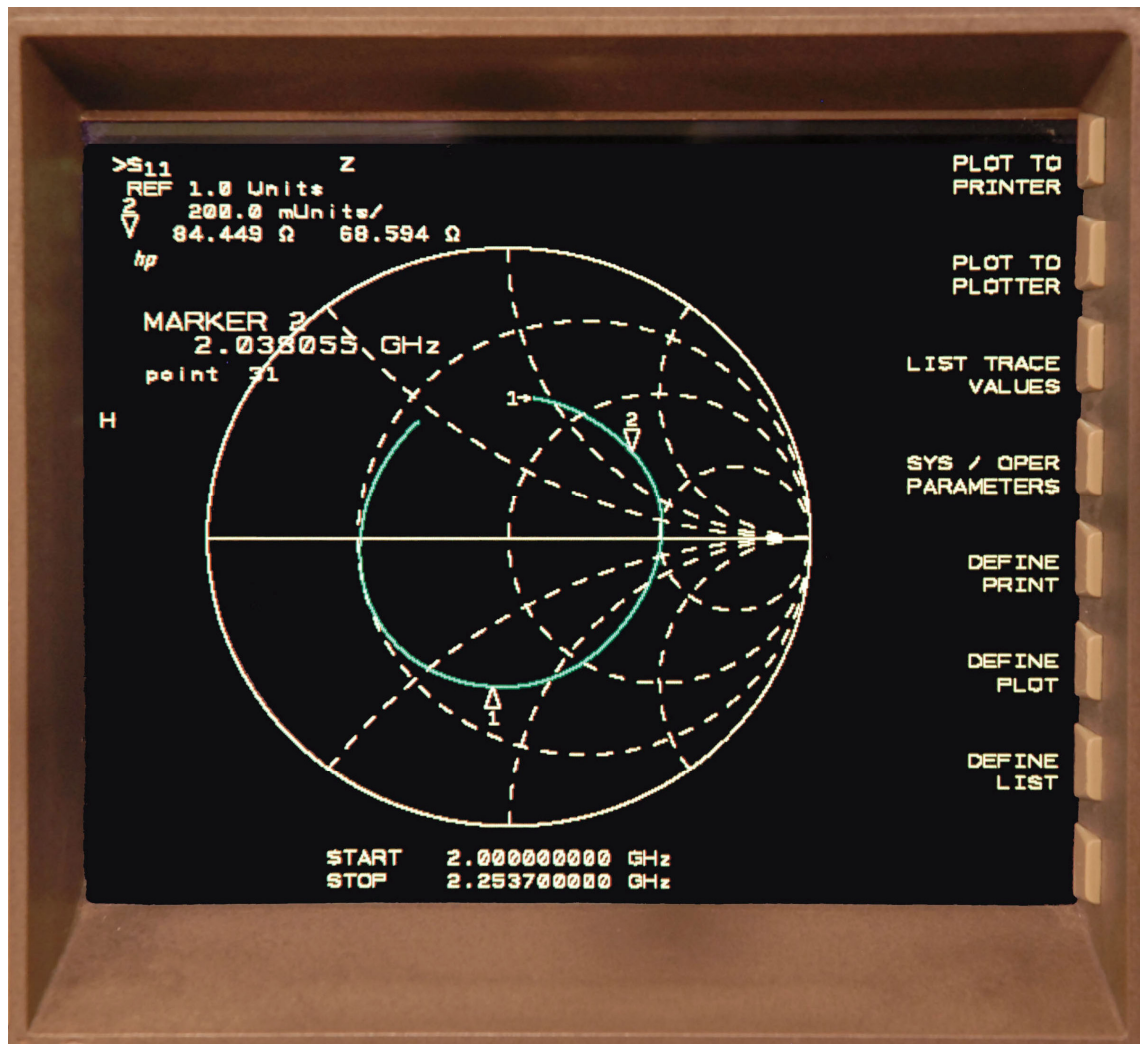


# Color LCD Retrofit Kit for the HP® 8510A and 8510B Displays

## Installation and User Guide



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**Publication Number**

8510-M5-1.00  
1st edition, September 2008  
Printed in U.S.A.

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## Section I

### General Information

- 1-1 **Description**
- 1-2 The 8510AB-LCD-RK Color LCD Retrofit Kit is a drop-in replacement for the monochrome CRT in the HP® 8510A and 8510B displays. The Retrofit Kit uses a Sharp® 6.4” TFT color LCD with a resolution of 640 x 480 pixels.
- 1-3 The intensity adjustment works as before; adjust the front panel intensity knob as you would for the CRT.
- 1-4 The front panel align adjustment is no longer used.
- 1-5 There are two color schemes available. The focus pot adjusted clockwise selects the “Classic” color scheme, and counterclockwise selects the “TEP” color scheme.
- 1-6 In the classic color scheme, data is shown as yellow. Text, graticule, and marker dots are white. The reference line is green.
- 1-7 In the TEP color scheme, data is shown as green. Text and marker dots are yellow. The graticule is blue. The reference line is white.
- 1-8 GPIB automation software including verification software is still fully compatible.
- 1-9 The LCD backlight lamp is replaceable and has a typical lifetime of 50,000 hours of operation. The lamp reaches full brightness within 5 minutes of being turned on.
- 1-10 The rear panel X, Y, and Z display outputs will no longer operate once this kit is installed.
- 1-11 The LCD kit is powered from the unregulated +23V supply that was used for the CRT high voltage. This is a dedicated, fused supply that is isolated from the rest of the power systems.
- 1-12 **Specifications.**
- 1-13 Instrument specifications are unchanged (except for the X, Y, and Z rear outputs described in paragraph 1-8 above).
- 1-14 **Calibration**
- 1-15 The calibration procedure is unchanged.
- 1-16 **Adjustments**
- 1-17 High Voltage and CRT Display adjustments are obsolete.

**1-18 Recommended Tools & Equipment**

1-19 The LCD kit installation will require the items listed in Table 1-1. Substitutions must meet the critical specifications listed in the table.

<b>Table 1-1</b>		
<b>Item</b>	<b>Critical Specification or Use</b>	<b>Substitute</b>
HP® 8510A/B Service Manual		
4-spline .048” Bristol wrench	Included in kit	
Needle nose pliers		
#1 Pozi screwdriver		
#2 Pozi screwdriver		
Slotted screwdriver		
Nut driver		
Soldering Iron		
Wire cutters		
Dremel® Tool with cutoff wheel		File

## Section II

### Installation

#### 2-1 Initial Inspection.

2-2 Refer to table 4-1 for a list of parts included in the 8510AB-LCD-RK Retrofit Kit. Verify that all parts listed are included in your kit.

#### 2-3 Installation of the Color LCD Kit.

2-4 Installation should not be attempted unless it is done so by a trained electronic repair technician.

2-5 Kit installation time is approximately 2 hours.

2-6 Refer to instrument service manual for location of assemblies.

2-7 Disconnect AC power cords.

2-8 Remove the cable connecting the 85101A/B display processor section to the 85102A/B IF detector section and separate the two sections.

2-9 Remove the top, bottom, and side covers from the 85101A/B.

2-10 Remove the eight front corner frame screws connecting the front panel assembly (figure 1) to the four frame struts.

2-11 Remove the screws on the top- and bottom-center of the front panel assembly that attaches it to the centerline partition plate.

2-12 Carefully separate the front panel assembly from the frame struts.

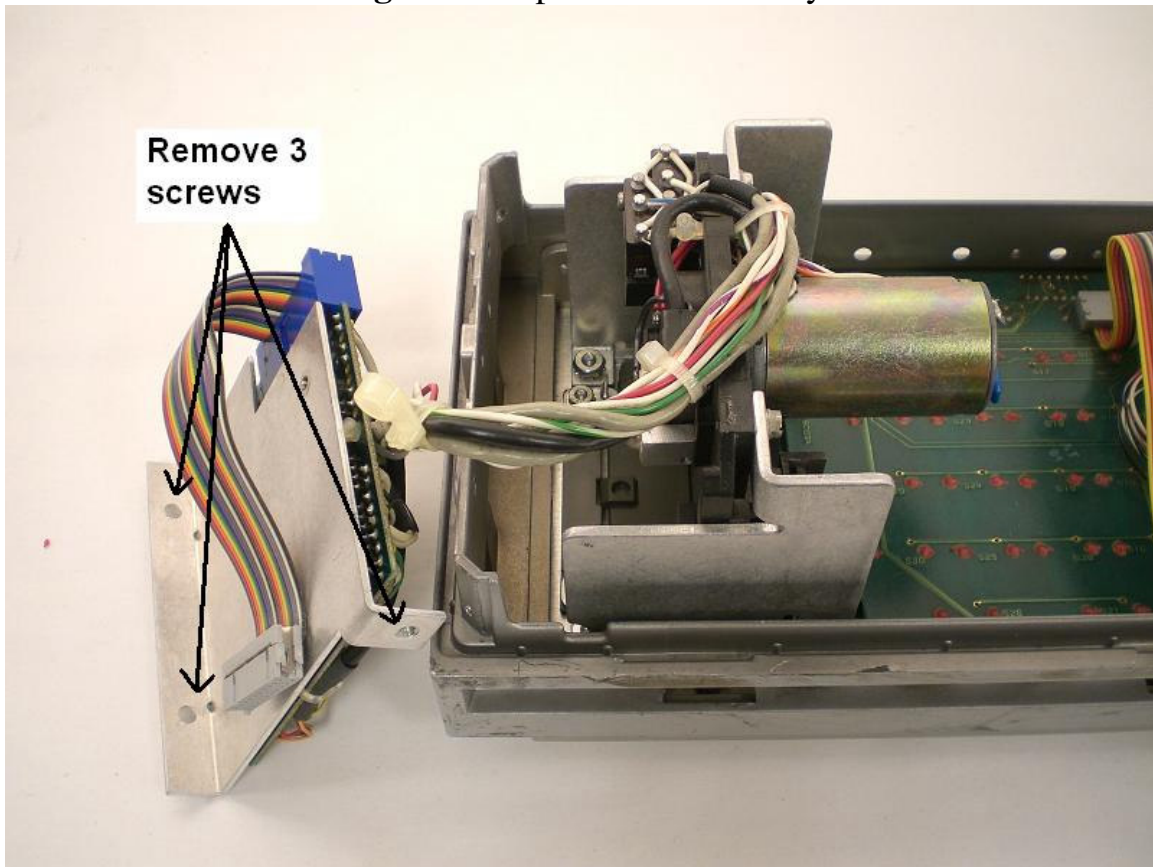
**Figure 1: Front Panel Assembly**



2-13 Disconnect the 34-pin and 20-pin ribbon cable connectors attaching the front panel to the motherboard.

2-14 Remove the 3 screws shown in figure-2 that secure the tape drive circuitry to the motherboard and centerline partition plate.

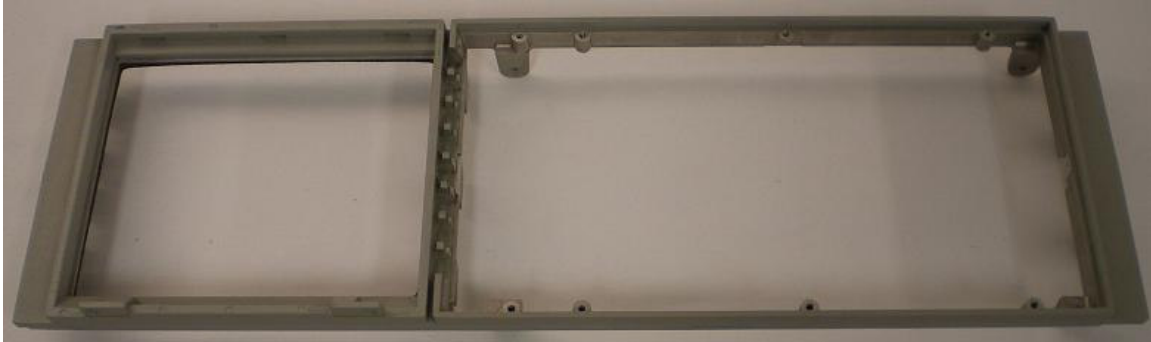
**Figure-2** Tape Drive Assembly



- 2-15 The front panel assembly should be completely separated at this point from the rest of the display processor.
- 2-16 Remove the 4 nuts that secure the tape drive assembly to the front panel and lift off the tape drive assembly.
- 2-17 Remove the front panel rotary pulse generator (RPG) knob and the retaining nut underneath it.
- 2-18 Remove the intensity knob, using the 4-spline Bristol wrench provided in the kit, and then remove the retaining nut underneath the knob.
- 2-19 Remove the keyboard assembly from the front panel. As you do this, the aluminum shaft extension for the front panel test button will fall out. Save it.
- 2-20 Remove the front panel test, align, and focus nuts.
- 2-21 Separate the front dress panel from its backing plate.
- 2-22 Remove the front dress panel.
- 2-23 Remove the two small screws from the bottom of the plastic CRT bezel.
- 2-24 With the front panel assembly on it's back so the glass cannot fall out, gently pull the plastic CRT bezel bottom forward until it clears the mounting tabs on the inner bezel casting, then slide it downward to free it's upper retaining tabs and remove it.
- 2-25 Carefully remove the metallized glass window from the old inner bezel casting.
- 2-26 Clean the glass with glass cleaner.
- 2-27 Install the glass and its plastic CRT bezel and screws into the modified inner bezel casting provided in the kit.
- 2-28 Remove any remaining screws on the front panel assembly attaching the outer bezel casting to the old inner bezel casting.

- 2-29 Separate the outer bezel casting from the old inner bezel casting. There should now be nothing attached to the old inner bezel casting (figure 3). **NOTE:** Save your undamaged old inner bezel casting and return it to Test Equipment Plus for a refund of the core charge.

Figure 3: Inner Bezel Casting



- 2-30 Set the modified inner bezel casting face down and remove the two 6-32 x 5/16" flat head screws, on the side, and the black electrical tape, that holds the LCD assembly in place. Keep track of these two screws because they are just the right length.
- 2-31 The LCD is only attached to the Plotter board with two cables so take care to keep them together and to not unseat the cables.
- 2-32 Lift out the LCD, Plotter board, and mounting brackets, as one LCD assembly. Set it aside temporarily.
- 2-33 Transfer, in reverse order, all the parts that were removed in steps 2-20 through 2-22 from the old inner bezel casting (figure 3), over to the new modified inner bezel casting provided in the kit.
- 2-34 Use a Dremel tool fitted with a cutoff wheel or a file to make a 0.3" high and 0.1" wide notch in the top right corner (as viewed from figure-4) of the keyboard's printed circuit board so that it will make room for the LCD panel. The notch will come to the right edge of the top right pushbutton switch (as viewed from figure-4). Be careful to not grind or file into the switch.
- 2-35 Set the aluminum shaft extension for the front panel test button into the test button hole then fit the keyboard assembly into place and secure it in place with its mounting hardware (screws or spring clips).
- 2-36 Transfer, in reverse order, all the parts that were removed in steps 2-16 through 2-18 from the old inner bezel casting (figure 3), over to the new modified inner bezel casting provided in the kit.
- 2-37 Remove the 3 screws that hold the potentiometer mounting bracket in place on the backside of the keyboard (see figure-4).
- 2-38 Remove the protective plastic shipping film from the front of the LCD screen, being careful to not touch the LCD screen.
- 2-39 Replace the LCD assembly into the modified inner bezel casting but don't put the screws in yet.
- 2-40 Carefully fit the outer bezel casting onto the modified inner bezel casting and LCD assembly. Be careful to not pinch the LCD backlight wires going to the plotter boards J1 connector.
- 2-41 Replace the two new 6-32 flat head screws that were provided in the kit, which hold the outer bezel casting, inner bezel casting, and LCD assembly together.

- 2-42 Install the six remaining 6-32 flat head screws, that were removed earlier, through the outer bezel and into the modified inner bezel casting side mounting tabs.
- 2-43 Reinstall the 3 screws that hold the potentiometer mounting bracket in place on the backside of the keyboard (see figure-4). These screws will now be also mounting the Plotter board's sheet metal bracket.
- 2-44 Strip all 6 of the potentiometer cable (W4) wires.
- 2-45 Desolder the 6 wires going to the top and middle potentiometers. Keep track of the wire color that goes to each terminal (see figure-4).
- 2-46 Match the W4 wire colors with the top and middle potentiometers. Solder the three long wires to the top potentiometer and the three short wires to the middle potentiometer.
- 2-47 Cut off, at the motherboard, the original wires that were desoldered from the potentiometers.
- 2-54 Release the plotter board J2 zero insertion force (ZIF) connector retainer bar by sliding the light brown tabs on each side of the connector about 1.5mm away from the center of the plotter board.
- 2-48 Insert one end of the 16-conductor flat flex cable (W2) into connector J2 on the plotter board with the contacts facing up (away from the Plotter board). Lock the plotter board J2 connector by pushing the ZIF retainer bar back into the connector.
- 2-49 Set the front panel assembly aside
- 2-50 **Warning! Potentially Lethal Voltages Present!**
- 2-51 **Review the instrument service manual for safety guidelines, CRT warnings, and high voltage power supply warnings before proceeding.**
- 2-52 Carefully discharge the CRT and high voltage power supply assembly as per your 8510 service manual.
- 2-53 Disconnect and remove the CRT as per your 8510 service manual.
- 2-54 Remove the power supply top cover and lay it aside to be reinstalled later.
- 2-55 Remove the A3 High Voltage shielding cage top cover and discard it.
- 2-56 Remove the processor/memory card cage.
- 2-57 Remove the A3 high voltage assembly.
- 2-58 Reinstall the processor/memory card cage.
- 2-59 Remove the obsolete HP A2 Z-axis amp card, A4 X-axis amp card, A5 Y-axis amp card, and A6 line generator card (see figure-7).
- 2-60 De-solder and discard the eight L-shaped pins that the CRT plugged into (figure 5) on the motherboard. NOTE: This step is required because the pins no longer have a mating CRT connector that is insulated and so they would be a potential shorting hazard to the instrument cover.

Figure 4: Plotter board & LCD

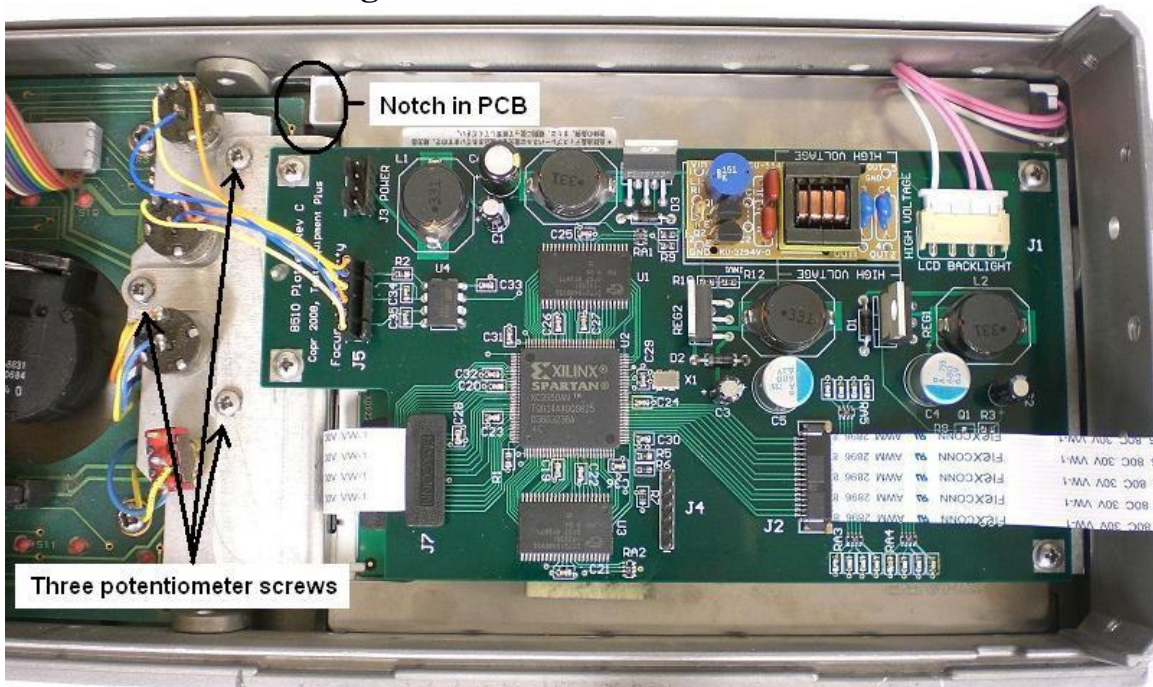
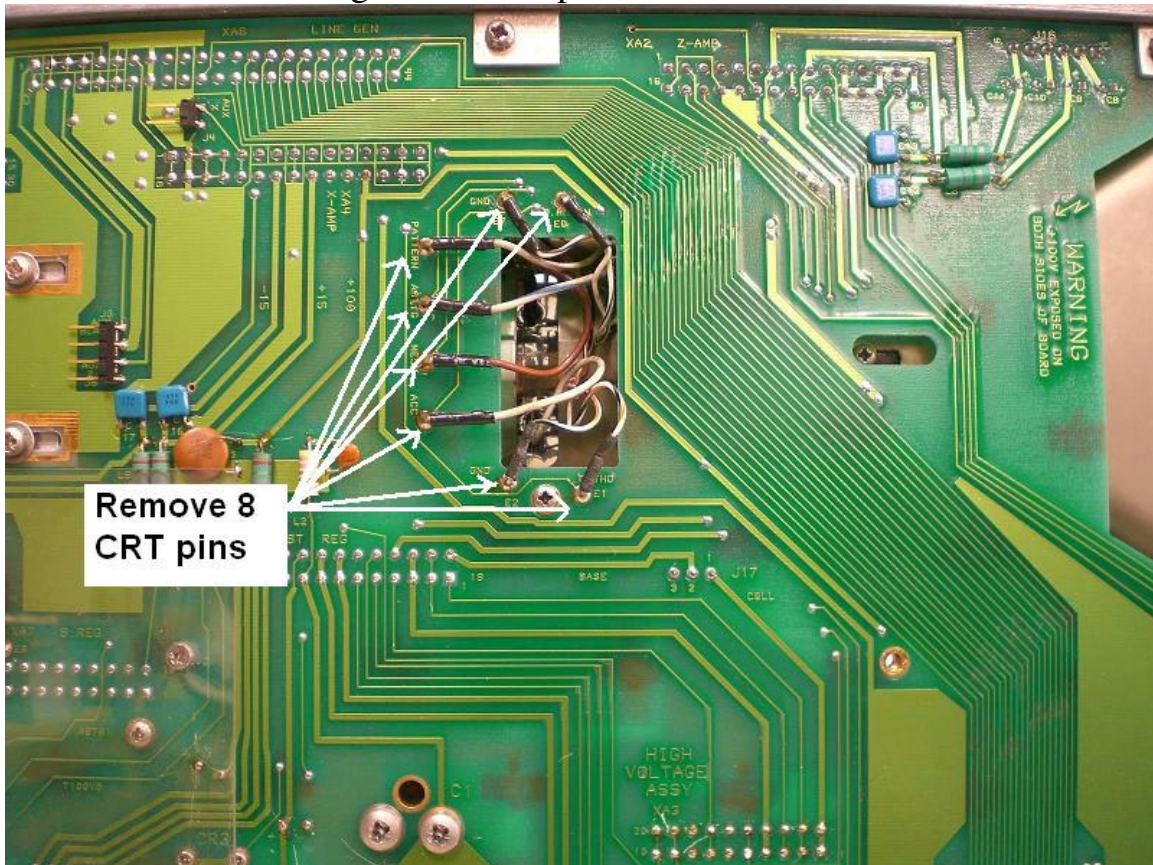
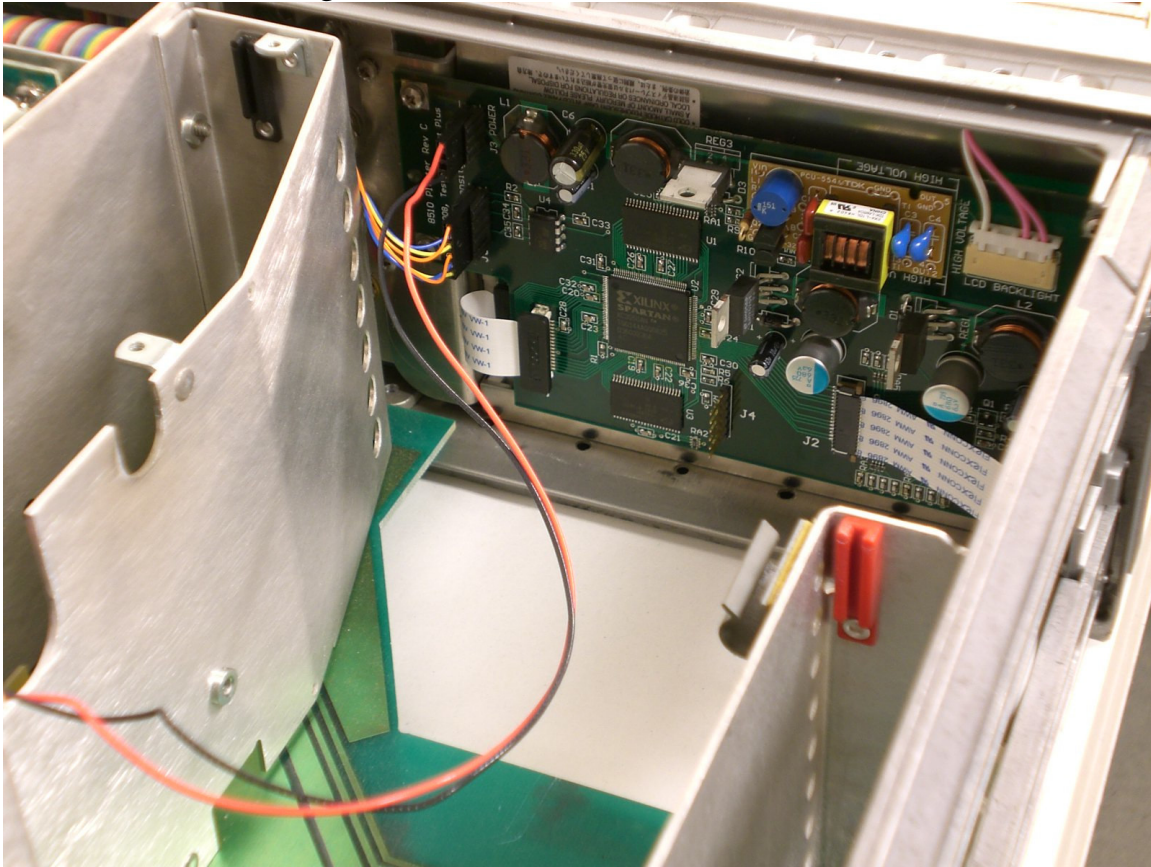


Figure 5: CRT pins to be removed



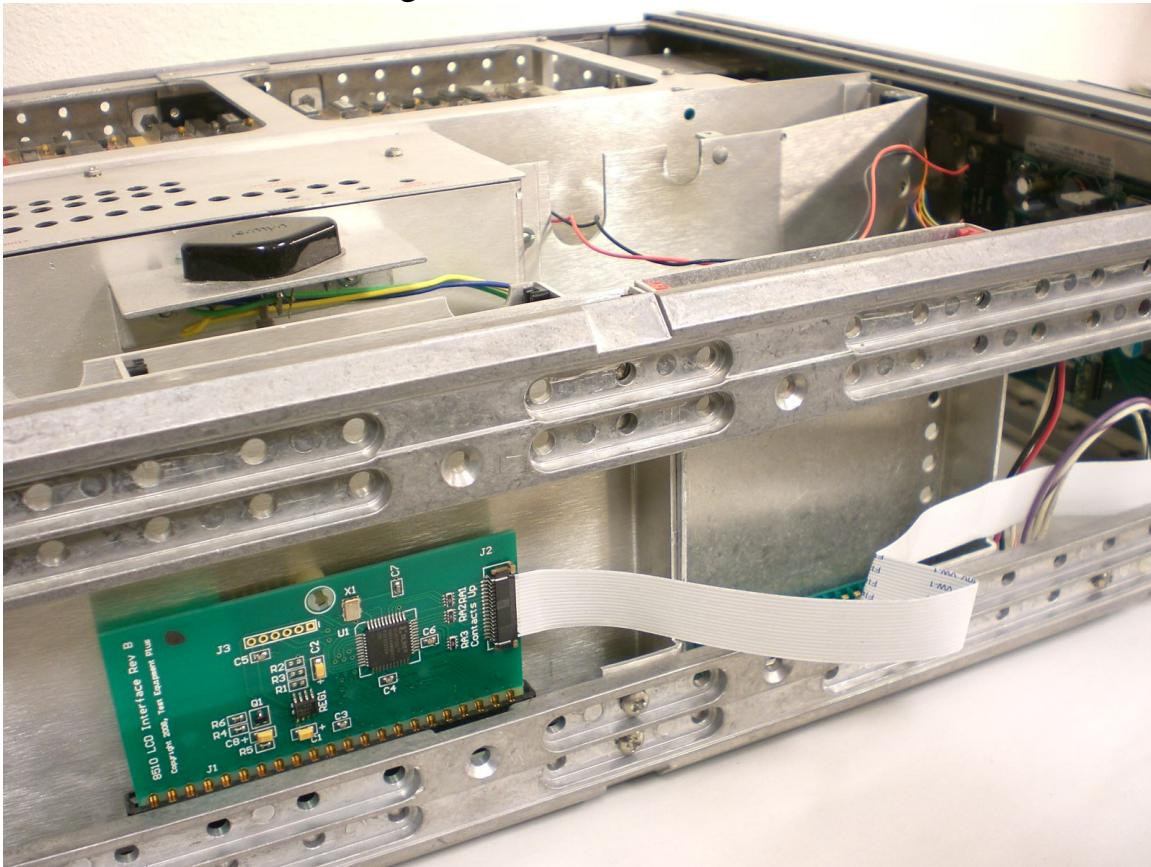
- 2-61 Reinstall the 3 screws shown in figure-2 that secure the tape drive circuitry to the motherboard and centerline partition plate.
- 2-62 Feed the loose end of the 16-conductor flat flex cable (W2) through the side of the 85101A/B frame toward the LCD kit's A6 interface board (see figure 7).
- 2-63 Re-connect the 34-pin and 20-pin front panel cables to the 85101A/B mainframe that were removed in step 2-13.
- 2-64 Fit the front panel assembly back into the frame and install the eight frame screws that were removed in step 2-10.
- 2-65 Reinstall the centerline partition plate screws that were removed in step 2-11.

Figure-6 Plotter board and LCD Panel



- 2-66 Release the LCD kit's A6 Interface board J2 zero insertion force (ZIF) connector retainer bar by sliding the light brown tabs on each side of the connector about 1.5mm away from the center of the plotter board.

Figure-7 A6 Interface board



- 2-67 Make sure cable W2 contacts are facing up (away from the A6 Interface board).
- 2-68 Lock the A6 board J2 connector by pushing the ZIF retainer bar back into the connector.
- 2-69 Insert the LCD kit's A6 board into its card cage slot. Leave a little slack for an A6 service loop by creasing a fold into the flat flex cable.
- 2-70 Plug the LCD kit's power cable (W3) edge connector PCB into the unused XA3 connector on the motherboard, inside of the High Voltage shielding cage.
- 2-71 Plug the other end of W3 (4-pin polarized power connector) into the plotter board J3 connector.
- 2-72 Reinstall the power supply cover.
- 2-73 Replace the side and bottom covers and turn the 85101A/B right side up.
- 2-74 Turn the front panel intensity knob fully clockwise.
- 2-75 Re-connect the 85101A/B to the network analyzer IF section, interconnect cable, and AC power.
- 2-76 Turn on network analyzer and verify correct operation.
- 2-77 Turn the front panel intensity knob fully counter-clockwise to verify the new dimming function is operating properly then return it to your desired intensity.
- 2-78 Rotate the front panel focus adjustment fully clockwise and counterclockwise to verify that the color scheme switches.
- 2-79 Replace top cover.
- 2-80 Place the retrofit kit's CD instruction manual in front of your HP service manual as supplemental data.

## Section III

### Principles of Operation

**3-1 A6 Interface board.**

**3-2** The interface board collects vector, move-to and line-to data that is sent to the plotter board.

**3-3 Plotter board.**

The plotter board converts the vector data into a bitmap format for driving the LCD. It also generates the colorizing information for the display. The plotter stores bitmap data in two pages. Each page contains enough information to paint a full screen on the LCD. One page refreshes while the other page paints to the LCD.

Section IV

**Replaceable Parts**

4-1 This section contains information for ordering replacement parts found in table 4-1.

Table 4-1				
Ref Designator	Description	Qty	Note	Part Number
	8510A/B LCD Retrofit Kit			8510AB-LCD-RK
	Plotter board	1	1	8510AB-Plotter
	Color LCD Display	1	1	8510AB-Display
A6	A6 Interface board	1	2	8510AB-A3A4
	SS Screw, pan-philips-SEM, 4-40 x 1/4	4	1	8510AB-M1
	SS Screw, 82° flat-pozi, 6-32 x 7/16	4	1	8510AB-M2
	SS Screw, 82° flat-pozi, 6-32 x 5/16	2	3	8510AB-M2
	Bracket, Center (sheet metal)	1	1	8510AB-M3
	Bracket, Outside (machined)	1	1	8510AB-M4
	Manual and Software Utility on CD	1	4	8510AB-M5-1.00
	Modified Inner Bezel Casting	1	1	8510AB-M6
	Cable, ribbon, LCD to Plotter	1	1	8510AB-W1
	Cable, 16-conductor Flat Flex, 14", Plotter to A6	1	3	8510AB-W2
	Cable, 23V Power (red-black wire harness)	1	4	8510AB-W3
	Cable, Potentiometer Connection	1	4	8510AB-W4
	4-spline Bristol Wrench (looks like Allen wrench)	1	3	8510AB-BW

- NOTE: 1. Shipped assembled  
 2. Shipped in bubble wrap bag.  
 3. Shipped in plastic 4-dram box  
 4. Shipped in bubble wrap miscellaneous bag with 4-dram box

4-2 Before ordering parts, record the serial number of your kit (located on the plotter board). Have this information available when ordering replacement parts.

## Section V

### Block Diagram

