

Digital clock & Temperature meter for the shack.

I had the need for a Digital clock with Temperature indication for my shack and decided to rather build one than scan Amazon for something suitable. It was clear from the beginning that I would have to use one of the micro processors. In my case, I prefer to use the PIC Micro 16F886 which have all the hardware and registers to communicate on the I²C bus with the DS1307 Clock chip.

I used the DS18B20 chip to give me the current temperature. This chip uses the 1-Wire bus to communicate with the 16F886. This bus control is done in software, unlike the I²C Bus which in this Micro Controller is controlled by internal hardware and firmware.

The temperature is updated about every five seconds while the clock is updated every second. The minutes, hours, day of the week, date of the month and year is set by four switches.

The DS1307 has an input for a 3Volt battery to keep the clock going during periods of no power to the circuit. The chip has an onboard oscillator controlled by an external 32.768 kHz crystal.

On switch on, the 16F886 reads the clock & Temperature data and display them on a 16x2 Line LCD display and then thereafter updates the display every second for time and the Temperature.

I have the DS16B20 chip mounted on a small PC Board (a small piece of Vero board can also be used) with a 1M screen cable so that it can be placed anywhere.

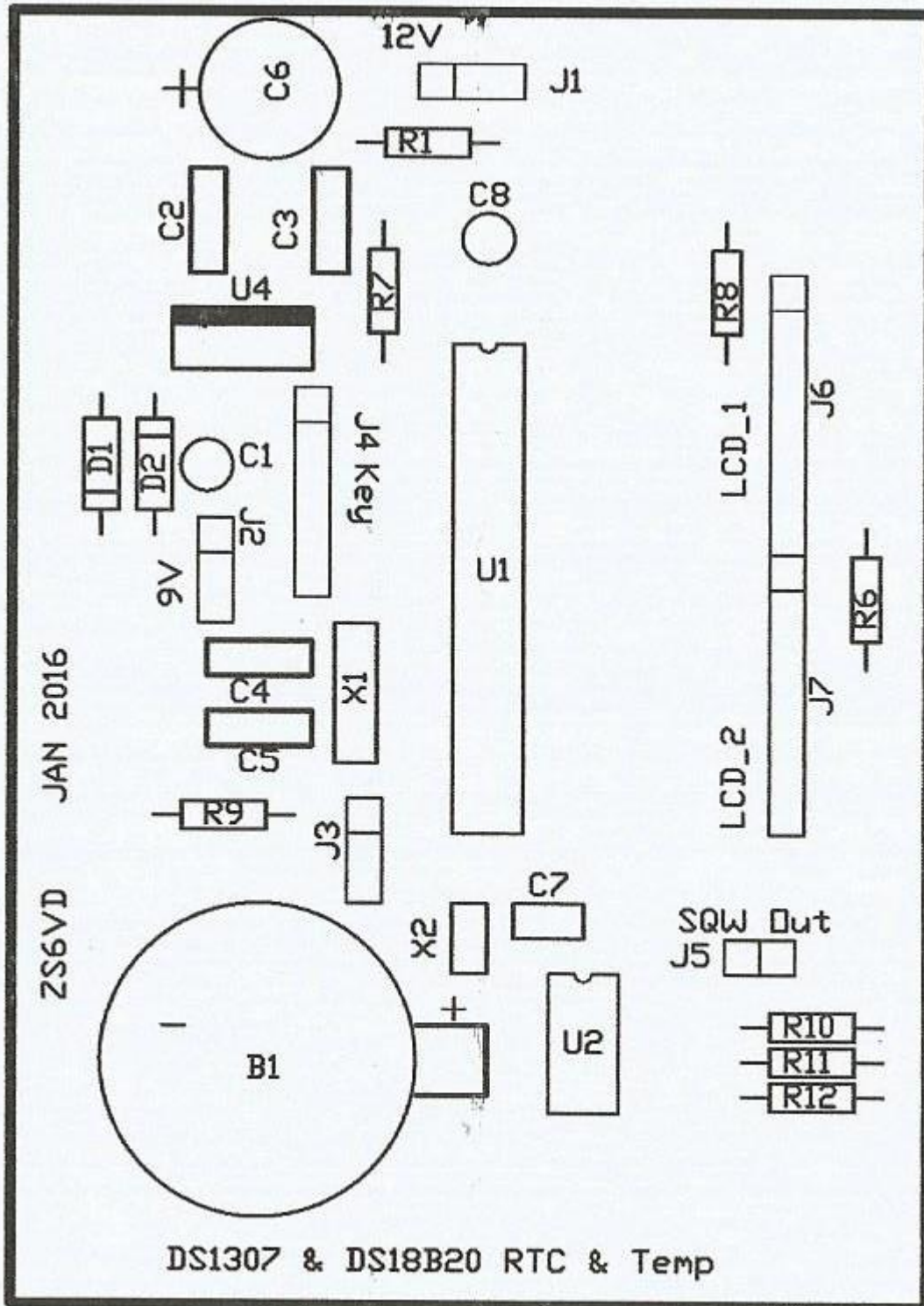
I have also provided a PP3 Battery clip and cable for a 9V PP3 battery to be placed inside the case.

Switches:

- To change the Clock and time, you have to use the switches. When finished setting or changing the clock or date, the new settings is saved automatically.

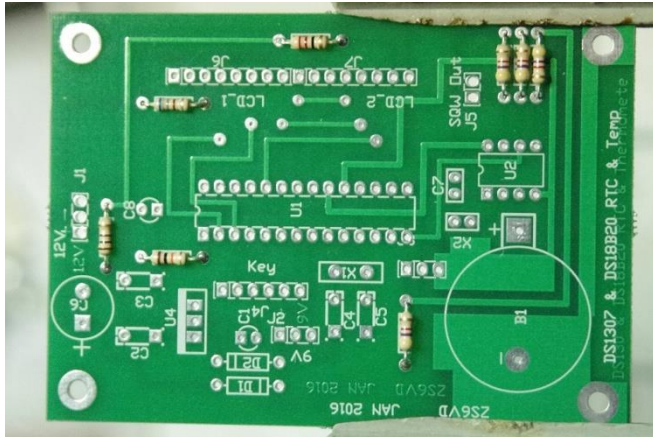
- Switch 1: Setting the clock.
 - Pressing the switch once will display the hours. Use the up or doen switches to change the hours.
 - Pressing the clock (SW1) again will display the minutes and by using the Up or Down switches, the minutes can be adjusted.
 - Prssing the Clock (SW1) switch will return you to the main display showing the new time setting.

- Switch 2: Setting the Date.
 - Pressing the Date (Calendar) switch will display the Day. Set the number to the number of the day – Sunday = 1, Monday = 2.... Saturday = 7 using either the Up or Down Switch.
 - The 2nd press of the Calendar switch will display the day of the month. By using either the Up or Down Switch, change the date to the current day of the month.
 - Pressing the Date Switch (SW2), the month will be indicated. Using the Up or Down Switch, set the Month.
 - Pressing the Date switch again, will display the year. Use the Up or Down switch to change the year.
 - Pressing the Calendar switch again will return you the main display. The new Date settings are saved automatically.



is the component layout of the project.

This



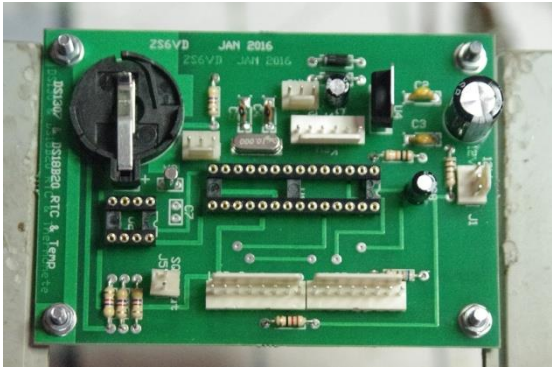
This is the PC Board with the resistors installed.



This is the switch Pc Board to allow you to set the time and Date.



This is the front panel and I still need to make a template with the switches clearly marked.



This Photo shows the PCB fully populated without the PIC microprocessor and Real Time Clock IC installed. The clock back-up battery holder can be seen in the top left hand corner of the PCB.

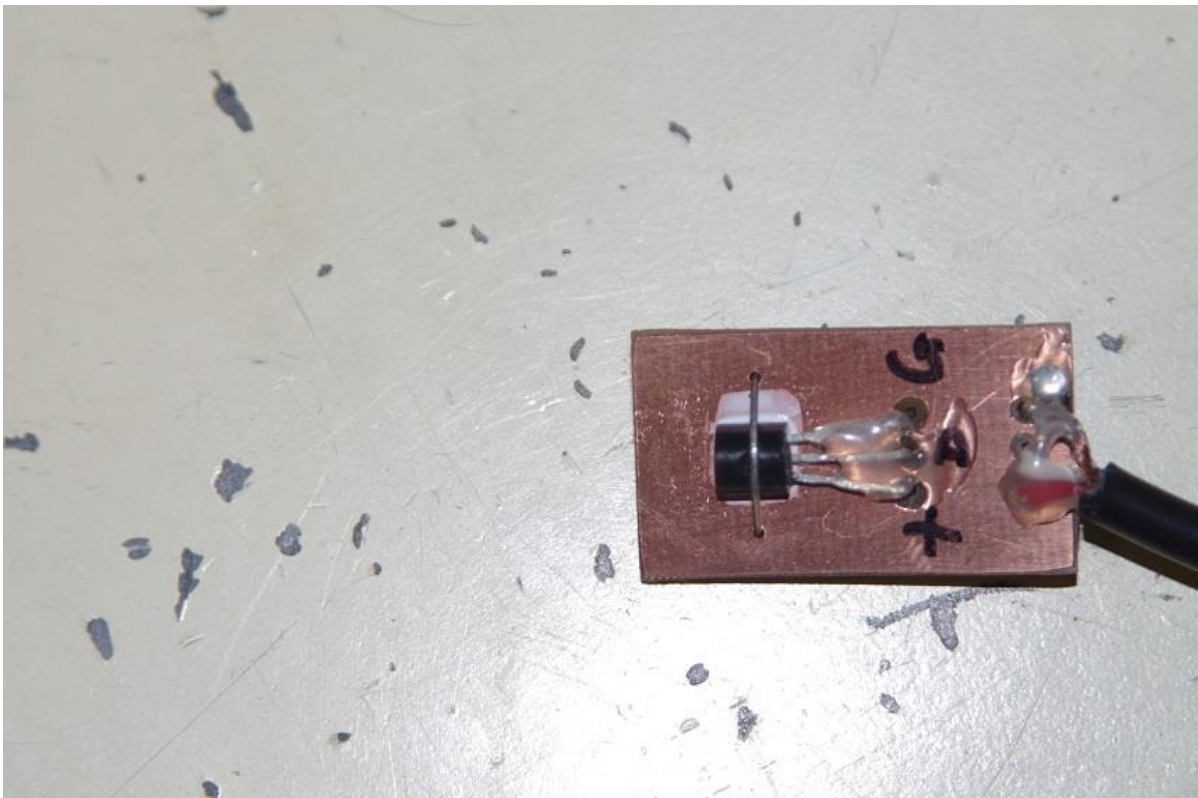
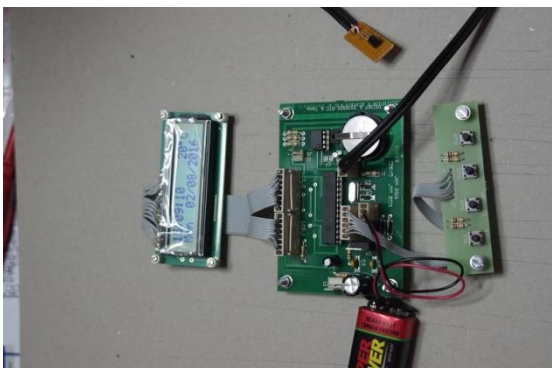
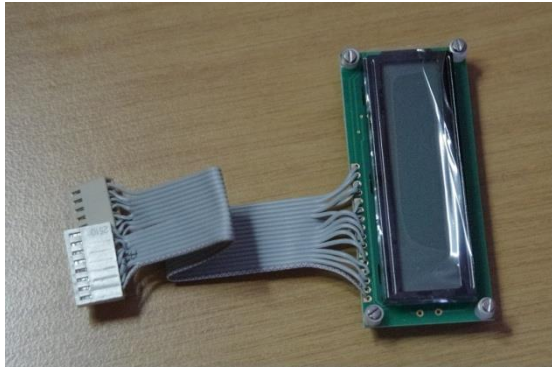


Photo 3 shows the DS16B20 Temperature chip mounted on a PCB. The Temperature sensor is connected to J3 on the main PC Board via the 2 core screen cable.



This the Digital Clock Fully assembled.



This is the LCD Display with its ribbon cable

ready to be plugged into J6 & J7.

This is the component list.

DS1307 & DS18B20 RTC & Thermometer 16F886		
Count	Label-Value	Designation(s)
1	10k	R 7
5	4.7k	R8 R9 R10 R11 R12
1	1k	R 6
1	22R	R 1
1	1000uF 16V	C6
2	1uF 16V	C1 C8
2	100nF Ceramic	C2 C3
2	22pF Ceramic	C4 C5
1	10pF Ceramic	C7
1	16F886	U1
1	16x2 Line LCD Display	
1	10MHz Crystal	X1
1	32.768kHz Crystal	X2
2	1N4007	D1 D2
1	DS18B20	J3
1	7805	U4
1	DS1307	U2
1	3V CR2032	B1
1	CR2032 Battery Holder	B1
1	28 Pin Gold Plated IC Socket Slim line	U1
1	8 Pin Gold Plated IC Socket	U2
2	8 Pin Small Molex PCB Mound	J7 J8
2	8 Pin Small Molex Cable Mound	
1	6 Pin Small Molex PCB Mound	J4
1	6 Pin Small Molex Cable Mound	
3	3 Pin Small Molex PCB Mound	J1 J2 J3
3	3 Pin Small Molex Cable Mound	
1	2 Pin Small Molex PCB Mound	J5
40	Small Molex Inserts	J2
1	PP3 Battery clip	
10	5mm Plastic Spacers (Standoff)	

300mm	16Way Ribbon Cable	LCD & Tact Switch
500mm	2 Core Screen Cable	Temp Sensor

Tact Switch board

4	10mm Tact Switch	S1 S2 S3 S4
4	10k	R1 R2 R3 R4
2	5mm Plastic Pacers (Standoff)	