

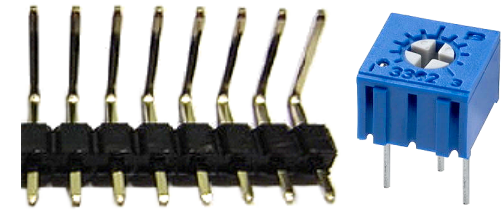
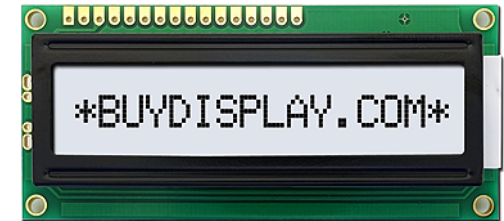
α JUNO-1, 2 & HS-10 LCD DIY v.20190129

This hack was made out of desperation when I was unable to find a reasonably priced drop-in LCD replacement for my trusty Roland Alpha Juno-1 (AJ-1). It started emitting an annoying high-pitched shrill from the Voltage inverter circuit... a common problem with the Alpha Juno and HS-10. Not including the minimal shipping costs for parts, the price to get everything working was very inexpensive at less than \$9 (USD). I call this a “hack” because it’s not a “Drop-In” solution. You will need to remove and replace a resistor on the Main PCB, remove an inductor from the PSU Board and (only for the AJ-1 and HS-10) make a bracket to properly align the LCD in the viewing window. All three synths share the identical Hitachi HD44780 LCD controller but the only difference is the silkscreen markings on the Main PCB for the contrast resistor. The contrast resistor used for the AJ-1 and HS-10 is **R47**. On the Alpha Juno-2 (AJ-2) it’s **R66**. Benefits of this new LCD are:

- ▶ The LCD backlight uses a super bright LED, not an Electroluminescence (EL) display like the old one. No more worries because the high Voltage inverter circuit is no longer needed for the EL so no more high-pitched shrill!
- ▶ There are 4 color choices available online at buydisplay.com. My favorite is the Black/White display*. Unlike my old faded blue LCD, the characters are crisp, clean and highly visible even in a brightly lit room

PARTS

The LCD model I used for my AJ-1 is the first LCD on the parts list below*. I’ve tested all the colors shown below and they all work but... I prefer the nice crisp, clear and bright Black/White display over the rest. The Black/Yellow-Green is nice and very bright but it’s a horrendous monkey vomit green color. The White/Black model and the White/Blue are just OK. They both look a little washed out at the maximum contrast because of the dark background mixed with the LED. Most of the parts are common and available from Tayda or eBay. Buying your LCD direct from the buydisplay.com website is preferred because they will solder the required 14-pin header onto the LCD for you. Also, their shipping charge is super cheap. There are different buying options for the LCD. If you follow this DIY implicitly, you **must** buy the 5V version and with a pre-soldered 14-pin connector. I recommend using the “Jumper Wires Method” described here because it helps to eliminate any soldering errors. If you want to cut corners and solder wires directly onto both PCB’s... go for it (see the **OPTIONAL ASSEMBLY METHODS** on Page 6 because you will need to order a different LCD configuration). If you make a mistake, it’s much easier to back-out when using the jumper wires and/or replace the LCD again down the road, if needed. I think the jumper wires make the installation much easier



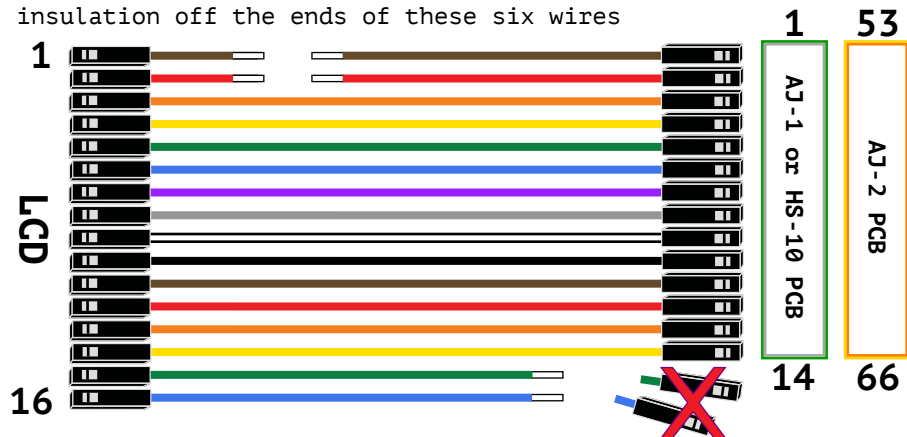
QUAN	P/N	DESCRIPTION	PRICE (USD)	VENDOR
1	ERM1601FS-2*	BLACK/WHITE 16x1 CHARACTER LCD - CHOOSE 5V w/14-PIN CONNECTOR PRE-SOLDERED	\$3.39	buydisplay.com
1	A-610	5K OHM TRIMMER POTENTIOMETER CERMET 1 TURN 3362P	\$0.19	taydaelectronics.com
1	A-2374	JUMPER WIRES FEMALE/FEMALE 200MM 40 PACK	\$3.99	taydaelectronics.com
1	A-197	40 PIN 2.54MM SINGLE ROW PIN HEADER STRIP (ONLY REQUIRED FOR AJ-2)	\$0.15	taydaelectronics.com
1	A-199	40 PIN 2.54MM RIGHT ANGLE SINGLE ROW PIN HEADER (ONLY REQUIRED FOR AJ-1 OR HS-10)	\$0.17	taydaelectronics.com
1	11998	GIBRALTAR GALVANIZED STEEL STEP FLASHING (ONLY REQUIRED FOR AJ-1 OR HS-10)	\$0.30	homedepot.com
	ERM1601SBS-2	WHITE/BLUE 16x1 CHARACTER LCD - CHOOSE 5V w/14-PIN CONNECTOR PRE-SOLDERED	\$2.95	buydisplay.com
	ERM1601DNS-2	WHITE/BLACK 16x1 CHARACTER LCD - CHOOSE 5V w/14-PIN CONNECTOR PRE-SOLDERED	\$3.24	buydisplay.com
	ERM1601SYG-2	BLACK/YELLOW-GREEN 16x1 CHARACTER LCD - CHOOSE 5V w/14-PIN CONNECTOR PRE-SOLDERED	\$2.95	buydisplay.com

There are three sections to this DIY: **ASSEMBLY**, **LCD PLACEMENT** and **DISABLING THE INVERTER**. ASSEMBLY and DISABLING THE INVERTER are the easy parts. If you have the AJ-1 or HS-10, the hardest part will be the LCD PLACEMENT because you will need to make a new bracket. However, no bracket is needed for the AJ-2. Just screw the LCD into the old spot

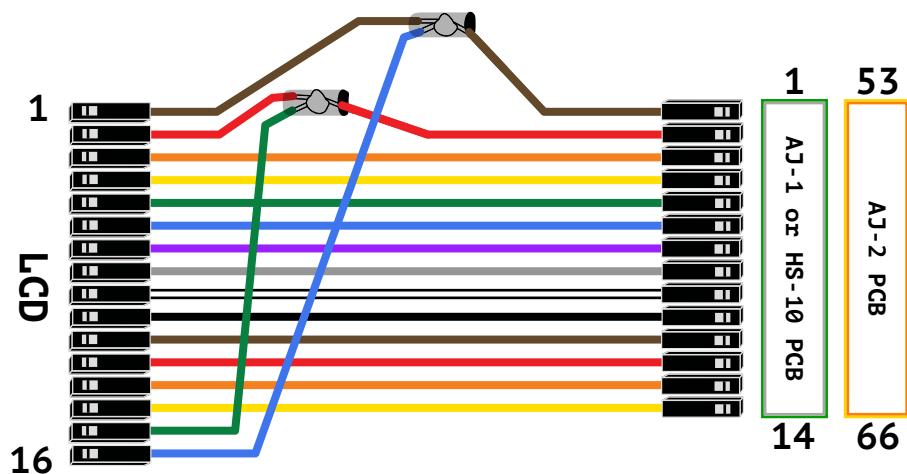
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ASSEMBLY

Peel off a group of 16 wires from the 40 pack of Female/Female jumper wires. Keep them connected in a strand. Cut the 1st and 2nd wires 40mm from the end of the LCD side. Cut the female connector off one end of the 15th and 16th wires 40mm from the end of the opposite side and discard. Strip a 5mm section of insulation off the ends of these six wires



Solder the 16th wire to both ends of the 1st wire then solder the 15th wire to both ends of the 2nd wire as shown below



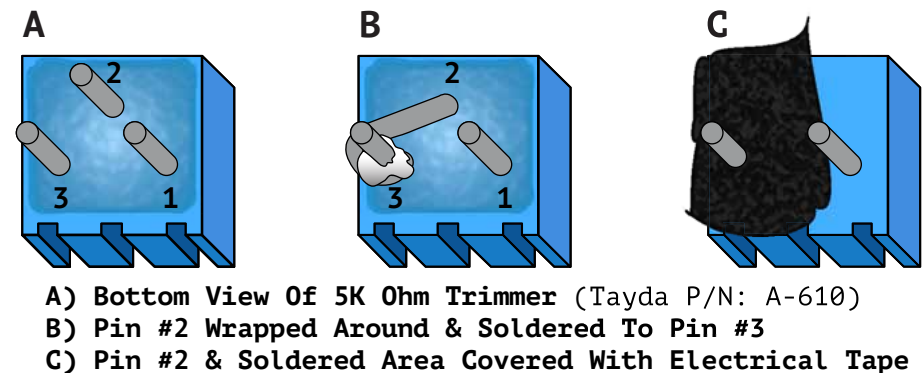
Cover all solder joints with shrink wrap or electrical tape to prevent any short circuits

Get your Anti-Static Wrist Strap and use proper grounding procedures before continuing. Finding a replacement Alpha Juno

or HS-10 PCB is uncommon if you zap any of those rare IC's! Unplug your synth from the electrical outlet and open the case. **Use extreme caution when removing the Main PCB from the AJ-2! See the warning and pics at this link: <http://bit.ly/2S6VX8m>**

Unplug the LCD ribbon cable and all of the white wire harness connectors from the Main PCB. Remove the LCD. Remove the Main PCB and place it upside-down on a static-free workbench. Very carefully unsolder the black 14-pin ribbon connector from the Main PCB at location **CN9** (AJ-1 & HS-10) or **53 to 66** (AJ-2). When unsoldering this part, take extreme care not to damage any of the thin and fragile PCB traces on the top and bottom of the PCB. Clear away excess solder from the holes. The best way I've found to unsolder this part is by using stainless steel desoldering needles. See this link for details: <http://bit.ly/1Jb7qdr>

Next, unsolder the 5.6K Ohm resistor at location **R47** (AJ-1 & HS-10) or **R66** (AJ-2). This resistor is located just above the black ribbon connector. Clear away any excess solder from the holes. You will be replacing the old 5.6K Ohm resistor with a 5K Ohm Trimmer which is used to adjust the contrast (Tayda P/N: A-610). The value of the old 5.6 Ohm contrast resistor is too large and will not work with the new LCD. The 5K trimmer is added to fine-tune the contrast. You set it once and forget it. Turn trimmer upside down and wrap pin #2 around pin #3 and solder them together. Wrap pin #2 and soldered area with electrical tape

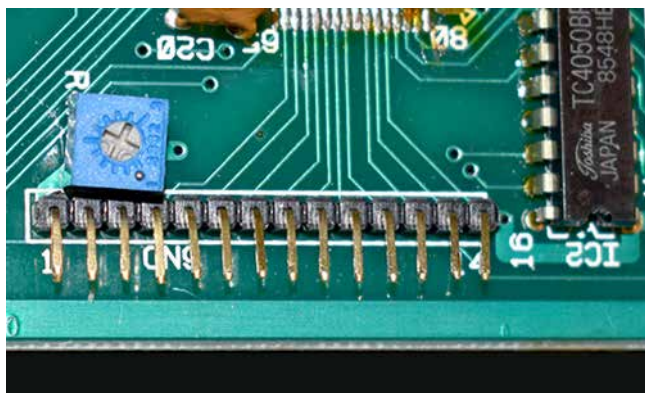


Insert the remaining two pins of the trimmer into location **R47** (AJ-1 & HS-10) or **R66** (AJ-2). Ensure that pin #1 is inserted into the hole nearest the row of empty holes leftover from the old ribbon connector and solder the trimmer in place (Figure A). For the AJ-2, you may need to carefully and slightly bend the small capacitor at **C48** to make room. Solder the 14-pin header in place where the black 14-pin ribbon connector used to be (Tayda P/N: A-199 for AJ-1 & HS-10 or P/N: A-197 for AJ-2). For the AJ-1 &

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ASSEMBLY (continued)

HS-10, ensure the right angle pins face away from the trimmer (Figure A). Connect the jumper wires in correct order (Refer to the diagrams on page 2). Plug the side with 16 wires onto the LCD pin header. You will most likely be looking at the LCD upside-down when installing it. When viewing it upside-down, Pin 1 on the LCD will be on the far left side (Figure C). Note that unlike the AJ-1 & HS-10, the AJ-2 PCB pins start at #53 and end at #66. i.e Connect LCD1 to 53, LCD2 to 54 and so on. After connecting all jumper wires, **DOUBLE-CHECK** that you have the correct wires going to the correct pins. Otherwise, you could fry the LCD. Power on! Fine-tune the contrast using the 5K Ohm trimmer before mounting the LCD inside the case. Much easier!



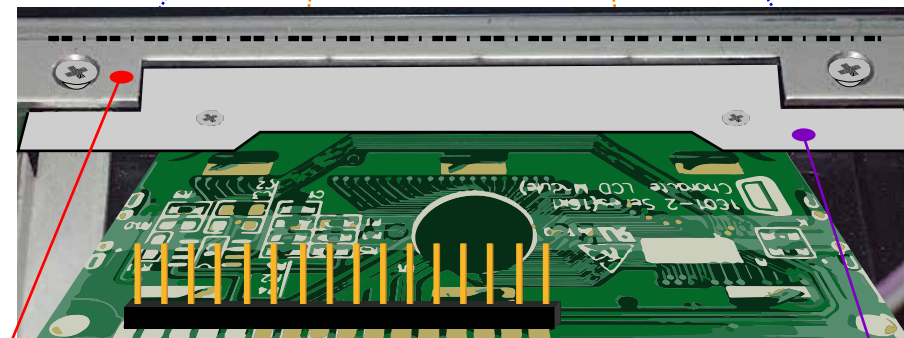
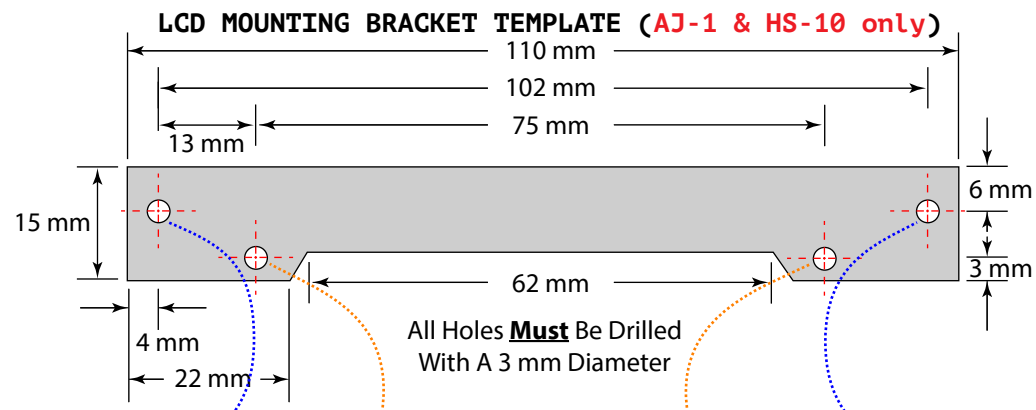
(Figure A - AJ-1 / HS-10)

LCD PLACEMENT (AJ-1 and HS-10 only)

For the AJ-1 and HS-10, this is the most difficult part of the DIY. For the AJ-2 it's super easy. The new LCD will not fit exactly in the same location as the old one. The alignment is slightly off by a few millimeters. The screw holes will not match-up. If you use them, the new LCD sits too high in the viewing window and some of the text is cut off. To fix this, I have supplied some suggestions for making your own mounting bracket. Feel free to improvise your own solution

I took an extremely thin piece of galvanized sheet metal (HomeDepot P/N: 11998) and created an extender bracket for the screw holes. This effectively lowers the LCD assembly into the correct viewing alignment. When printing this bracket template, don't "FIT" or "SCALE" the page. It will not be printed with the proper dimensions. Print it at "ACTUAL SIZE"

Use two 3mm screws with nuts and attach the LCD to the new bracket (Figure B). Ensure the nuts are on the same side as the LCD viewing window. Use a small strip of electrical tape to insulate the metal bracket from the LCD PCB. Unscrew two of the flat screws from the metal plate inside the case (Figure B) and attach the new bracket with the LCD in-between the existing metal bracket and the plastic case (Figure B). You may need to snip off the very top section of the two plastic holders inside the AJ-1 & HS-10 case in order to make the LCD slide into place. Check the LCD alignment in the viewing window. Make any adjustments if the angle is askew or if any text is blocked



(Figure B)

Factory Installed Metal Bar And Screws

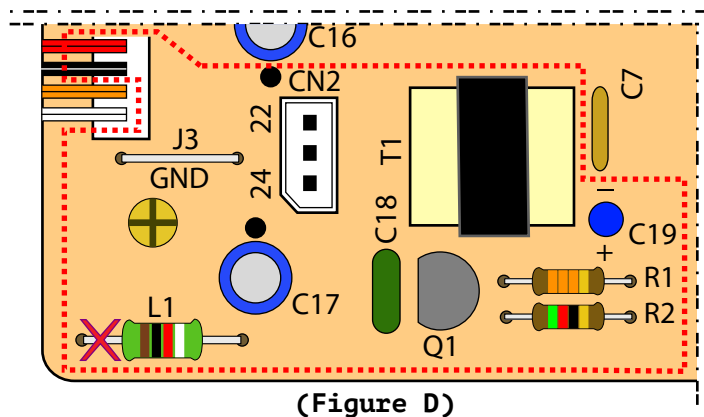
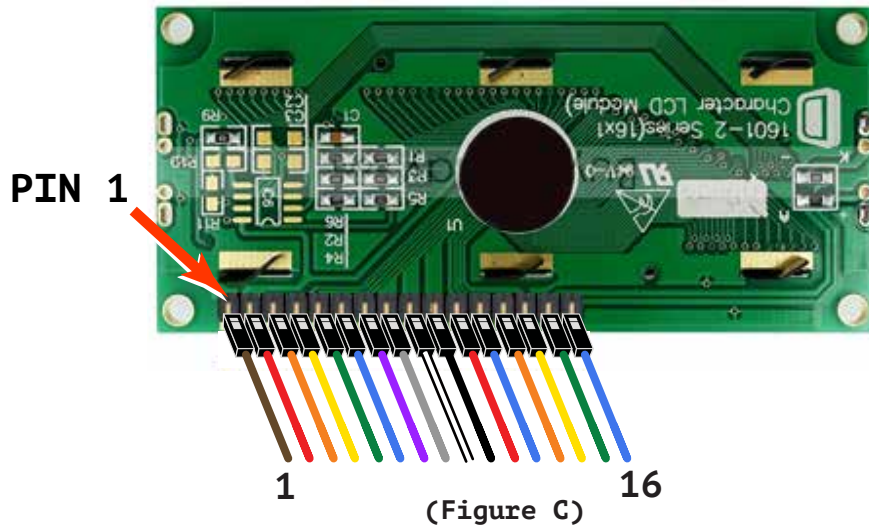
New Bracket and 3mm Screws - Place Underneath Metal Bar

NOTE: When printing the bracket template, do not "FIT" or "SCALE" the document or else it won't be printed with the proper dimensions. Print this page "ACTUAL SIZE" and "LANDSCAPE"

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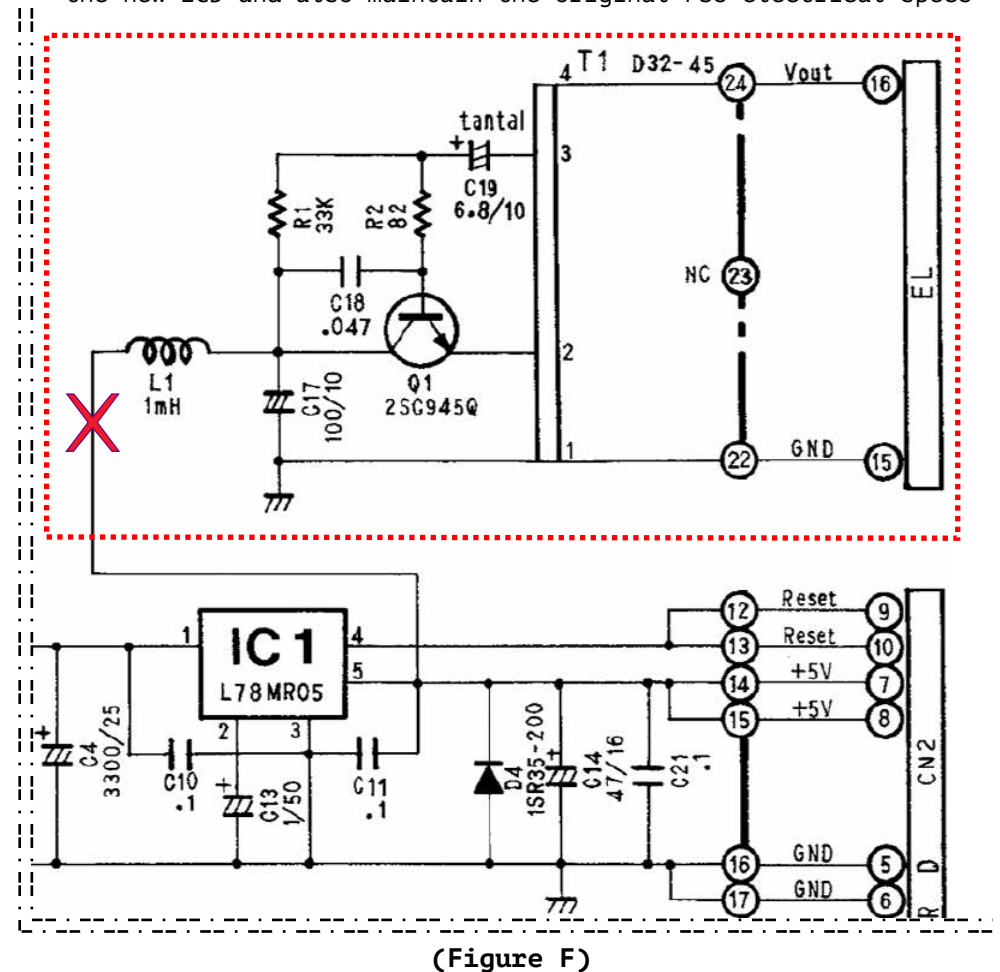
LCD PLACEMENT (AJ-2 only)

The most difficult part of the LCD placement for the AJ-2 will be finding four tiny screws to attach it to the frame. The screws from the old LCD are too short. The machined thread pitch of the screws is extremely small... like the size of screws used for eyeglasses. The diameter is somewhere between 1.25mm and 1.5mm... even smaller than an M2 screw. Luckily, I had some sitting around the house. However, you may not be so lucky. They are definitely an oddball size. Once you find four screws that fit, simply align the LCD and screw it onto the case



DISABLING THE INVERTER

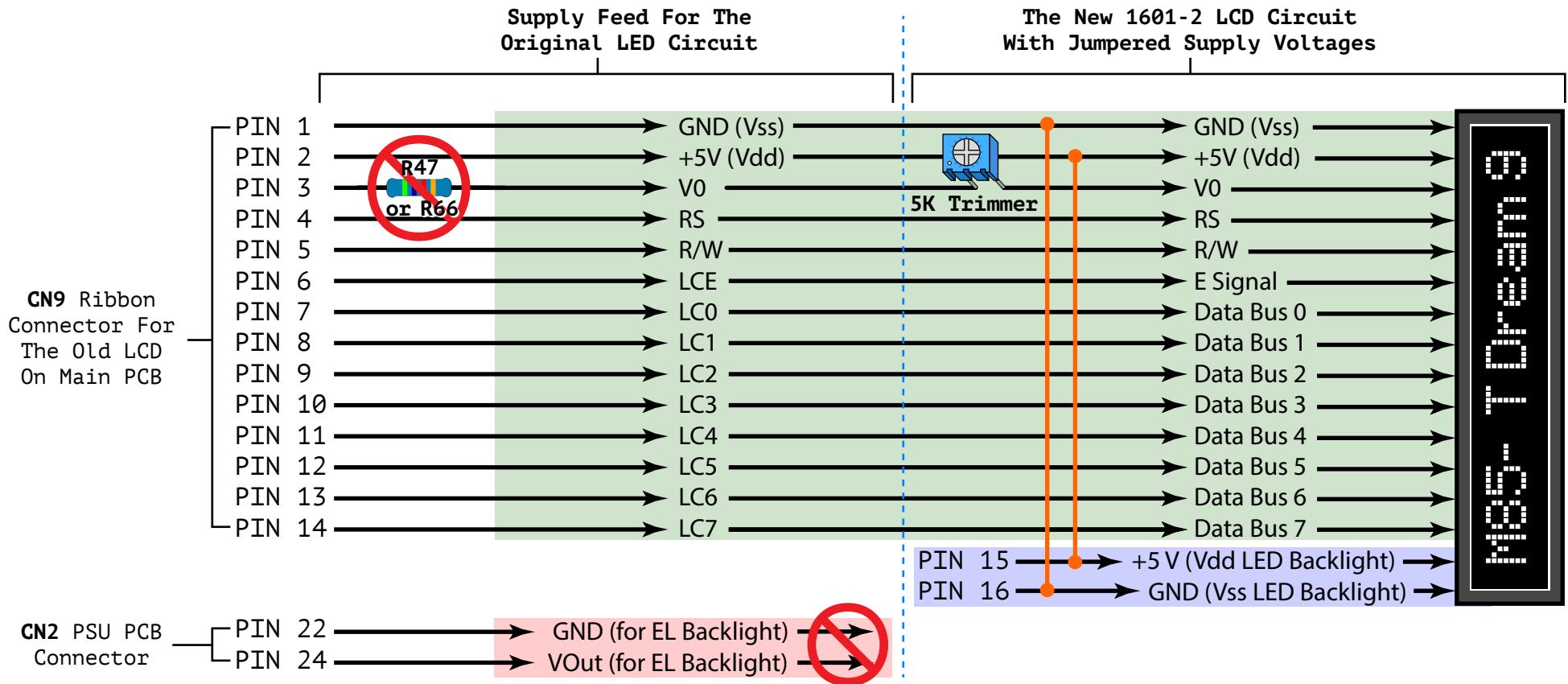
Figure D shows a top-view section of the AJ-1, AJ-2 and HS-10 Power Supply Unit PCB (PSU). Disabling all components in the inverter circuit is very easy. Simply unsolder (or use wire cutters) and completely remove the inductor at location L1. As you can see in a section of the PSU schematic (Figure F), there is a single Voltage feed line coming from the main power supply. After removing this single line (X), the inverter circuit is disabled. So why disable the inverter if the cable at CN2 is disconnected? This is because the transformer at T1 is still drawing a small amount of current from the PSU. Disabling this part of the circuit frees up wasted power which we can use for the new LCD and also maintain the original PSU electrical specs



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BEHIND THE SCENES

- These 14 lines are identical for the old LCD and the new 1601-2 LCD so they are simply jumpered pin-for-pin to send out the character data and supply Voltages. Unfortunately, the resistor value of 5.6K Ohm at location R47 is too large for the new 1601-2 LCD contrast value and it must be replaced with a lower value. The recommended substitute is a 5K Ohm trimmer for an easy “set-and-forget” adjustment. A 2K Ohm resistor may also be installed in place of the trimmer as a static value (Note: Depending on which LCD model you buy, you may need to experiment with other resistor values anywhere from 1K Ohm to 3K Ohm)
- The new 1601-2 LCD requires an additional +5VDC Voltage supply line for it’s LED backlight so we tap from the existing +5VDC and GROUND lines from pin #1 and pin #2 and route them over to Pin #15 and Pin #16
- These two lines supply a high Voltage AC supply from the inverter circuit to power the EL backlight on the old LCD. This part of the circuit supplies a very high AC Voltage which is around the 100VAC range. This section is no longer needed anymore so it can be disconnected. Removing the inductor (L1) from the PSU Board is recommended



Note: Pins 22 and 24 shown above are not used for the jumper wires and wiring diagrams shown on the previous pages. These are shown here to help explain the original LCD circuit wiring

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OPTIONAL ASSEMBLY METHODS & PARTS

It's possible to omit the 5K Ohm trimmer and simply add a regular 2K Ohm 1/4W resistor in it's place. This will keep the LCD contrast at a constant level which is very close to the maximum brightness. Depending on the color LCD model you buy, you may need to experiment with different resistor values anywhere from 1K Ohm to 3K Ohm. I've found from experience that the 5K Ohm trimmer is the preferred method to use because you can fine-tune the LCD contrast level to make the display look it's best. The 5K Ohm trimmer is a common part. It's a CERMET 1 TURN 3362P. Vendors other than Tayda Electronics selling this part are:

mouser.com P/N: 652-3362P-1-502LF

digikey.com P/N: 3362P-502LF-ND

alliedelec.com P/N: 70154054

If you want to cut corners and solder wires directly onto the LCD and the Main PCB, use the same wiring diagrams but simply ignore the female jumper blocks on the end of the cables in those diagrams. Use #24 gauge wire in place of the female jumper wires. I highly recommend using the jumper wires and pin headers because of the easy color coding and assembly (or disassembly, if needed). If you decide not to use jumper wires, make sure that you purchase your new LCD *without* the optional 14-pin connector pre-soldered in place so the PCB trace holes are empty for soldering!

I chose the Gibraltar Galvanized Steel Step Flashing for the bracket because it is extremely thin. There is zero clearance between the metal bar inside the case (Figure B) and the bottom of the keys. If you use thick metal for the new bracket, it will press against one or more keys and simulate a stuck note. Other items I've had good luck with for similar brackets is by using the metal from an old license plate or tin from a baking pan. Both are thin and rigid. Use a drill press if possible

DISCLAIMER

The modifications used here were performed on an Alpha Juno-1 manufactured March 1986 and on an Alpha Juno-2 manufactured January 1987. Both of these synths were some of the earliest production models they made. Roland may have retooled their equipment and made changes to the case. If you find errors in this document because your synth is a later production model, please send me an eMail so I can keep this document accurate. Thanks!

eMail: llamamusic@hotmail.com

Modifications made to factory stock synths will always pose an element of risk. Sometimes mistakes are made which are irreversible. The author is not responsible for any damage or injury resulting from this DIY info. Use this DIY information at your own risk and be sure to always wear eye protection when soldering. That stuff flies everywhere!!!



ERM1601FS-2
BLACK/WHITE



ERM1601DNS-2
WHITE/BLACK

ERM1601SYG-2
BLACK/Y-G

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