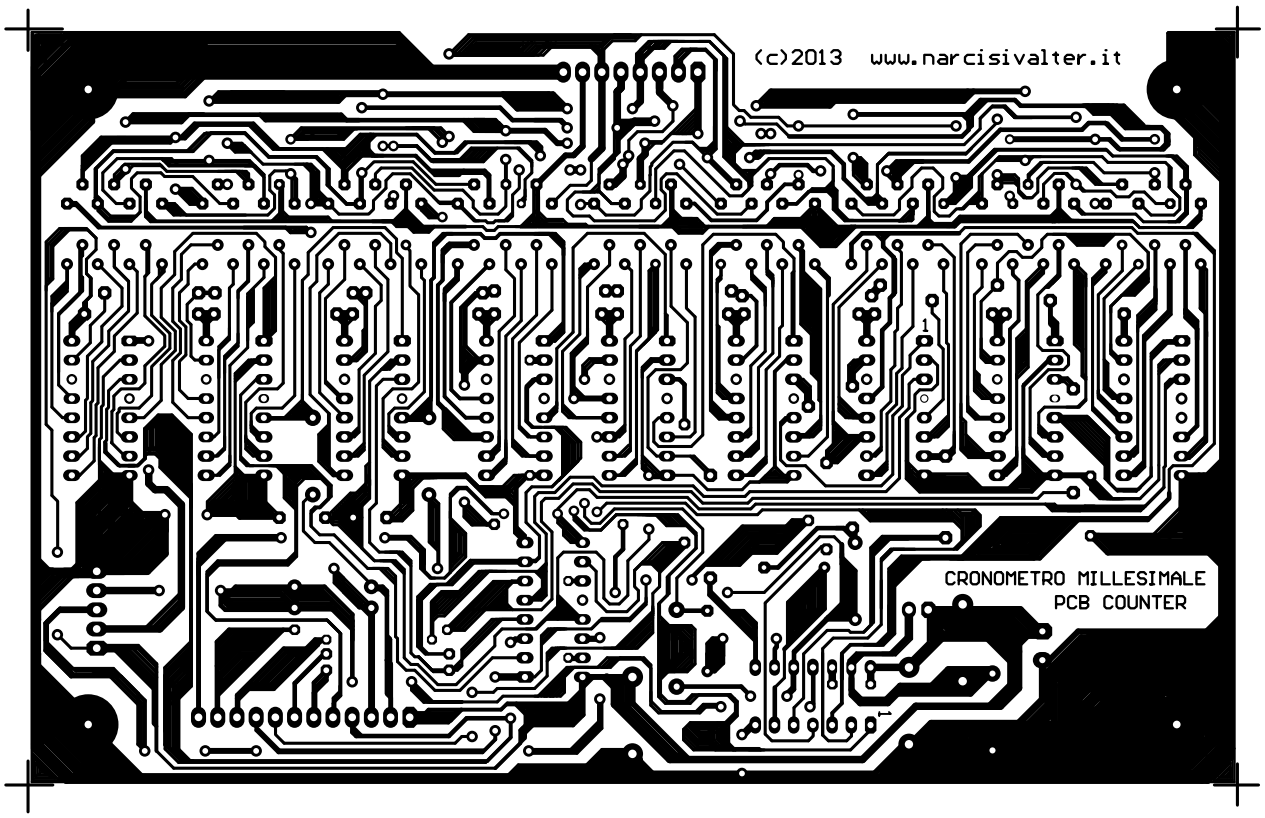


Author: **Valter Narcisi - San Benedetto del Tronto (AP)**				
Project: **Cronometro Millesimale (Counter / MPX)**				*Year:* 2013
Size: A3	*DWG no.* 1	*Rev.:* 1	*Scale:* 1:1	*Sheet:* 1 of 3
Note: **www.narcisivalter.it - info@narcisivalter.it**				

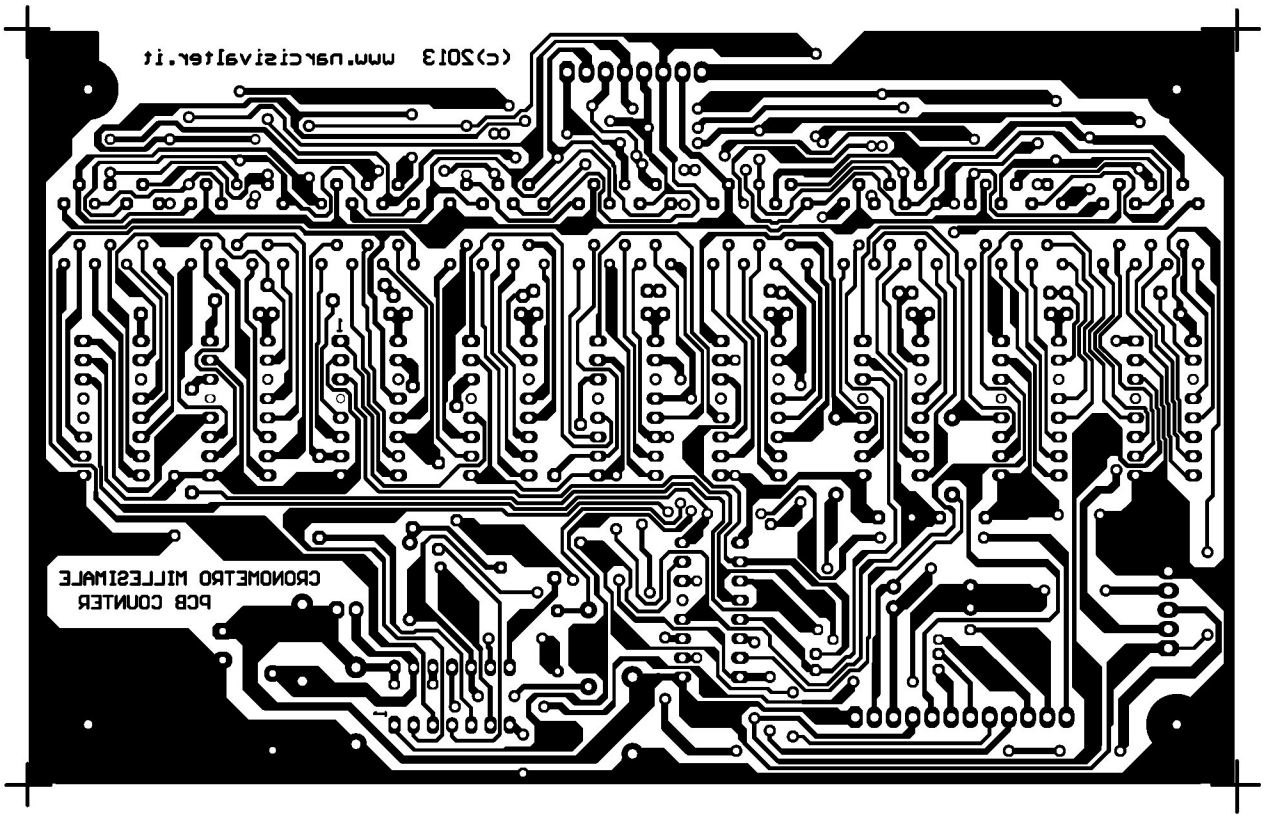


LA SEZIONE COUNTER (CONTEGGIO e MULTIPLEXER)
COUNTER and MULTIPLEXER SECTION


M2a
1 2 3 4 5 6 7 8
D63 D62 D60 D59 D58 D61 D56 D53 D52 D48 D49 D46 D43 D44 D45 D42 D39 D40 D38 D34 D32 D33 D30 D25 D24 D26 D23 D20 D21 D15 D17 D16 D14 D11 D8 D9 D10 D6 D7 D4 D1 D5 D3 D2
D57 D55 D50 D54 D51 D47 D41 D36 D37 D35 D29 D31 D27 D28 D22 D18 D19 D13 D12
U9 U8 U7 U6 U5 U4 U3 U2 U1
R7 R6
M3b
1 2 3 4 5
D65
R2
S1
C2
C17
R3
C3
U11
D64
R1
C1
U10
R5
R4
1 2 3 4 5 6 7 8 9 10 11 12
M1a
PCB - Counter (160 x 100 mm)

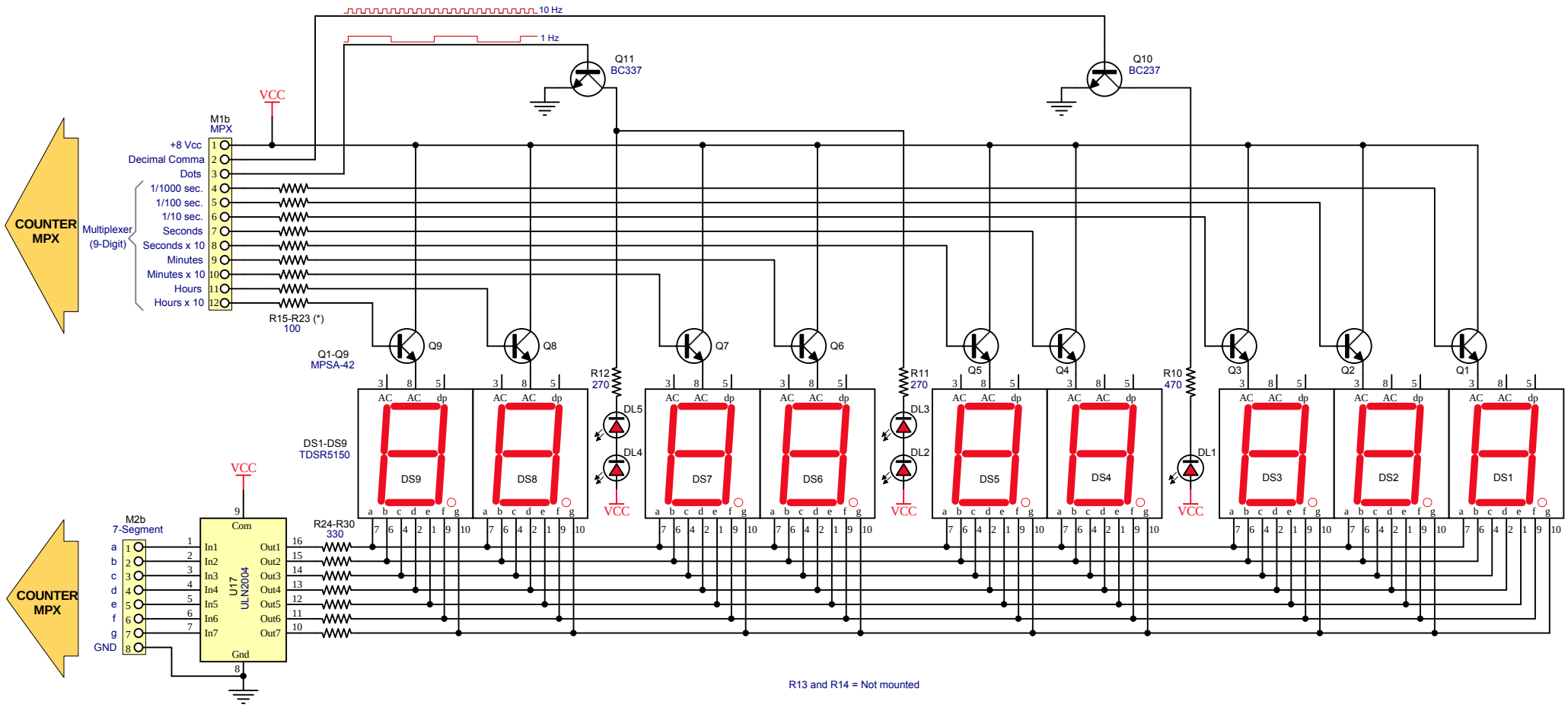


MASTER - Counter (160 x 100 mm)

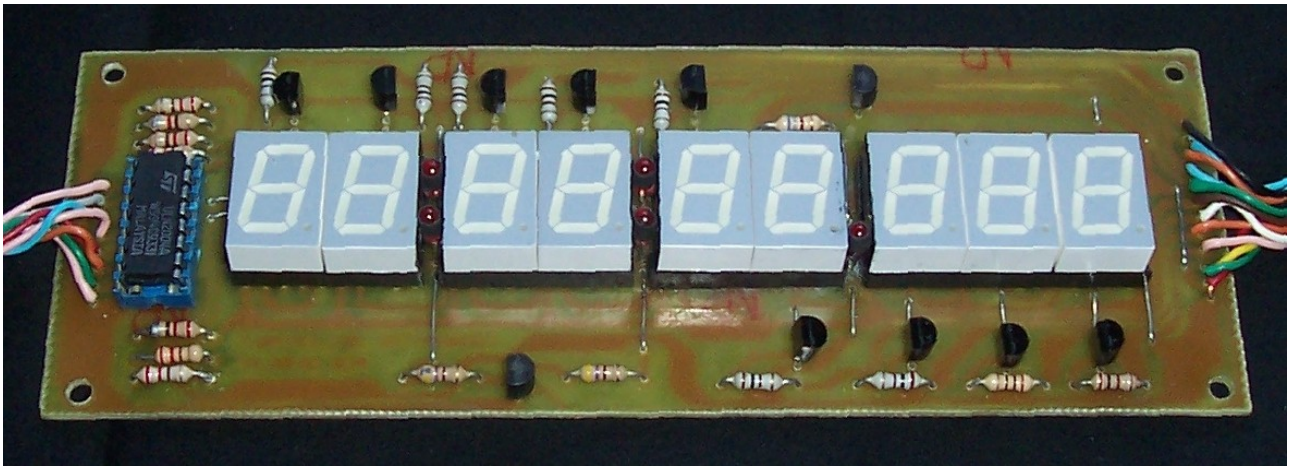


MIRROR Side version

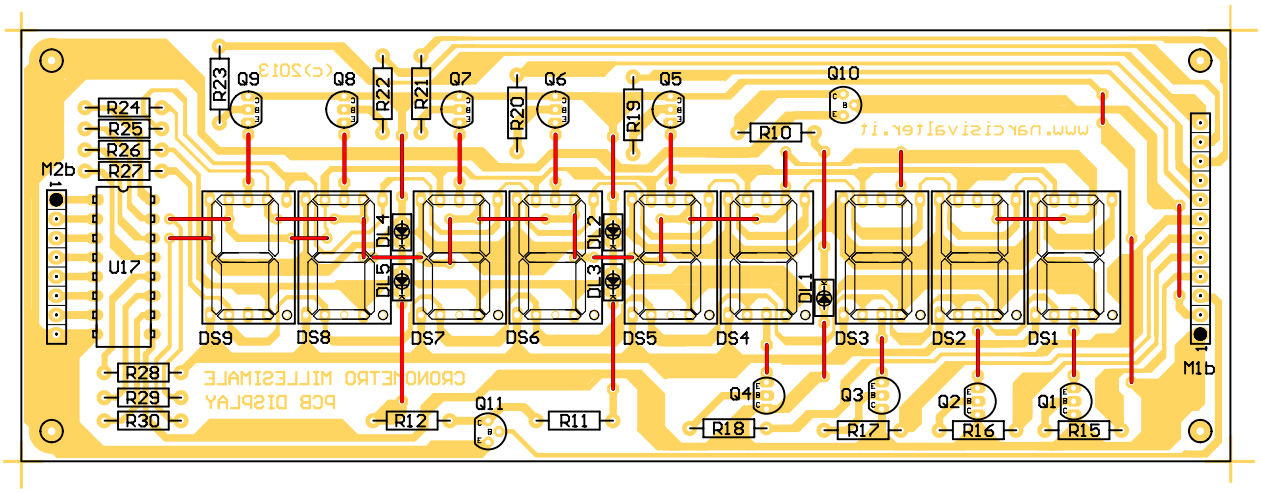
COUNTER & MULTIPLEXER		
Designator	*Part Type*	*Description*
C1	0.1u	Condensatore Ceramico/Poliestere
C2	100uF	Condensatore Elettrolitico
C3	0.1u	Condensatore Ceramico/Poliestere
C17	0.47u	Condensatore Ceramico/Poliestere
R1	10K	Resistenza 1/4 W
R2	10K	Resistenza 1/4 W
R3	10K	Resistenza 1/4 W
R4	10K	Resistenza 1/4 W
R5	10K	Resistenza 1/4 W
R6	10K	Resistenza 1/4 W
R7	10K	Resistenza 1/4 W
D1 - D65	1N4148	Diodo Generico al Silicio (1N4148)
U1	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U2	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U3	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U4	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U5	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U6	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U7	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U8	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U9	CD4026	Integrato CD4026 (Div. 10 - Out 7 Segmenti)
U10	CD4017	Integrato CD4017 (Divisore/Contatore 10)
U11	CD4073	Integrato CD4073 (Triple 3-Input AND Gate)
S1	RESET	Pulsante N.A.
M1a	MPX	Connettore/Morsettiera 12 vie
M2a	7-Segment	Connettore/Morsettiera 8 vie
M3b	Clock/Power	Connettore/Morsettiera 5 vie



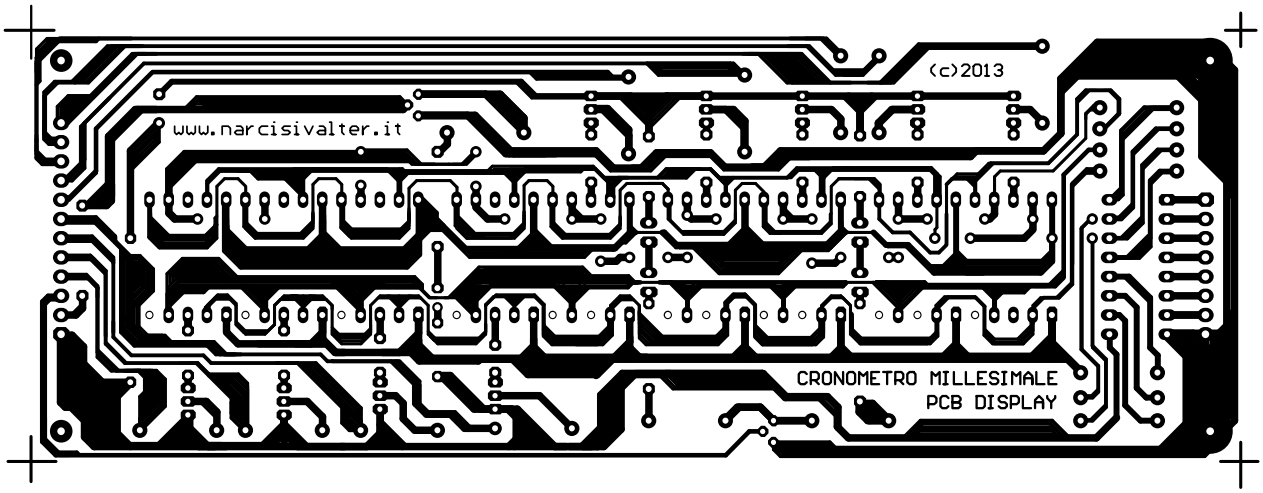
Author: **Valter Narcisi - San Benedetto del Tronto (AP)**					
Project: **Cronometro Millesimale (Display)**				*Year:* 2013	
Size: A4	*DWG no.* 3	*Rev.:* 1	*Scale:* 1:1	*Sheet:* 3 of 3	
Note: **www.narcisivalter.it - info@narcisivalter.it**					



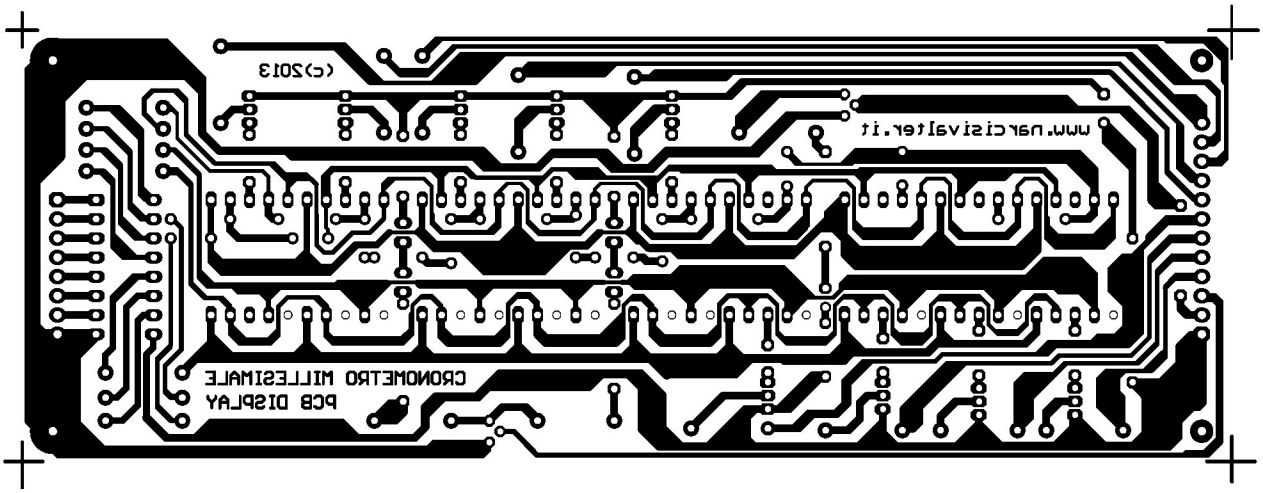
LA SEZIONE DISPLAY
DISPLAY SECTION



PCB - Display (160 x 57 mm)



Master - Display (160 x 57 mm)

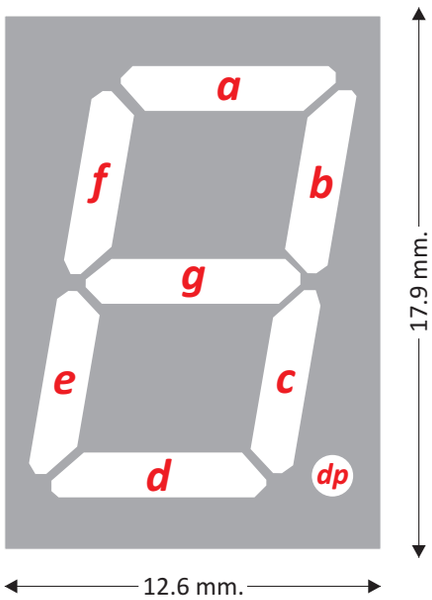


MIRROR Side version

DISPLAY		
Designator	*Part Type*	*Description*
R10	470	Resistenza
R11	270	Resistenza
R12	270	Resistenza
R15	100	Resistenza
R16	100	Resistenza
R17	100	Resistenza
R18	100	Resistenza
R19	100	Resistenza
R20	100	Resistenza
R21	100	Resistenza
R22	100	Resistenza
R23	100	Resistenza
R24	220	Resistenza
R25	220	Resistenza
R26	220	Resistenza
R27	220	Resistenza
R28	220	Resistenza
R29	220	Resistenza
R30	220	Resistenza
DS1	DS-TDSR5150	Display AC tipo TDSR5150
DS2	DS-TDSR5150	Display AC tipo TDSR5150
DS3	DS-TDSR5150	Display AC tipo TDSR5150
DS4	DS-TDSR5150	Display AC tipo TDSR5150
DS5	DS-TDSR5150	Display AC tipo TDSR5150
DS6	DS-TDSR5150	Display AC tipo TDSR5150
DS7	DS-TDSR5150	Display AC tipo TDSR5150
DS8	DS-TDSR5150	Display AC tipo TDSR5150
DS9	DS-TDSR5150	Display AC tipo TDSR5150
DL1	DIODO LED R	LED Rosso 3mm o puntiforme
DL2	DIODO LED R	LED Rosso 3mm o puntiforme
DL3	DIODO LED R	LED Rosso 3mm o puntiforme
DL4	DIODO LED R	LED Rosso 3mm o puntiforme
DL5	DIODO LED R	LED Rosso 3mm o puntiforme
Q1	MPSA-42	Transistor NPN
Q2	MPSA-43	Transistor NPN
Q3	MPSA-44	Transistor NPN
Q4	MPSA-45	Transistor NPN
Q5	MPSA-46	Transistor NPN
Q6	MPSA-47	Transistor NPN
Q7	MPSA-48	Transistor NPN
Q8	MPSA-49	Transistor NPN
Q9	MPSA-50	Transistor NPN
Q10	BC237	Transistor NPN
Q11	BC337	Transistor NPN
U17	ULN2004	ULN 2004 (7 Darlington Arrays)
M1b	MPX	Connettore/Morsettiera 12 vie
M2b	7-Segment	Connettore/Morsettiera 8 vie

DISPLAY 7 segment

FRONT VIEW



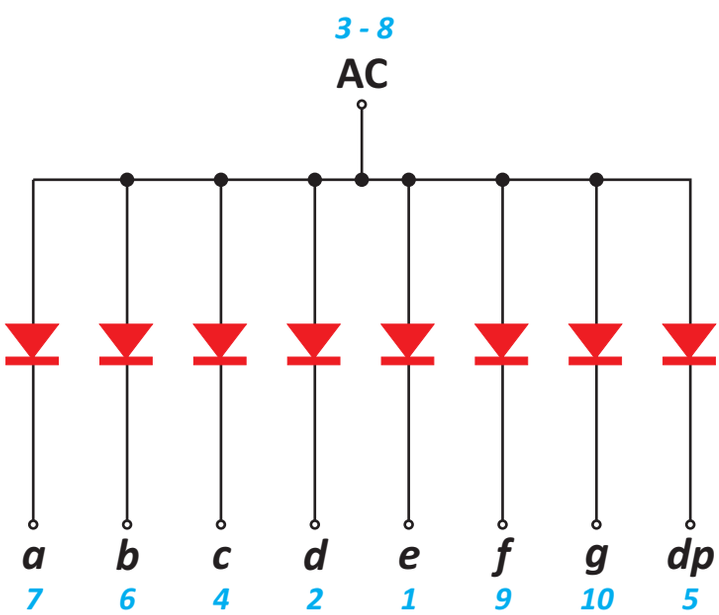
Display **Common Anode**

Dimensions: 17.9 x 12.6 x 7.2 mm.

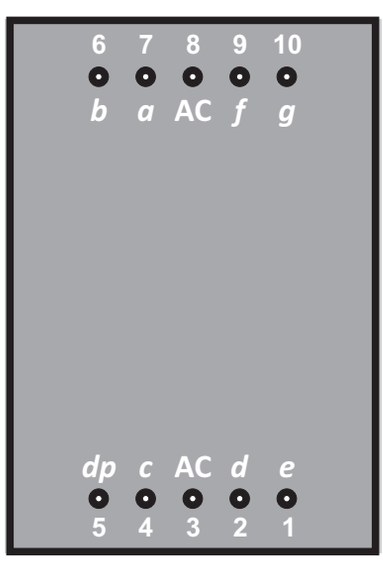
IF segment = 15-20 mA

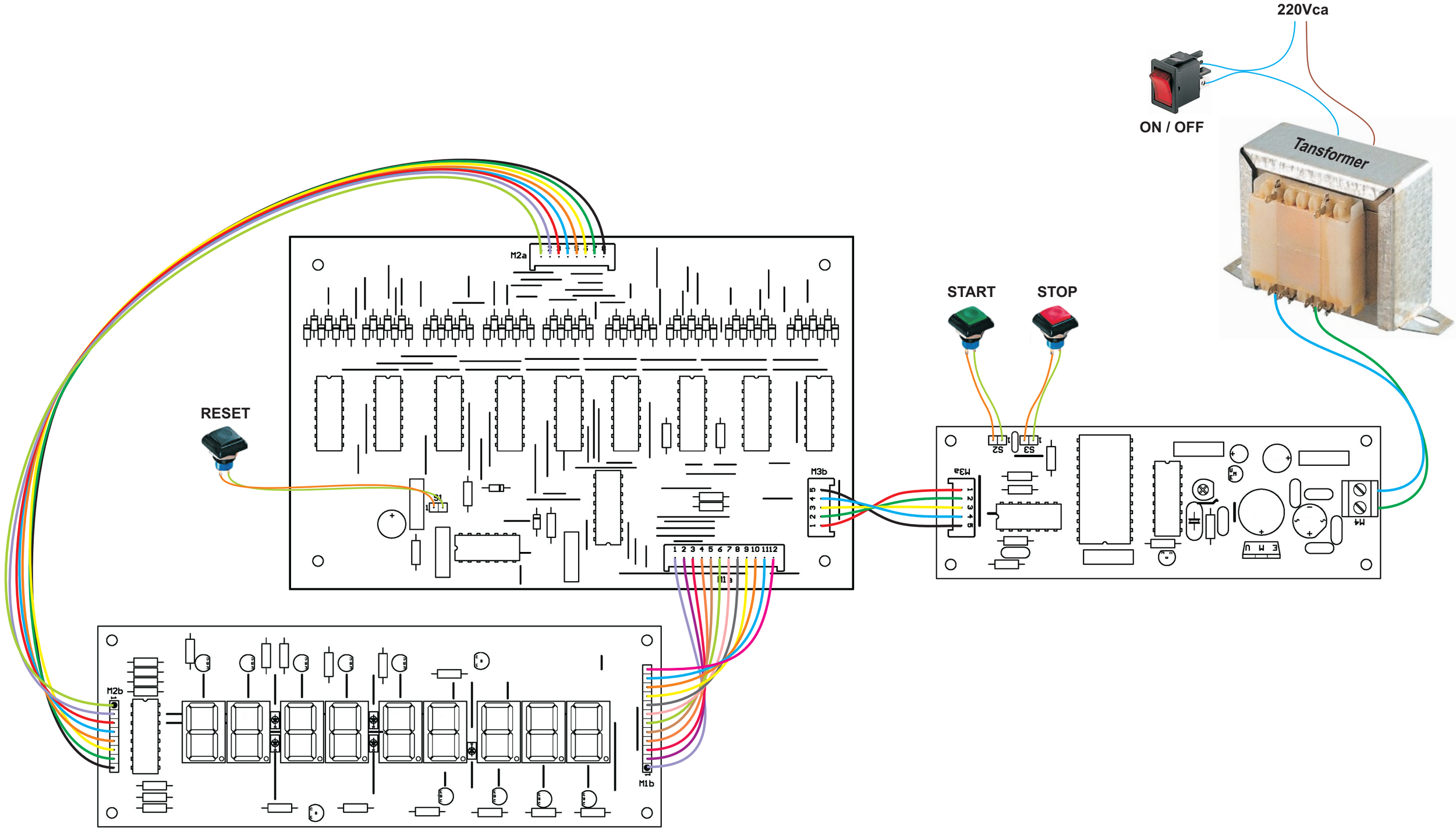
VF voltage = 1.8 V (2.0 V_{max})

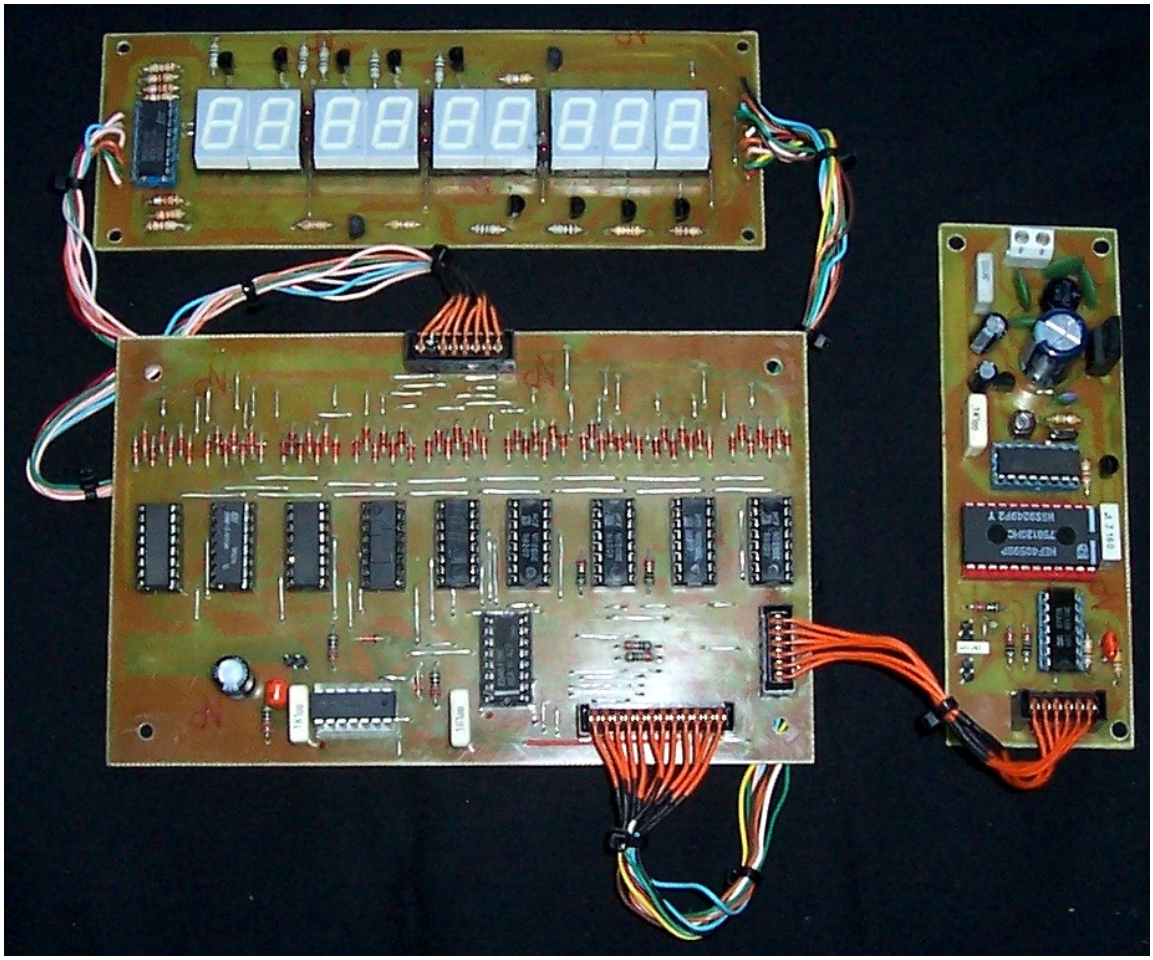
for example:
TDSR-5150 *(Vishay)*
LTS-546AR *(Liteon)*



REAR VIEW




220Vca
ON / OFF
Tansformer
START
STOP
RESET
M2a
M3b
M3a
S1
S2
S3
M2b
M1b
M1a
M1



I COLLEGAMENTI DELLE SCHEDE
WIRES