First, you need to build a wiring harness to connect the Rambo headers to the reprapdiscount lcd. I took the short ribbon cables provided and hacked off the end. The I took a 2x4 crimp connector housing to use for the SPI connection and a 2x8 crimp connector housing to use for the Extension 2 connection. In the table below, the reprap discount A connector is also labeled EXP1 and the B connector is labeled EXP2. The connectors when completed should map to the following:

<table>
<thead>
<tr>
<th>Reprapdisc Pin</th>
<th>Rambo Pin</th>
<th>Rambo Pin</th>
<th>Reprapdisc Pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10</td>
<td>VCC</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>MISO</td>
<td>MOSI</td>
<td>B6</td>
</tr>
<tr>
<td>B2</td>
<td>SCK</td>
<td>SS</td>
<td>B4</td>
</tr>
<tr>
<td>A9</td>
<td>GND</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

The completed cable (plugged in) should look like the following:

<table>
<thead>
<tr>
<th>Function</th>
<th>Reprapdisc Pin</th>
<th>Rambo Pin</th>
<th>Rambo Pin</th>
<th>Reprapdisc Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>VCC</td>
<td>VCC</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>GND</td>
<td>GND</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>A4</td>
<td>PG4</td>
<td>PH7</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>EN</td>
<td>A3</td>
<td>PG3</td>
<td>PH2</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>A5</td>
<td>PJ2</td>
<td>PD6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>A6</td>
<td>PJ3</td>
<td>PD5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D6</td>
<td>A7</td>
<td>PJ7</td>
<td>PD4</td>
<td>B7</td>
<td>SDCARDDDTECT</td>
</tr>
<tr>
<td>D7</td>
<td>A8</td>
<td>PJ4</td>
<td>PE7</td>
<td>B8</td>
<td>KILL_PIN</td>
</tr>
<tr>
<td>BTN_ENC1</td>
<td>B3</td>
<td>PJ5</td>
<td>PE6</td>
<td>A1</td>
<td>BEEPER</td>
</tr>
<tr>
<td>BTN_ENC2</td>
<td>B5</td>
<td>PJ6</td>
<td>PE2</td>
<td>A2</td>
<td>BTN_ENC</td>
</tr>
</tbody>
</table>
You’ll note the connector at the upper left is the SPI and the one close to the bottom is the Extension 2 connector. I’ve only used a 2x8 connector in the picture because I didn’t have a 2x10 handy.

Next, you need to modify the arduino environment. Find your pins_arduino.c in the hardware/arduino/cores/arduino/ folder. Look at line 202 for the following stanza:

```cpp
PK , // PK 7 ** 69 ** A15
};
```

You need to add the lines to make it look like:

```cpp
PG , // PG 4 ** 70 ** D50
PG , // PG 3 ** 71 ** D51
PJ , // PJ 2 ** 72 ** D52
PJ , // PJ 3 ** 73 ** D53
```
Then, you need to go down to line 289 which should look like this:

```c
_BV(7)   // PK 7 ** 69 ** A15
```

Make it look like the following:

```c
_BV(7)   // PK 7 ** 69 ** A15
_BV(4)   // PG 4 ** 70 ** D50
_BV(3)   // PG 3 ** 71 ** D51
_BV(2)   // PJ 2 ** 72 ** D52
_BV(3)   // PJ 3 ** 73 ** D53
_BV(7)   // PJ 7 ** 74 ** D54
_BV(4)   // PJ 4 ** 75 ** D55
_BV(5)   // PJ 5 ** 76 ** D56
_BV(6)   // PJ 6 ** 77 ** D57
_BV(2)   // PE 2 ** 78 ** D58
_BV(6)   // PE 6 ** 79 ** D59
_BV(7)   // PE 7 ** 80 ** D60
_BV(4)   // PD 4 ** 81 ** D61
```

Basically, this maps the ports from Extension 2 so that they can be referenced as pins from the arduino libraries.

Next, you'll need to open up the firmware to make the appropriate modifications. First, open up the fastio.h file. Go to line 1387 and insert the following lines:

```c
#define DIO76_PIN PINJ5
#define DIO76_RPORT PINJ
#define DIO76_WPORT PORTJ
#define DIO76_DDR DDRJ
#define DIO76_PWM NULL

#define DIO77_PIN PINJ6
#define DIO77_RPORT PINJ
#define DIO77_WPORT PORTJ
#define DIO77_DDR DDRJ
#define DIO77_PWM NULL
```
Next, you'll need to open up your configuration.h file. You need to add the appropriate lcd sections within the Rambo motherboard section.

Go to line 250 and insert the following lines:

```c
//LCD and SD support
//#define ULTRA_LCD  //general lcd support, also 16x2
//#define SDSUPPORT // Enable SD Card Support in Hardware Console

//#define ULTIMAKERCONTROLLER //as available from the ultimaker online store.
//#define ULTIPANEL  //the ultipanel as on thingiverse

#ifdef ULTIMAKERCONTROLLER //automatic expansion
    #define ULTIPANEL
    #define NEWPANEL
#endif

#ifdef ULTIPANEL
    #define NEWPANEL  //enable this if you have a click-encoder panel
    #define SDSUPPORT
    #define ULTRA_LCD
    #define LCD_WIDTH 20
    #define LCD_HEIGHT 4

    // Preheat Constants
    #define PLA_PREHEAT_HOTEND_TEMP 170
    #define PLA_PREHEAT_HPTEMP 60
```
Lastly, you’ll need to modify your pins.h to reflect the modifications that you added. Starting at line 1204, you should include the following text:

```
#define SDPOWER            -1
#define SDSS               53
#define LED_PIN            13
#define FAN_PIN            8
#define PS_ON_PIN          4
#define KILL_PIN           80
#define SUICIDE_PIN        -1  //PIN that has to be turned on right after start, to keep power flowing.
#ifdef ULTRA_LCD
#ifdef NEWPANEL
 //arduino pin which triggers an piezzo beeper
#define BEEPER 79          // Beeper on AUX-4
#define LCD_PINS_RS 70
#define LCD_PINS_ENABLE 71
#define LCD_PINS_D4 72
#define LCD_PINS_D5 73
#define LCD_PINS_D6 74
#define LCD_PINS_D7 75
//buttons are directly attached using AUX-2
#define BTN_EN1 76
#define BTN_EN2 77
#define BTN_ENC 78  //the click
#define BLEN_C 2
#define BLEN_B 1
#define BLEN_A 0
#define SDCARDDETECT 81    // Ramps does not use this port
//encoder rotation values
#define encrot0 0
#define encrot1 2
#define encrot2 3
```
And that’s it. When you power up it all should work!