Fixing the Linksys WMLS11B Wireless Music System LCD Display

This paper presents a simple modification to the Linksys WMLS11B Wireless Music System that will greatly increase the readability of the display from above the unit. The modification adds a potentiometer to the unit allowing you to adjust the display contrast for a preferred viewing angle. The viewing angle range is small but acceptable. The modified unit is a pleasure to use. Here is what you can get with the modification.

I mounted the new contrast potentiometer on the top of the center unit on the left side. I'd like to say that I chose this spot for its artistic balance with the antenna; but in reality the case interior presents few options to mount readily-available potentiometers.

This modification requires reasonable skill with a small soldering iron as connections are required to surface-mount components on the display PC board. So if you're still interested, gather your parts, warm up your tiny iron and get out the tools. If you're over 50 like me, you'll need a big magnifier, too.

A brief scan of manufacturer's LCD literature shows that most monochrome LCD displays require a bias adjustment for contrast. This is often provided by a potentiometer or other means of adjustment available to the user. Linksys chose to eliminate the adjustment and instead used two fixed resistors on the upper PC board located under the plastic display holder marked R12 and R13. We will be tapping those resistors and adding in an adjustable voltage through a high-value resistor. The circuit is extremely simple. A potentiometer is connected across the 5 volt supply. The wiper of the pot connects to a 3.3 megohm resistor. The other end of the 3.3 megohm resistor connects to R12 and R13 on the display board.

First up is a visit to a parts store. You will need a small 5/8" diameter potentiometer with a shaft, a knob, a 3.3 megohm resistor and some fine wire. The value of the potentiometer is not critical, anything from 5K to 100K will be suitable. Try to get a linear taper if possible, but an audio taper will work. If you're stuck with Radio Shack, get their 271-215 10K miniature audio potentiometer and 271-1365 5-pack of 10 megohm 1/4W resistors. You may want to get some wire-wrap wire or other AWG 28 to 30-gauge insulated wire. Wire taken from an excess 40-pin IDE cable will work also. Avoid magnet wire as it is hard to strip. Any color will do. I used different colors for the photography.

First, you'll have to open the center unit. An excellent tutorial is available elsewhere on this group. Set the top cover aside. Remove the four display-board mounting screws and gently wiggle the board to disengage the connector from the lower board. Set the display board aside.

Remove the three screws from the lower board and gently lift the top edge of the lower board away from the bottom case half to provide clearance for your drill bit. A pen or pencil makes a good prop.

Using a 5/16" drill bit or step-bit, drill a hole in the top of the rear case about 5/8" from the outer edge and 3/8" down from the upper edge.
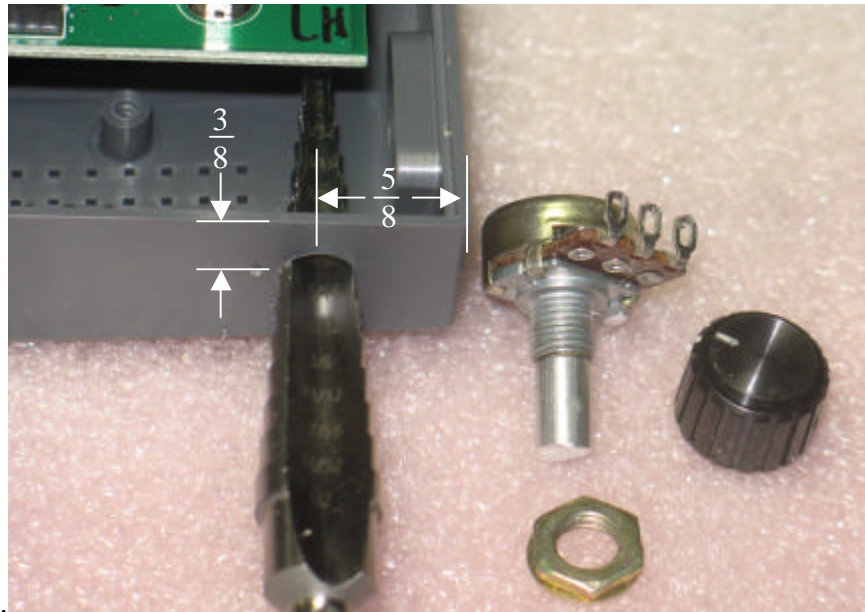

The potentiometer I used is slightly different from the Radio Shack one but is almost the same size. Remove the rear switch and metal barrel from the RS pot to get it to fit.

Now mount the potentiometer in the case. Check the fit with the case top half. You may have to rotate the pot to get everything to fit. I used a sloppy ¼" washer under the pot to give a little clearance for the lip on the top case half. Install the knob on the pot.

Knob
Pot nut
¼" washer
Potentiometer
Display board
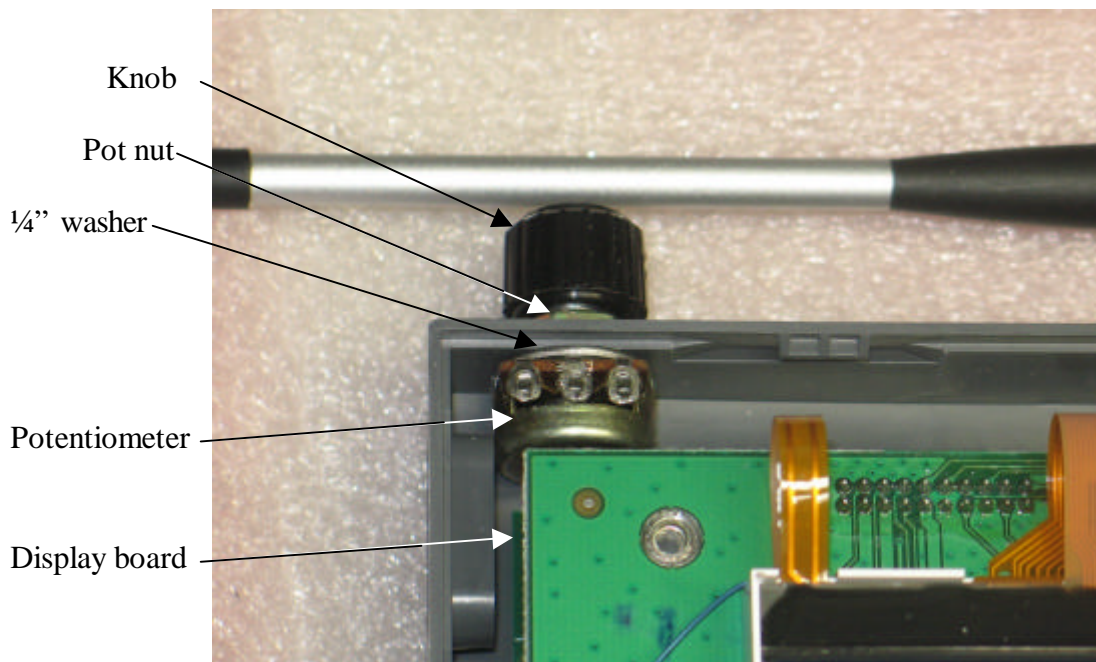
Set the lower case half with the new potentiometer aside.

Warm up your smallest soldering iron and get the display board removed earlier. From the back of the board, unclip the four white plastic snap-catches holding the display. Unfold the display from the board and set the assembly on a soft surface. Solder a 6-inch piece of wire-wrap or other fine wire to the end of R12 between R12 and R13. Call this wire the "contrast wire".

Contrast wire
R13
R12
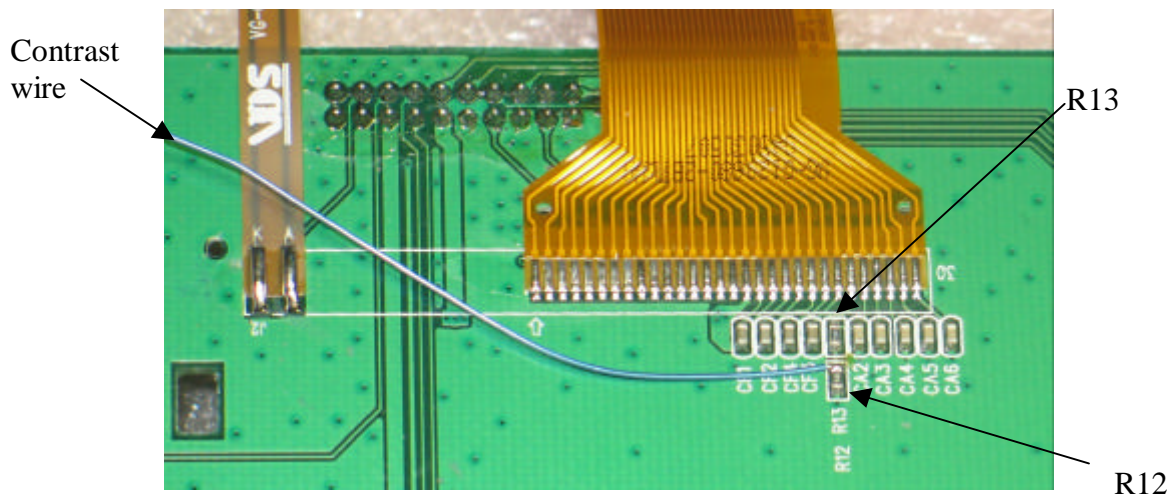
Now we'll get +5 volts for the potentiometer. This is available from the IR receiver unit at the bottom of the display board. Solder an 8-inch piece of fine wire to the upper end of C1, just to the left of the IR receiver. Call this the "5 volt wire".
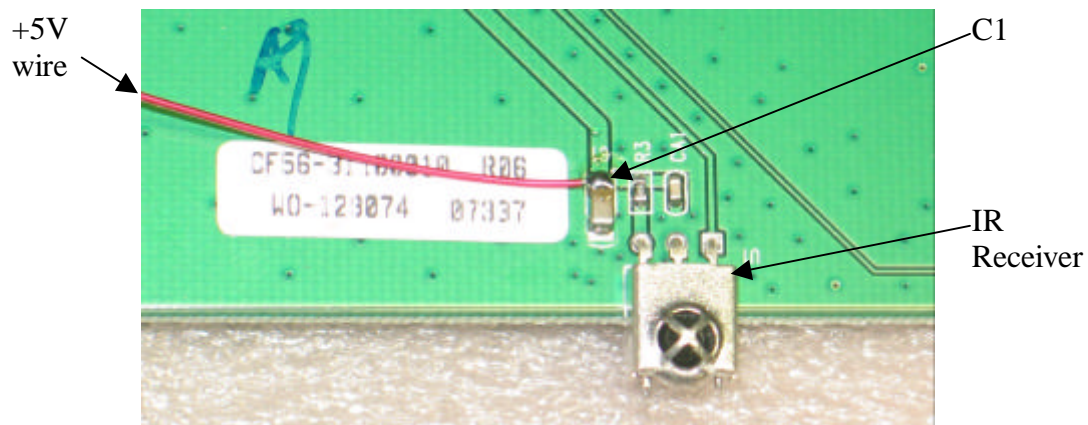
Reinstall the display on the PC board. Reinstall the three screws fastening the bottom PC board and reinstall the display board to the bottom board, carefully mating the connector between them. Install three display board mounting screws, leaving out the one nearest the new pot. We're now ready to wire up the pot.

First, solder the 3.3 megohm resistor to the pot wiper. If you're stuck with Radio Shack 10 megohm resistors, twist three together in parallel. This is not shown in the following picture, so use your imagination.

Next, solder the "5 volt wire" to the right potentiometer lug.

Then solder the "contrast wire" to the free end of the 3.3 megohm resistor (or the wad of 10 megohm resistors if you had to use them).

Solder a 2-inch piece of wire to the left lug of the pot. This will be the ground wire. Strip the other end and loop it around the remaining display board screw. Install the screw in the hole nearest the new pot.

The completed assembly is shown in the following picture. I used a red wire for the 5 volt wire, a blue wire for the contrast wire and a black wire for the ground wire. The electrons don't care, I did this to make the pictures easier to follow.

After the picture was taken I added some electrical tape to the joint between the contrast wire and the 3.3 megohm resistor.

Pot wiper   Contrast wire

Ground screw and wire

Ground wire

3.3 megohm resistor

3.3M free end

Contrast wire
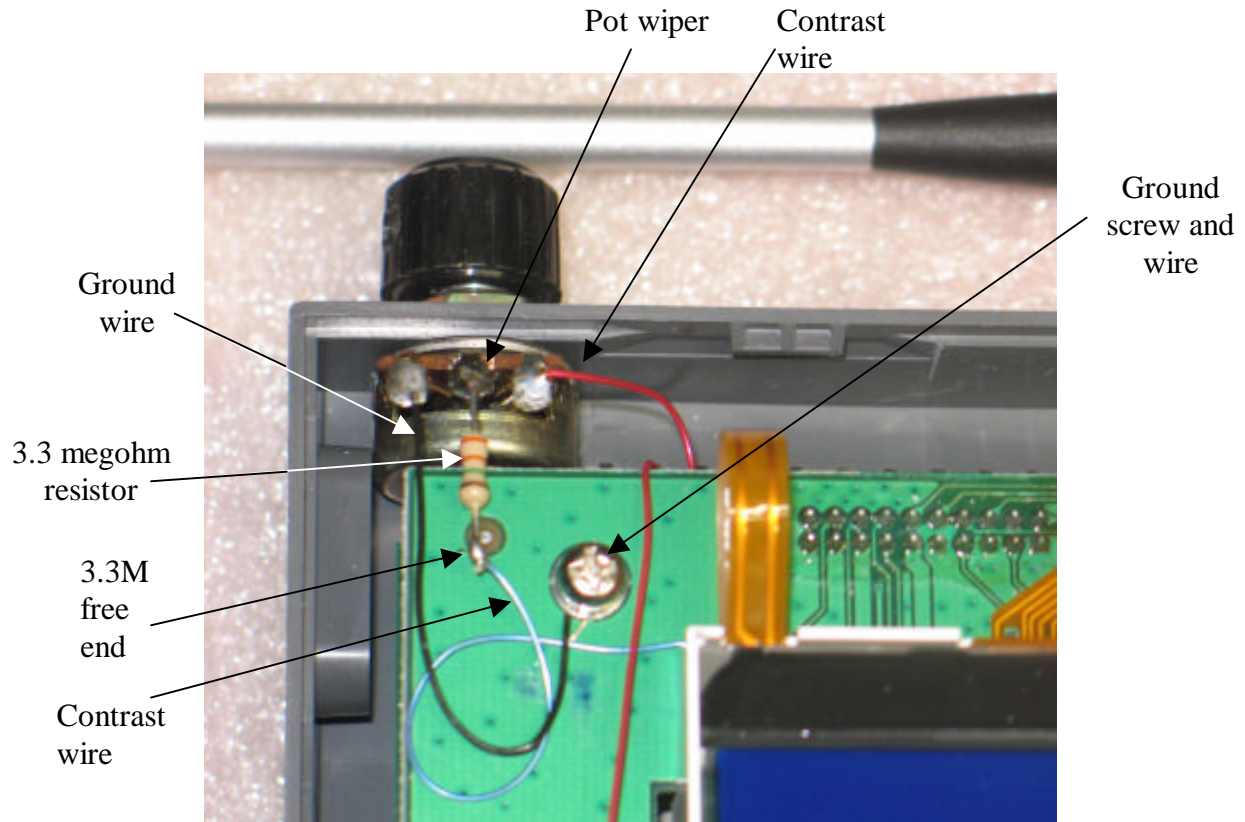
This completes the wiring. You can connect the 12 volt power supply to the unit and test your creation. Note how the display changes from all-blue, to reversed, to readable, to purple, to faded, and then to all-white as you rotate the pot. This is a normal characteristic of a TN display. Adjust it for best contrast at your preferred viewing angle. The best adjustment will drift somewhat with temperature as the unit warms up.

Reassemble the unit and enjoy. Good luck.

--Nevell Greenough, 4/17/2007