

## NM110:

### Assembly instructions

The NM110 is a general purpose user interface module when plugged into the NM101 protoboard. It consists of the following functions.

16 x 2 line LCD display  
Software controlled backlight  
4x4 keypad interface  
10 bit LED bar display

There are two kits, one that is for a non backlit LCD and the other for a backlit display.

There are a few component differences as outlined below.

For the Backlit version install R1, R2 and Q1 and VR1. Do not install R3 and R4.

If you have purchased the non backlit display, then you will need to install R3 and R4. Do not install Q1,VR1,R1 and R2. R3 will be either a 330Ω resistor or a 2.2kΩ resistor. Only use the resistor value that came in your kit.

Some care is needed with the assembly. The distance between the LCD module and the board has been kept to a minimum. Care must be taken to ensure the installation of the components are carried out as instructed..

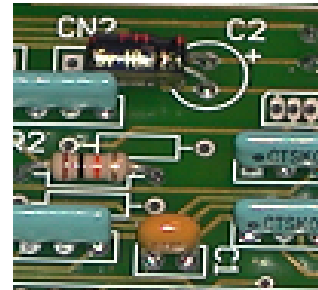
Start with the discrete resistors. Insert them and then solder them in place.

Next install the resistor packs. There are four parts all of the same value. Locate the lead with the dot and insert it such that it goes in the hole of the square pad.



RP2 should be bent slightly in the direction of Q1. This will allow the LCD unit to sit flat. Solder them all in place.

Next install the two capacitors. Make sure C2 is installed the correct way around with the + terminal connected to the + mark on the board. Additionally you should bend the capacitor such that its body will lie flat against the board as shown

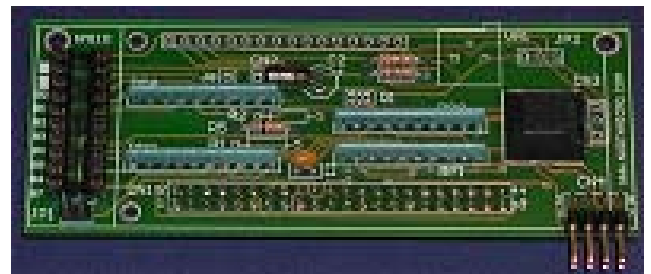


If you have a VR1 then install it now.

Install Q1 if you have a backlit display. Make sure to insert the correct way around.

Install the IC socket for the LED bar next making sure to have pin1 of the socket locate in hole one.

Install the Jumpers and right angled connector for the keypad.



### **NOTE:**

The board defaults to write only mode. This means a fixed delay is used rather than reading the busy flag. This mode saves an I/O line of the PIC.

If you wish to be able to read information from the LCD module, you will need to cut the trace that runs between pin 1 and 2 of JP2.

Once you have cut the trace, you will need a 3 pin right angled header to switch modes, or solder a wire link between pins 2 and 3.

Now insert the 44 pin connector. The connector is inserted from the non component side. Make sure that it is at 90 to the board. You may want to use a piece of scotch tape to hold it in place. Solder from the component side.

Next install the rubber bumper in the area of the board marked support.

You now need to install the LCD module to the circuit board. The first step is to mechanically install all the parts and the second is to solder. This way ensures the correct alignment of the parts.

The connector strip for the backlit LCD unit will have 16 pins whereas the non backlit will use a 14 pin connector.

Insert the LCD board connector into the holes of the NM110. Align pin 1 with hole 1. Two holes on the board will have nothing connected to them with the non backlit display. Note that the holes of the LCD board (left hand side) should line up with corresponding holes on the NM110.

Take one of the bolts and pass it through the LCD unit and then pass it through the spacer and then into the NM110 board. Attach the nut to the end of the bolt. Do the same for the other hole.

Once the LCD display is attached to the NM110, it is now time to solder the leads in place. Make sure that the connector is centered between the boards.



NM110 assembly

Finally install the LED bar display into the IC socket. Chamfered edge into pin1 of the socket.

## **PROBLEMS**

If you have made a mistake then use a solder sucker or solder wick to remove the solder and correct the error.

Check the solder side of the board for good solder connections. They should look shiny and smooth and the solder should appear to flow around the component lead.

If a ball of solder formed, you probably lifted the iron off too soon. To solve the problem, apply the iron again and allow the solder to flow around the pin.

There should be no solder bridges between pins.

## **TESTING**

After completing the above, the unit is ready for testing. You will need to have a working NM101. Download our sample LCD unit code. If you have an NM100 programmer then just connect it to your board and the PC and program your chip. If you are using another programmer then follow its instructions.

The code will enable you to test all the features of your display unit.

If the LED's do not light, make sure that you have inserted the LED module with the chamfered edge to pin1 of the socket and that JP1 is jumpered.

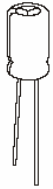
## **INFO**

CN3 is for alternative backlight connections to some LCD modules.

JP2 allows LCD reading. Allows user to switch modes depending on application. Link between pins 2-3 for read/write or pins 1 and 2 for write only. Note Circuit board defaults to write only.

**PARTS IDENTIFICATION**

The following pictures have been included to aid in parts identification.



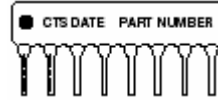
C2  
10 $\mu$ F



C1  
0.1  $\mu$ F



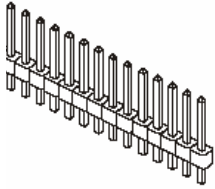
R1 – R5  
Various



RP1- RP4  
10 pin 470ohm



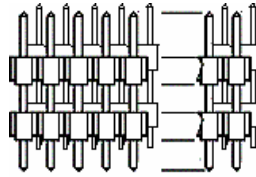
Q1 MosFet  
VN10



CN2  
14 or 16 pin  
header.



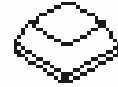
JP1  
2 pin  
header



CN1  
44 pin dual row  
header



Spacer  
0.6"



Support  
for LCD

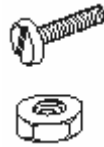


CN4

8 pin dual row  
header



LCD Spacer  
0.25 in



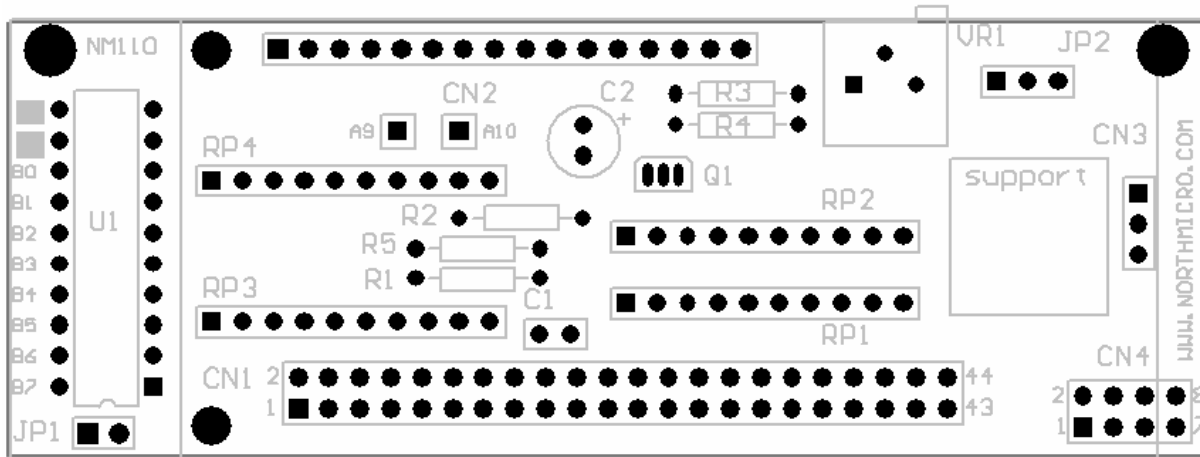
Nuts and bolts  
may be nylon

**PARTS LIST Non Backlit**

C1	0.1uF	U1	10 LED BAR
C2	10uF	U1	20 pin socket
		R3	330 $\Omega$ or 2.2k $\Omega$ 1/4W
CN1	44 pin dual row	R4,R5	10k $\Omega$ 1/4w
CN2	14 or 16 pin connector	RP1,RP2,RP3,RP4	470 $\Omega$ isolated
CN3	Not req		
CN4	8 pin Right angled	support	Rubber Bumper
		LCD spacer	Qty 2
JP1	2 pin	Bolts and nuts	Qty 2
JP2	Not req	Spacer	0.6 in

**PARTS LIST Backlit**

C1	0.1uF	U1	10 LED BAR
C2	10uF	U1	20 pin socket
		R1	4.7 Ω
CN1	44 pin dual row	R2,R4,R5	10kΩ 1/4w
CN2	14 or 16 pin connector		
CN3	Not req	RP1,RP2,RP3,RP4	470Ω isolated
CN4	8 pin Right angled	support	Rubber Bumper
		VR1	10KΩ side
JP1	2 pin	LCD spacer 0.25 in	Qty 2
JP2	Not req	Bolts and nuts	Qty 2
		Spacer	0.6 in
Q1	VN10K		



**NM 110 Component Layout**

