SP-700 LCD REPLACEMENT DIY

After this DIY was created, sampler enthusiast and designer **Pit Sehl** has developed a custom PCB for this DIY which eliminates a lot of extra desoldering work shown in this document. See _**"SP-700 CUSTOM PCB MOD"**_ on Page 7 for more info. S-750/S-770 upgrade? **Geert Heyrman** has supplied additional tech info on Page 7 for these

Two of the most common failures on the Roland SP-700 are a dim LCD or a high pitched shrill from a defective high voltage inverter which supplies current to the LCD's electroluminescent backlight. Not including the minimal shipping costs for parts, this is a very cost effective DIY to replace the LCD. The price to get everything working is under $30 (USD). This DIY requires intermediate soldering skills and a set of high quality desoldering tools for the task. I'll call this DIY a "hack" because it's not a "drop-in" solution. However, it's a lot better than a dim LCD or listening to the wailing cries of a banshee from Hell. Two issues which make this a hack are:

▶ The original LCD required high voltage levels from the inverter circuit to power the blue electroluminescent backlight. The new LCD does not require an inverter so that old section needs to be completely disconnected from the circuit. This requires removing one capacitor and one resistor from the SP-700 Main PCB

▶ Two additional wires, two 10-pin headers and an extra resistor are added into the LCD circuit

PARTS

The LCD screen model I used for my SP-700 is the first one shown on the list*****. I'm 99.999% sure the other three models shown below will work just as well. From looking at the other LCD datasheets, the only differences I can see are the display colors. The display quality of the White/Blue model is extremely bright, crisp, clear & easy to read. The header pins, hookup wire, heat shrink and 100 Ohm 1W resistor are very common parts and can be found at Mouser, eBay or taydaelectronics.com

QUANTITY	PART NUMBER	DESCRIPTION	PRICE(USD)	VENDOR
1	**ERM24064SBS-1***	**WHITE/BLUE 240x64 CHARACTER LCD**	$26.00	**buydisplay.com -or- eBay**
1	**A-2374**	**PACK OF 40 JUMPER WIRES FEMALE/FEMALE**	$ 2.99	**taydaelectronics.com**
1	**A-2271**	**100 OHM 1W METAL FILM RESISTOR**	$ 0.05	**taydaelectronics.com**
1	**A-4979**	**50cm 24AWG HOOKUP WIRE**	$ 0.10	**taydaelectronics.com**
1	**A-197**	**40 PIN 2.54MM SINGLE ROW HEADER PINS**	$ 0.15	**taydaelectronics.com**
1	**A-4918**	**20CM BLACK HEAT SHRINK TUBING 6MM**	$ 0.15	**taydaelectronics.com**
- - - - - - -	- - - - - - - - - - -	- -	_$26.00_	- - - - - - - - - - - - - - - - - - -
_1_	_ERM24064FS-1_	_Black/White 240x64 Character LCD_	_$28.00_	_buydisplay.com or eBay_
_1_	_ERM24064DNS-1_	_White/Black 240x64 Character LCD_	_$26.00_	_buydisplay.com or eBay_
_1_	_ERM24064SYG-1_	_Black/YelGrn 240x64 Character LCD_		_buydisplay.com or eBay_
_1_	_A-198_	_2.54MM Double Row Pin Header Strip_	_$ 0.21_	_taydaelectronics.com_

**NOTE: This last item (A-198) is required if you did not order your LCD with the recommended 2 x 11 Pin Header**

* VERY IMPORTANT
When placing your order for the LCD from buydisplay.com, choose the extra option with the 2 x 11 Pin Header (Soldered onto display). This costs an extra 59¢ but it is required and well worth the extra money!

BEFORE YOU BEGIN TEARING STUFF APART, PLEASE READ THROUGH THIS ENTIRE DOCUMENT

MODIFY THE JUMPER CABLES

Separate two jumper cables from the bundle and cut off the female connector on one end of each cable. Strip a small 1cm length of insulation from each end. Solder the 100 Ohm 1W Metal Film Resistor onto one end of a jumper wire and solder the other end of the 100 Ohm 1W Metal Film Resistor onto a piece of 150mm 24AWG hookup wire. Solder a piece of 150mm 24AWG hookup wire to the end of the other jumper cable. Place heat shrink over the resistor and all exposed solder connections. Make everything match up with the image shown in **Figure 1**
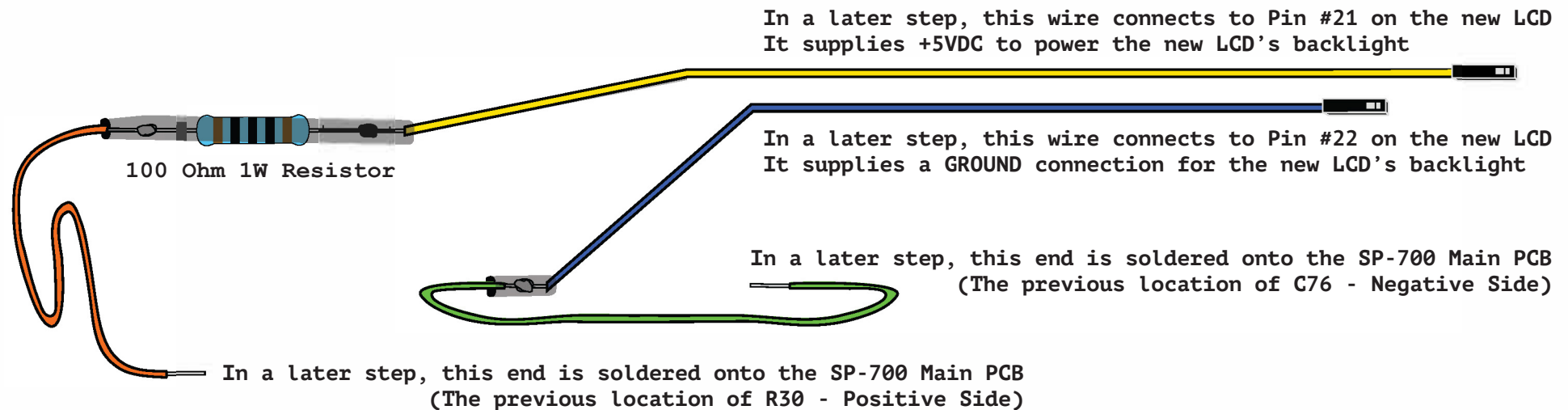

In a later step, this wire connects to Pin #21 on the new LCD
It supplies +5VDC to power the new LCD's backlight

100 Ohm 1W Resistor

In a later step, this wire connects to Pin #22 on the new LCD
It supplies a GROUND connection for the new LCD's backlight

In a later step, this end is soldered onto the SP-700 Main PCB
(The previous location of C76 - Negative Side)

In a later step, this end is soldered onto the SP-700 Main PCB
(The previous location of R30 - Positive Side)

Figure 1

REMOVE COMPONENTS FROM SP-700 MAIN PCB AND FRONT PANEL

Ensure that you are using an anti-static wrist strap, working on a static-free workbench and wearing eye protection! Unplug the 2-wire harness from connector CN4. Unplug the flex ribbon cable from connector CN5. Unscrew the black Plexiglas bezel and the old LCD PCB and remove it from the front panel. Carefully unplug all of the cable harnesses attached to the SP-700 Main PCB (CN1, CN2, CN3, CN4, CN5, CN6, CN7, CN8). There is a screw hidden from view which attaches the Main PCB onto the case. You will need to remove the back panel to gain access to this hidden screw. Remove all screws from the main PCB, remove the PCB and place it on a static-free workbench

The PCB traces on the double sided PCB are very, very thin and it's easy to accidentally break or lift a trace so **be extremely careful** when unsoldering the next three components. Unsolder the resistor at R30, the capacitor at C76 and the CN5 Connector. It is important to remove any excess solder from all of the empty holes so the replacement parts will fit properly. The components to be removed are shown in **Figure 2** on the next page and are outlined in **red**
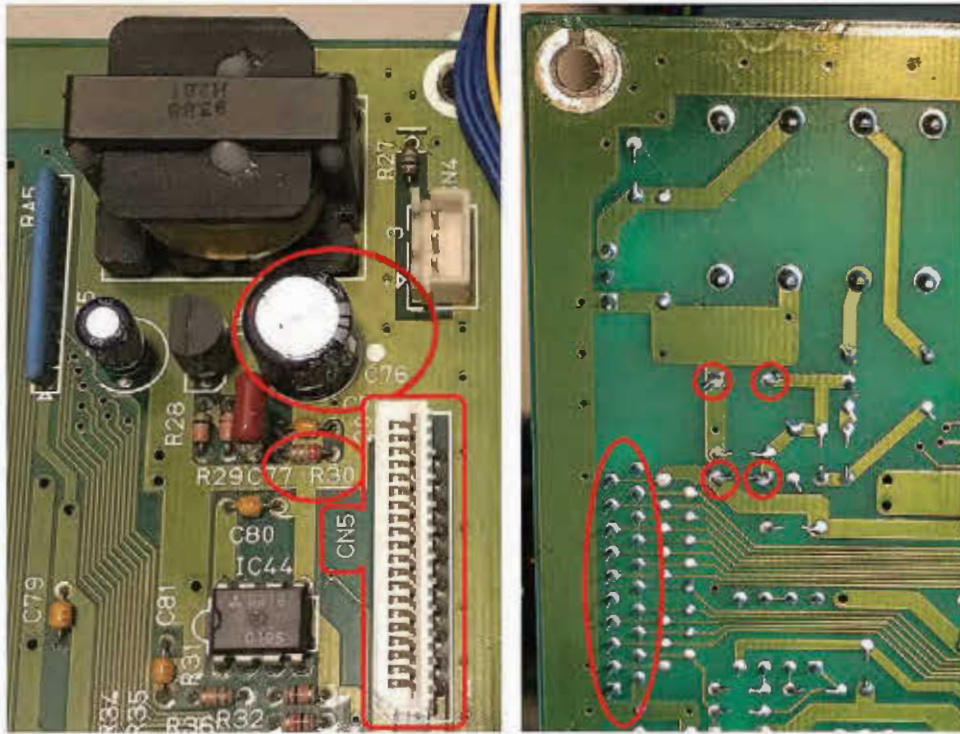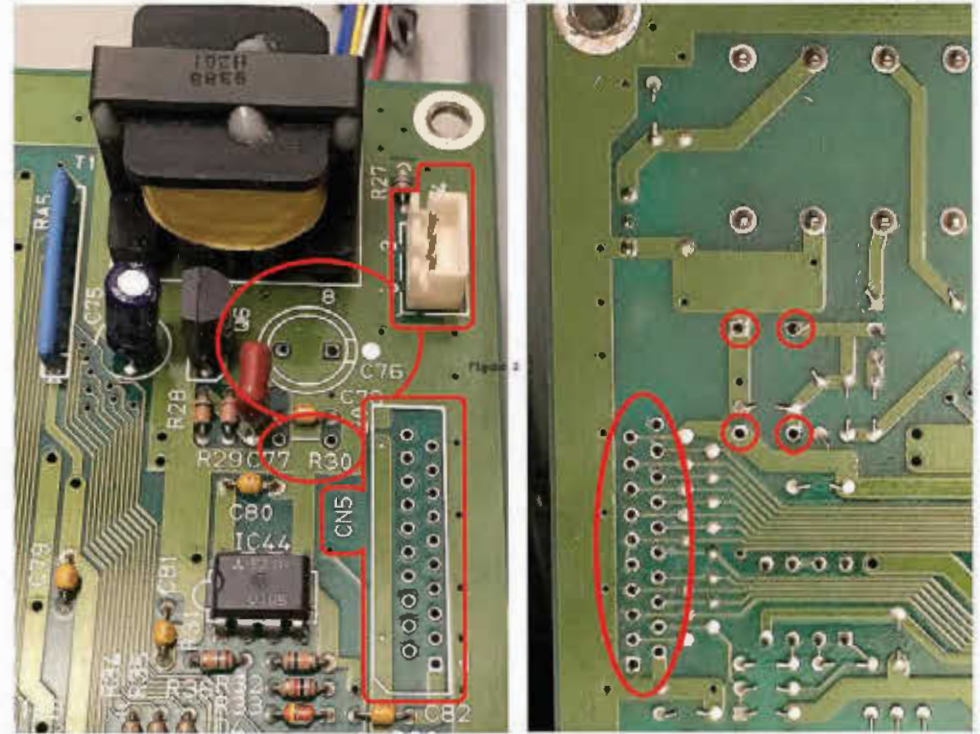
Figure 2

Figure 3

REMOVE COMPONENTS FROM SP-700 MAIN PCB AND FRONT PANEL (continued)

The image in **Figure 3** show details of the PCB after the three components have been removed. This effectively removes the old LCD backlight high voltage supply from the circuit. No more high pitched whine. Notice that all of the holes are empty and completely clear of any excess solder

SOLDER NEW LCD PIN CONNECTORS AND WIRES ONTO THE SP-700 MAIN PCB

Place the new wires and 10-pin headers on the PCB and solder them in place as shown in **Figure 4** on the next page. Use care when inserting the two 10-pin header strips. You do not want to force them which could possibly damage the trace holes on the opposite side of the PCB

The Green wire connects to the negative side of the old C76 location. This will provide GROUND for the new LCD's backlight. The Orange wire connects to the positive side of the old R30 location. Likewise, this will provide +5VDC for the new LCD's backlight. **It is important to note that this Orange wire is the one which has the 100 Ohm 1W Resistor soldered onto it**
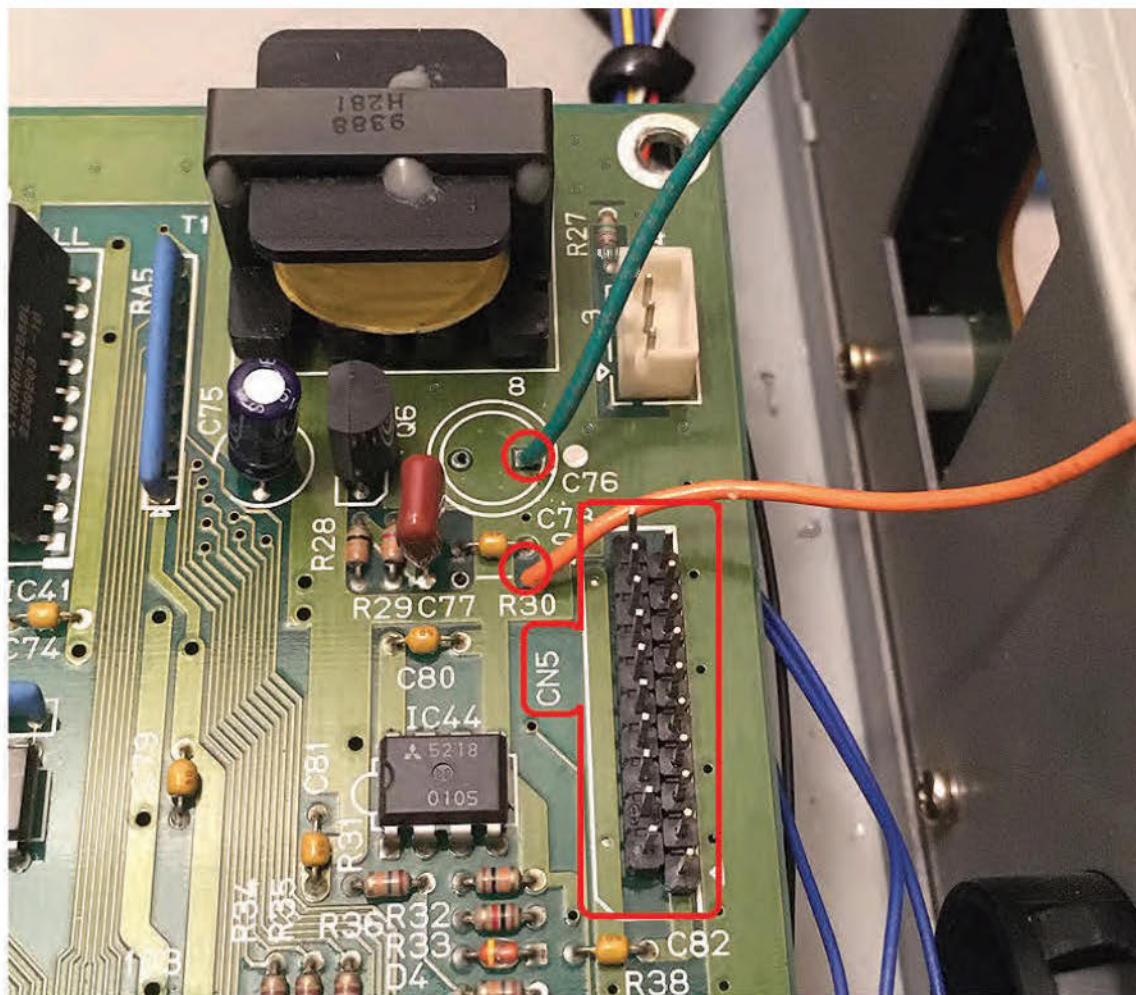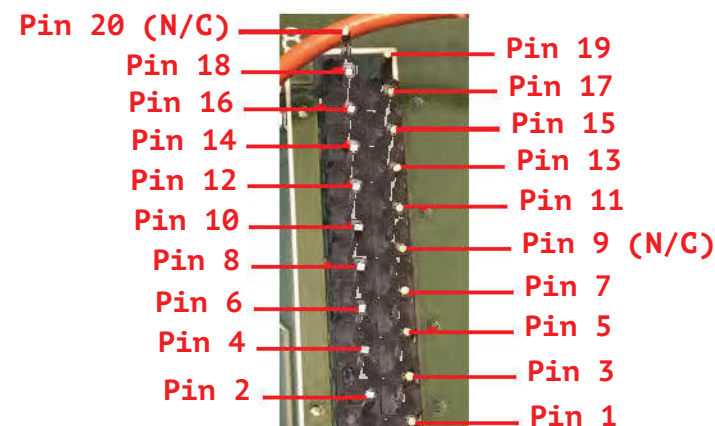
Figure 4

Figure 5

Note that Pin #9 and Pin #20 are not connected (N/C) to the SP-700 Main PCB or the new LCD. I recommend keeping the jumper wires bundled together and just place some electrical tape on both ends of jumper cables #9 and #20

CONNECT FEMALE JUMPER WIRES FROM SP-700 MAIN PCB TO LCD
DO NOT make a mistake when connecting the female jumper wires from the LCD to the Main PCB. I recommend that you triple-check all connections to ensure you have connected wires onto the correct pins. If you make a mistake here, the LCD will be permanently disabled. Feed the jumper cables through the small opening in the front panel

Pins 1 through 8 and pins 10 through 19 are a straight-through one-to-one connection. The new 10-pin headers on the SP-700 Main PCB are staggered so watch out for that when matching up the pin numbers. Pin 1 is indicated by a white arrow on the SP-700 Main PCB as shown in **Figure 5**. Once all of the jumper cables are in place on the SP-700 Main PCB and on the new LCD, take some electrical tape and wrap it around the base of the female connectors a few times, This will hold the jumper cable assembly firmly in place

CONNECT POWER FOR THE LCD BACKLIGHT

This is another critical step so DO NOT make a mistake when connecting these two wires from the Main PCB onto the new LCD. Triple-check to ensure you have connected wires to the correct pins as shown in **Figure 6**

Pin #21 on the new LCD needs a +5VDC power connection and Pin #22 on the new LCD needs a GROUND connection in order for the LCD's backlight to turn on. The two jumper wires modified in an earlier step are used for this

Connect the modified jumper cable with the 100 Ohm 1W resistor to Pin #21 on the new LCD

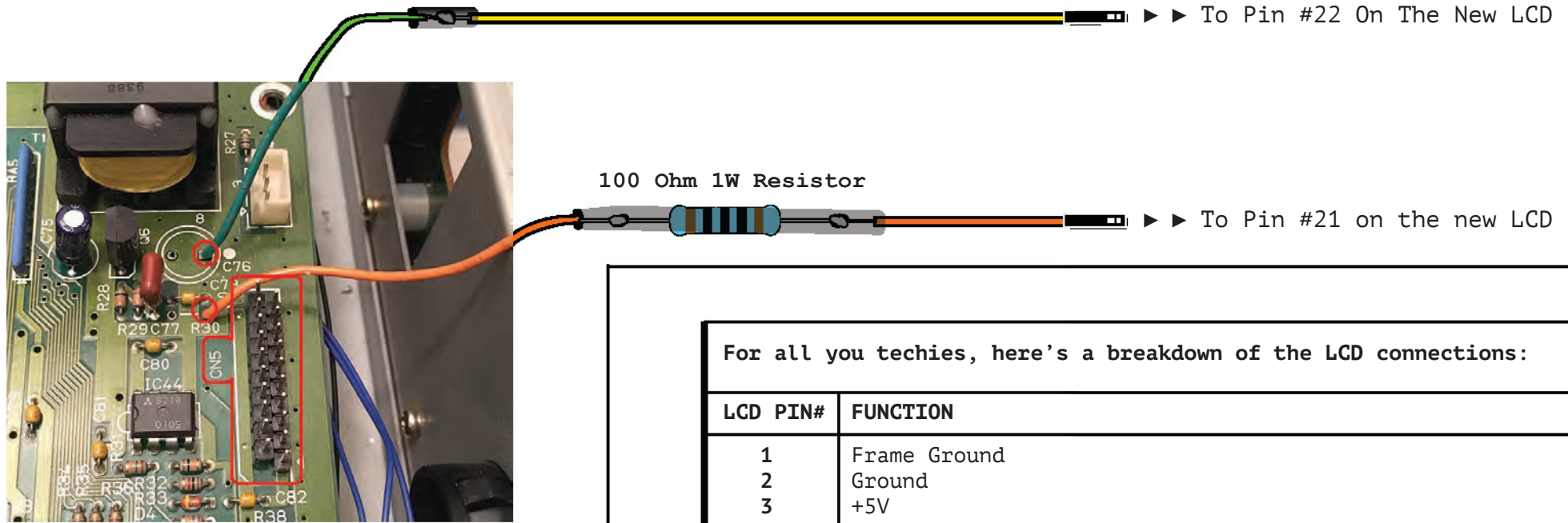Connect the other modified jumper cable to Pin #22 on the new LCD

► ► To Pin #22 On The New LCD

100 Ohm 1W Resistor

► ► To Pin #21 on the new LCD

Figure 6

TEST THE LCD

After verifying all the wires are connected properly, power on the SP-700. After the O/S boots, adjust the Contrast setting

    Press and hold **SHIFT** then press **HOME**
    Rotate the Alpha Dial
    Press **EXIT**
    Press **SYSTEM** then press **F5**
    Choose **SAVE** *(To set the default Contrast)*

For all you techies, here's a breakdown of the LCD connections:

| LCD PIN#	FUNCTION
1	Frame Ground
2	Ground
3	+5V
4	-8V to -5V For The SP-700 O/S Controlled Contrast Values
5	Write Signal
6	Read Signal
7	Chip Enable Signal
8	+5V - Sets The LCD Into "Data" Mode
10	Reset Signal
11-18	Eight Data Bus Lines
19	+5V - Sets The Font Selection To 6x8 Dots Resolution
21	+5V - For The LED Backlight (A - Anode)
22	Ground - For The LED Backlight (K - Cathode)

Note: Pin #9 and Pin #20 are not connected

VISUAL BILL OF MATERIALS

Before

After
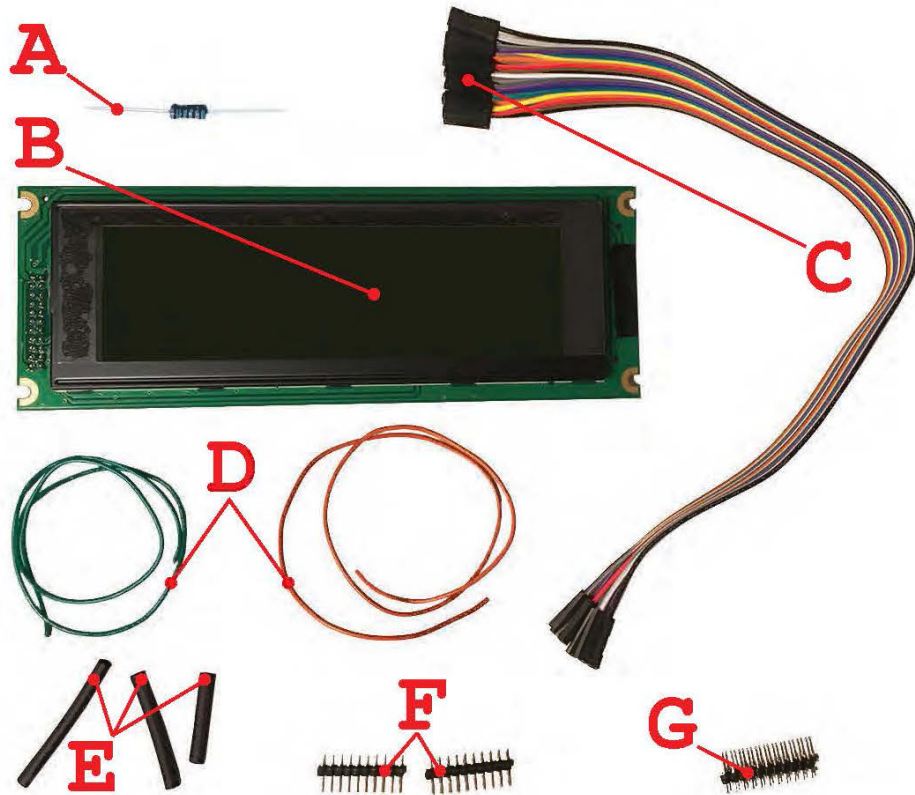
A) 100 OHM 1W RESISTOR *(taydaelectronics.com)*
B) 240X64 LCD *(buydisplay.com)*
C) JUMPER WIRE BUNDLE *(22 are needed)*
D) HOOKUP WIRES *(Minimum length of 300mm - 24AWG)*
E) HEAT SHRINK *(6mm Diameter)*
F) 10-PIN HEADERS SINGLE ROW *(Two are needed)*
G) 11-PIN DOUBLE ROW HEADER *(Required if not on LCD)*

TROUBLESHOOTING

If the LCD backlight is a bright solid color or a dark solid color, it's possible that the previous contrast level setting was at a higher or lower level than normal. After powering on, wait 45 seconds for the O/S to boot up completely, press and hold **SHIFT** then press **HOME**. Turn the Alpha Dial all the way counter-clockwise and then all the way clockwise to see if any text appears on the screen. If not, power off the sampler and verify that all of the wire connections are correct. If the LCD backlight does not turn on at all then power off the sampler and verify all of the wire connections. If the connections appear OK, check voltage levels on pins using a DVM
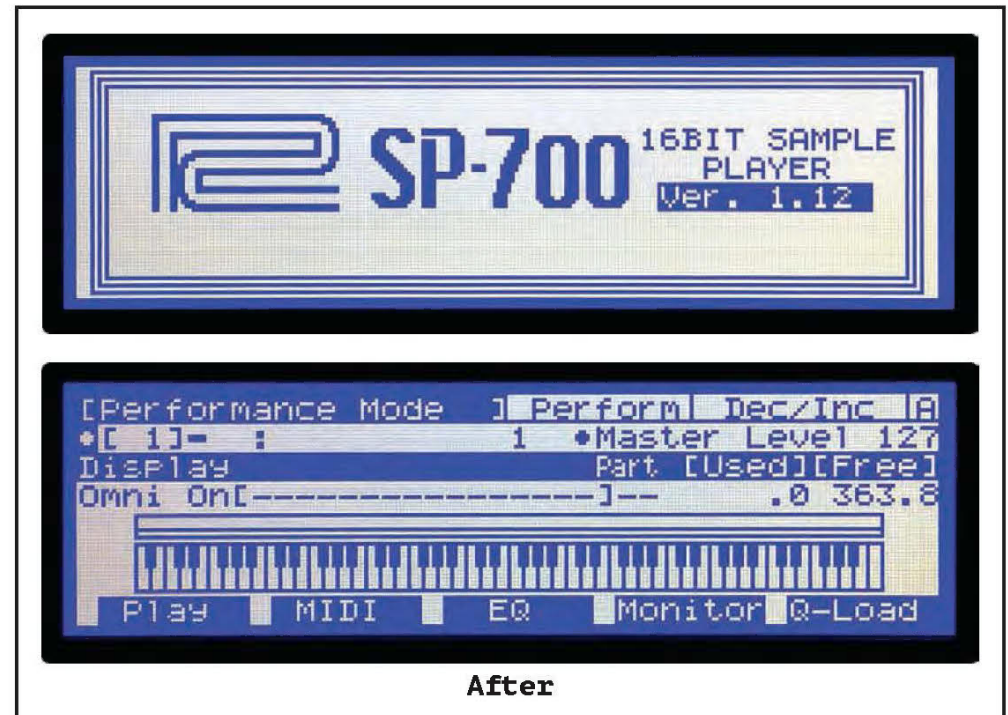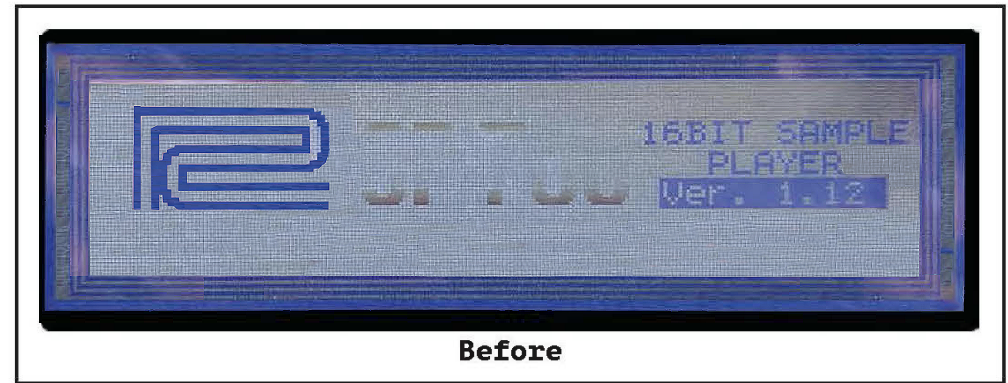
TROUBLESHOOTING (continued)

As stated earlier, I have not tested this DIY with the Black/White, White/Black or Black/YelGrn model LCD's. It is possible that a higher or lower 1W resistor is required for those models. However, my intuition is that a 100 Ohm resistor will work just fine with these other LCD's

SP-700 CUSTOM PCB MOD

Pit Sehl from the Roland Sampler Information Exchange page on Facebook has designed an excellent PCB which wipes out a lot of the extra work involved for this DIY. The ZIF connector for the flexible ribbon cable eliminates any need to unsolder the connector at CN5. This will save a huge amount of time and also cuts down on extra parts. More info can be found at this link --> *https://www.facebook.com/groups/rolandsamplers*
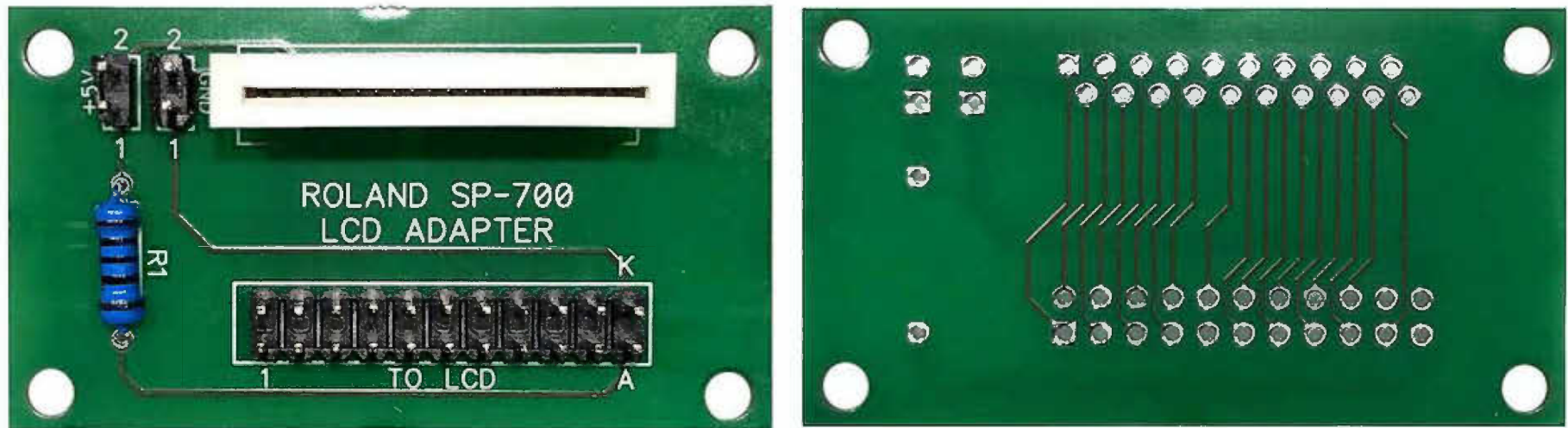
S-750 AND S-770 MODIFICATIONS

The images shown in **Figure A** and **Figure B** on the next page show details of an S-750 PCB before and after the C39 capacitor and R32 resistor have been removed. *It is important to note that there are errors in the S-750 and S-770 Service Notes. R35 on both schematics is actually silkscreened as R32 on the PCB and not R35*

Fortunately, the LCD connector at CN11 is an IDC Shrouded Header style and not a ZIF ribbon connector like the SP-700. This makes the modification much easier than the SP-700. Other than C39, R32 and CN11, the rest of the instructions should be identical for the S-750 and S-770. Use the S-750 and S-770 schematics to ensure that you connect the jumper wires to the correct pins on the CN11 connector. **Special thanks to Geert Heyrman for this additional info!!!**
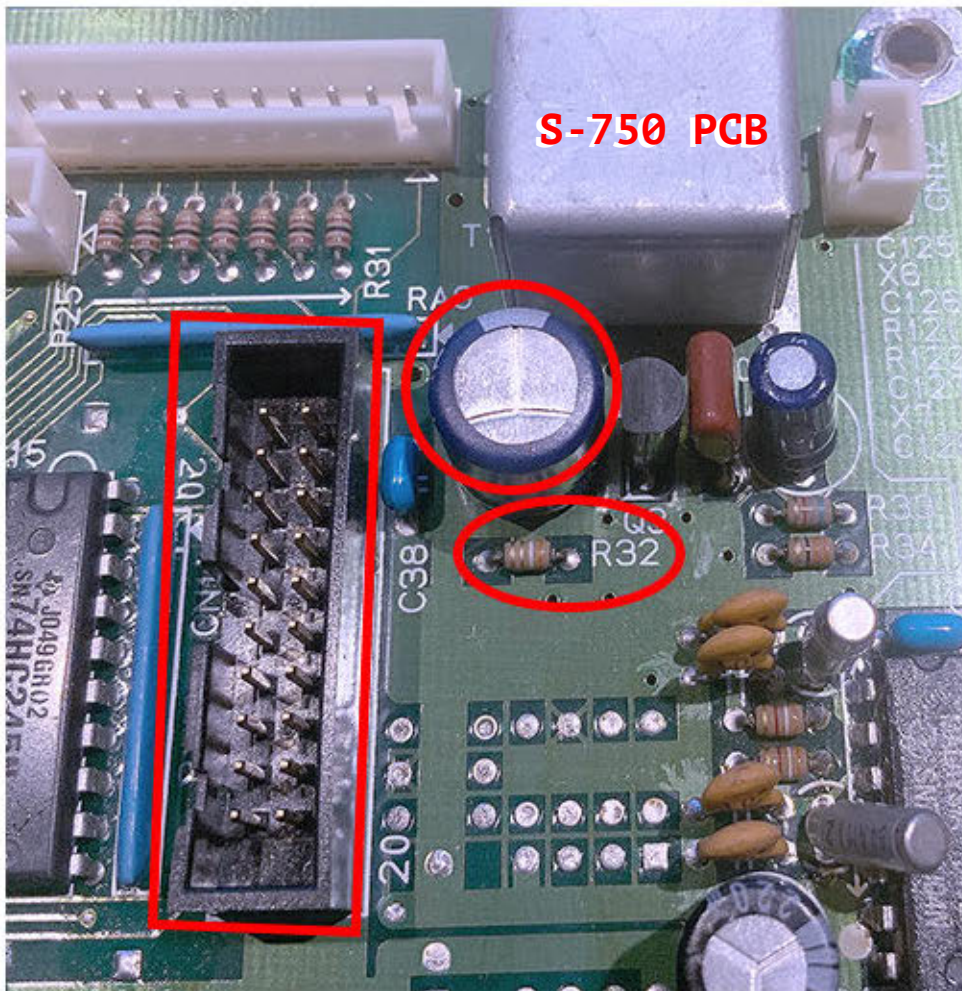
S-750 PCB
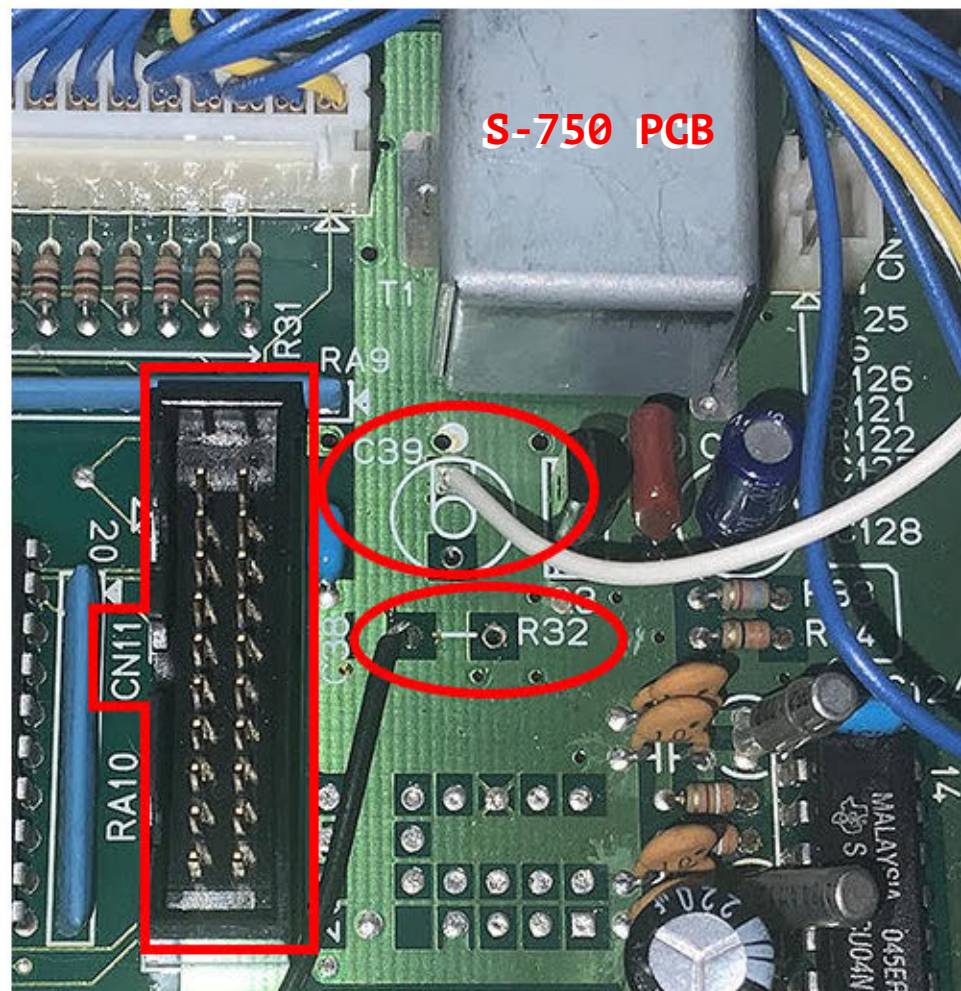
Figure A

S-750 PCB

Figure B

DISCLAIMER

Modifications used here were performed on a 117V Roland SP-700 manufactured in November 1992. If you find any errors because your SP-700 is a different production model or if you installed a different color LCD than the White/Blue model, I would appreciate an eMail so I can keep this document accurate for all of the other SP-700 owners out there. Thanks!

eMail: *llamamusic@hotmail.com*

DISCLAIMER (continued)

Modifications made to factory stock samplers 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!!!

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