

3.1 PARTS AND COMPONENTS

Check all parts and components against the "Parts List" on Pages III-2 through III-4 (Table 3-1). If you have difficulty in identifying any parts by sight, refer to Figure 3-1 on Page III-5.

3.2 ASSEMBLY TIPS

1. Scan Sections III and IV in their entirety before you start to assemble your Sol-PC.

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ASSEMBLYandTESTSol-PC SINGLE BOARD TERMINAL COMPUTERTM

2. Assembly steps and component installation are provided by a set of parentheses. Check off each installation and step as you complete them. This will minimize the chance of missing a step or component.

4. When installing components, make use of the assembly aids that are incorporated on the circuit boards and the assembly drawings. (These aids are designed to assist you in correctly installing the components.)

5. The circuit reference (R1, C10 and U20, for example) for each component is silk screened on the PC boards near the location of its installation.

6. Both the circuit reference and value or nomenclature (1.5K and 74H00, for example) for each component are included on the assembly drawings near the location of its installation.

7. To simplify reading resistor values after installation, install resistors so that the color codes or markings read from left to right and top to bottom as appropriate (position oriented as defined in Paragraph 3.2 on Page III-7).



8. Unless specified, install components, especially disc capacitors, as close as possible to the boards.

9. Should you encounter any problem during assembly, call on us for help if needed.

3.1 PARTS AND COMPONENTS

Check all parts and components against the "Parts List" on Pages III-2 through III-4 (Table 3-1). If you have difficulty in identifying any parts by sight, refer to Figure 3-1 on Page III-5.

3.2 ASSEMBLY TIPS

1. Scan Sections III and IV in their entirety before you start to assemble your Sol-PC kit.

2. In assembling your Sol-PC, you will be following an integrated assembly-test procedure. Such a procedure is designed to progressively insure that individual circuits and sections in the Sol-PC are operating correctly. IT IS IMPORTANT THAT YOU FOLLOW THE STEP-BY-STEP INSTRUCTIONS IN THE ORDER GIVEN.

3. Assembly steps and component installations are preceded by a set of parentheses. Check off each installation and step as you complete them. This will minimize the chances of omitting a step or component.

4. When installing components, make use of the assembly aids that are incorporated on the circuit boards and the assembly drawings. (These aids are designed to assist you in correctly installing the components.)

a. The circuit reference (R3, C10 and U20, for example) for each component is silk screened on the PC boards near the location of its installation.

b. Both the circuit reference and value or nomenclature (1.5K and 74H00, for example) for each component are included on the assembly drawings near the location of its installation.

5. To simplify reading resistor values after installation, install resistors so that the color codes or imprints read from left to right and top to bottom as appropriate (boards oriented as defined in Paragraph 3.5 on Page III-7).

6. Unless specified otherwise, install components, especially disc capacitors, as close as possible to the boards.

7. Should you encounter any problem during assembly, call on us for help if needed.

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Table 3-1. Sol-PC Parts List.

<u>INTEGRATED CIRCUITS</u>	
1 AM0026 or DM0026 (U104)	1 74S04 (U92)
1 4N26 (U39)	2 7406 (U57,87)
1 8T94 (U58)	2 74LS10 (U47,61)
5 8T97 (U67,68,77,80,81)	3 74LS20 (U23,59,83)
2 1458CP or 1558CP (U56,108)	1 74LS86 (U74)
1 1489A (U38)	8 74LS109 (U43,52,63,64,70, 72,73,75)
2 TMS6011NC (U51,69)	1 74LS136 (U22)
1 MCM6574 or MCM6575 (U25)	3 74LS138 (U34,35,36)
1 4001 (U102)	3 74LS157 (U12,30,32)
2 4013 (U100,113)	4 74LS163 or 25LS163 (U28,31,33,40)
1 4019 (U111)	1 74166 (U41)
1 4023 (U98)	2 74173 (U95,96)
1 4024 (U86)	10 74LS175 or 25LS175 (U2,13,26,27,42,76,90,93, 97,106)
1 4027 (U101)	4 74LS253 (U65,66,78,79)
3 4029 (U1,11,84)	7 74LS367 (U29,37,50,71,89, 94,107)
1 4030 (U99)	1 8080, 8080A or 9080A (U105)
2 4046 (U85,110)	1 8836 or 8T380 (U46)
2 4049 (U88,109)	16 91L02APC or 2102L1PC (U3 - 10, U14 - 21)
1 4520 (U112)	1 93L16 (U62)
1 74H00 (U91)	
3 74LS00 (U44,48,55)	
2 74LS02 or 9LS02 (U53,60)	
4 74LS04 (U24,45,49,54)	
<u>TRANSISTORS</u>	<u>DIODES</u>
2 2N2222 (Q4 & Q5)	9 1N4148 or 1N914 (D1,D3 - 10)
2 2N2907 or 2N3460 (Q1 & Q2)	1 1N5231B Zener Diode (D11)
1 2N4360 (Q3)	4 1N4001 (D2,12,13,14)
<u>CRYSTAL</u>	<u>RELAYS</u>
1 14.318 MHz in HC-18/U Case (XTAL)	2 DIP Reed, Sigma 191-TE1A15S (K1 & K2)

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM (Continued) SECTION III

Table 3-1. Sol-PC Parts List (Continued).

<u>RESISTORS</u>			<u>CAPACITORS</u>		
2	47	ohm, $\frac{1}{4}$ watt, 5%	1	10	pfd, disc
1	75	ohm, $\frac{1}{4}$ watt, 5%	1	330	pfd, disc
1	100	ohm, $\frac{1}{4}$ watt, 5%	3	680	pfd, monolythic or disc ceramic (labeled 681 and usually blue)
3	100	ohm, $\frac{1}{2}$ watt, 5%	6	.001	ufd, disc
1	200	ohm, $\frac{1}{4}$ watt, 5%	2	.001	ufd, Mylar tubular
13	330	ohm, $\frac{1}{4}$ watt, 5%	2	.01	ufd, Mylar tubular
1	330	ohm, $\frac{1}{2}$ watt, 5%	37	.047	ufd, disc
3	470	ohm, $\frac{1}{4}$ watt, 5%	12	.1	ufd, disc
2	470	ohm, $\frac{1}{2}$ watt, 5%	1	.1	ufd, Mylar tubular
9	680	ohm, $\frac{1}{4}$ watt, 5%	1	.68	ufd, monolythic ceramic
64	1.5K	ohm, $\frac{1}{4}$ watt, 5%	1	1	ufd, tantalum dipped (usually orange or red)
1	3.3K	ohm, $\frac{1}{4}$ watt, 5%	5	15	ufd, tantalum dipped (usually orange or red)
6	5.6K	ohm, $\frac{1}{4}$ watt, 5%	1	100	ufd, aluminum electrolytic
32	10 K	ohm, $\frac{1}{4}$ watt, 5%			
1	15 K	ohm, $\frac{1}{4}$ watt, 5%			
2	39 K	ohm, $\frac{1}{4}$ watt, 5%			
1	47 K	ohm, $\frac{1}{4}$ watt, 5%			
3	50 K	ohm, Potentiometer			
4	100 K	ohm, $\frac{1}{4}$ watt, 5%			
2	150 K	ohm, $\frac{1}{4}$ watt, 5%			
2	1 M	ohm, $\frac{1}{4}$ watt, 5%			
1	2.2M	ohm, $\frac{1}{4}$ watt, 5%			
2	3.3M	ohm, $\frac{1}{4}$ watt, 5%			
<u>CONNECTORS</u>					
1	25-pin Female, AMP206584-2 (J1)				
1	25-pin Male, AMP206604-1 (J2)				
2	20-pin Header, 3M3492-2002 (J3 & J4)				
1	30-pin Right Angle Edge Connector, VIKING 3KH15/1JKC15 (J5)				
2	Miniature Phone Jack (J6 & J7)				
2	Subminiature Phone Jack (J8 & J9)				
1	7-pin Male Locking Molex Connector (J10)				
1	100-pin Edge Connector, TI H322150-0306A (J11)				
1	Molex-type DC Power Cable, mates with J10 (prefabricated)				

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Table 3-1. Sol-PC Parts List (Continued).

MISCELLANEOUS

- | | | |
|----|---|-------------------------|
| 1 | Sol-PCB Circuit Board | length of #24 bare wire |
| 2 | 8-pin DIP Socket | |
| 29 | 14-pin DIP Socket | |
| 74 | 16-pin DIP Socket | |
| 1 | 24-pin DIP Socket | |
| 3 | 40-pin DIP Socket | |
| 16 | Augat Pins on Carrier | |
| 2 | DIP Switch, 6 position (S1 & S4) | |
| 2 | DIP Switch, 8 position (S2 & S3) | |
| 1 | 4-foot Length 72-ohm Coaxial Cable | |
| 1 | Tie Wrap for Coaxial Cable | |
| 2 | Mounting Bracket, Sol-1040 | |
| 2 | Card Guide, SAE1250F | |
| 10 | #4 Lockwasher, internal tooth | |
| 2 | #4 Insulating Washer | |
| 4 | 4-40 x $\frac{1}{4}$ Binder Head Screw | |
| 6 | 4-40 x $\frac{7}{16}$ Binder Head Screw | |
| 2 | 4-40 x $\frac{5}{8}$ Binder Head Screw | |
| 10 | 4-40 Hex Nut | |
| 1 | Length Solder | |
| 1 | Manual | |
| 1 | Personality Module Kit (See Section IV for contents.) | |

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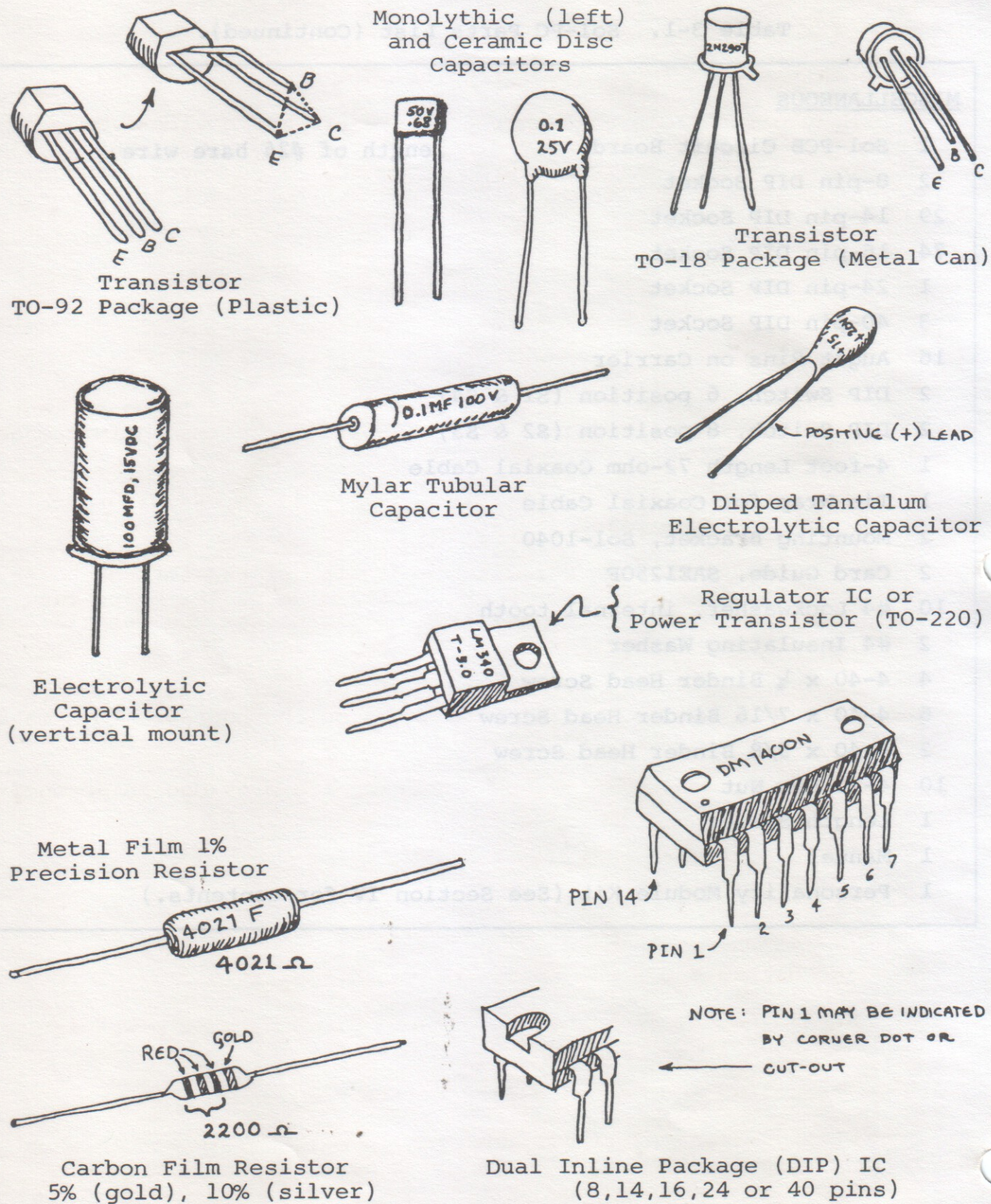


Figure 3-1. Identification of components.

3.3 ASSEMBLY PRECAUTIONS

3.3.1 Handling MOS Integrated Circuits

Many of the IC's used in the Sol-PC are MOS devices. They can be damaged by static electricity discharge. Always handle MOS IC's so that no discharge will flow through the IC. Also, avoid unnecessary handling and wear cotton--rather than synthetic--clothing when you do handle these IC's.

3.3.2 Soldering ****IMPORTANT****

1. Use a fine tip, low-wattage iron, 25 watts maximum.
2. DO NOT use excessive amounts of solder. DO solder neatly and as quickly as possible.
3. Use only 60-40 rosin-core solder. NEVER use acid-core solder or externally applied fluxes.
4. To prevent solder bridges, position iron tip so that it does not touch adjacent pins and/or traces simultaneously.
5. DO NOT press tip of iron on pad or trace. To do so can cause the pad or trace to "lift" off the board and permanently damage the board.
6. The Sol-PC uses circuit boards with plated-through holes. Solder flow through to the component (front) side of the board can produce solder bridges. Check for such bridges after you install each component.
7. The Sol-PC circuit boards have integral solder masks (a lacquer coating) that shield selected areas on the boards. This mask minimizes the chances of creating solder bridges during assembly. DO, however, check all solder joints for possible bridges.

8. Additional pointers on soldering are provided in Appendix IV of this manual.

3.3.3 Power Connection (J10)

NEVER connect the DC power cable to the Sol-PC when power supply is energized. To do so can damage the Sol-PC.

3.3.4 Installing and Removing Integrated Circuits

NEVER install or remove integrated circuits when power is applied to the Sol-PC. To do so can damage the IC.

3.3.5 Installing and Removing Personality Module

NEVER install or remove the plug-in personality module when power is applied to the Sol-PC. To do so can damage the module.

3.3.6 Use of Clip Leads

TAKE CARE when using a clip lead to establish a ground connection when testing the Sol-PCB circuit board. Make sure that the clip makes contact only with the ground bus on the perimeter of the board.

3.4 REQUIRED TOOLS, EQUIPMENT AND MATERIALS

The following tools, equipment and materials are recommended for assembling and testing the Sol-PC:

1. Needle nose pliers
2. Diagonal cutters
3. Screwdriver
4. Sharp knife
5. Controlled heat soldering iron, 25 watt
6. 60-40 rosin-core solder (supplied)
7. Small amount of #24 solid wire
8. Volt-ohm meter
9. Video monitor or monochrome TV converted for video input.
10. IC test clip (optional)
11. Oscilloscope (optional)

3.5 ORIENTATION (Sol-PCB)

Location J5 (personality plug-in module connector) will be located in the upper right-hand area of the circuit board when location J10 (power connector) is positioned at the bottom of the board. In this position the component (front) side of the board is facing up and all IC legends (U1 through U10, U22 through U24, etc.) will read from left to right. Subsequent position references related to the Sol-PCB assume this orientation.

3.6 Sol-PC ASSEMBLY-TEST PROCEDURE

The Sol-PC is assembled and tested in sections and/or circuits. You will first test the Sol-PCB circuit board for shorts (solder bridges) between the power buses and ground. After assembling

the personality module (see Section IV), the clock and display control circuits are assembled. The bus, CPU, decoder and memory circuits are then assembled, followed by the parallel and serial input/output (I/O) and audio cassette I/O sections.

CAUTION

THE Sol-PC USES MANY MOS INTEGRATED CIRCUITS. THEY CAN BE DAMAGED BY STATIC ELECTRICITY DISCHARGE. HANDLE THESE IC'S SO THAT NO DISCHARGE FLOWS THROUGH THE IC. AVOID UNNECESSARY HANDLING AND WEAR COTTON, RATHER THAN SYNTHETIC, CLOTHING WHEN YOU DO HANDLE MOS IC'S. (STATIC CHARGE PROBLEMS ARE MUCH WORSE IN LOW HUMIDITY CONDITIONS.)

3.6.1 Circuit Board Check

- (✓) Visually check Sol-PCB board for solder bridges (shorts) between traces, broken traces and similar defects.
- (✓) Check board to insure that the +5-volt bus, +12-volt bus and -12-volt bus are not shorted to each other or to ground. Using an ohmmeter, make the following measurements (refer to Sol-PC assembly drawing in Section IX).
 - (✓) +5-volt Bus Test. Measure between positive and negative mounting pads for C58. There should be no continuity.
 - (✓) +12-volt Bus Test. Measure between positive and negative mounting pads for C59. There should be no continuity.
 - (✓) -12-volt Bus Test. Measure between positive and negative mounting pads for C60. There should be no continuity.
 - (✓) 5/12/(-12) Volt Bus Test. Measure between positive mounting pads for C58 and C59, between positive pad for C58 and negative pad for C60, and between positive pad for C59 and negative pad for C60. You should measure no continuity in any of these measurements.

If visual inspection reveals any defects, or you measure continuity in any of the preceding tests, return the board to Processor Technology for replacement. If the board is not defective, proceed to next paragraph.

3.6.2 Personality Module Assembly

Since the personality module is required for testing the Sol-PC in the later stages of its assembly, we suggest that you assemble the personality module first. In so doing, your Sol-PC assembly will proceed uninterrupted. Assembly instructions for the personality module are provided in Section IV of this manual.

If you wish to wait to assemble the personality module until it is needed, go on to Paragraph 3.6.3.

3.6.3 Sol-PCB Assembly and Test

Refer to Sol-PC assembly drawing in Section IX.

- (✓) Step 1. Install DIP sockets. Install each socket in the indicated location with its end notch oriented as shown on the circuit board and assembly drawing. Take care not to create solder bridges between the pins and/or traces. (Refer to footnotes at end of this step before installing U105.)

INSTALLATION TIP

Insert socket pins into mounting pads of appropriate location. On solder (back) side of board, bend pins at opposite corners of socket (e.g., pins 1 and 9 on a 16-pin socket) outward until they are at a 45° angle to the board surface. This secures the socket until it is soldered. Repeat this procedure with each socket until all are secured to the board. Then solder the unbent pins on all sockets. Now straighten the bent pins to their original position and solder.

<u>LOCATION</u>	<u>TYPE SOCKET</u>
(✓) U1 through 21	16 pin
(✓) U22 through 24	14 pin
(✓) U25	24 pin
(✓) U26 through 37	16 pin
(✓) U38	14 pin
(✓) U39	None
(✓) U40 through 43	16 pin
(✓) U44 through 49	14 pin
(✓) U50	16 pin
(✓) U51	40 pin
(✓) U52	16 pin
(✓) U53 through 55	14 pin
(✓) U56	8 pin
(✓) U57 through 61	14 pin

(Continued on Page III-10.)

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LOCATIONTYPE SOCKET

() U62 through 68	16 pin
() U69	40 pin
() U70 through 73	16 pin
() U74	14 pin
() U75 through 81	16 pin
() U82#	None#
() U83	14 pin
() U84,85	16 pin
() U86,87	14 pin
() U88 through 90	16 pin
() U91,92	14 pin
() U93 through 97	16 pin
() U98 through 100	14 pin
() U101	16 pin
() U102	14 pin
() U103#	None#
() U104	None
() U105*	40 pin
() U106,107	16 pin
() U108	8 pin
() U109 through 112	16 pin
() U113	14 pin

#Spare locations, not used.

*Note that U105 notch is positioned at the top.

- () Step 2. Install the following capacitors in the indicated locations. Take care to observe the proper value, type and orientation, if applicable, for each installation. Bend leads outward on solder (back) side of board, solder and trim.

NOTE

Disc capacitor leads are usually coated with wax during the manufacturing process. After inserting leads through mounting holes, remove capacitor and clear the holes of any wax. Reinsert and install.

<u>LOCATION</u>	<u>VALUE (ufd)</u>	<u>TYPE</u>	<u>ORIENTATION</u>
() C1	.047	Disc	None
() C2	.047	"	"
() C3	.047	"	"
() C4	.047	"	"
() C5	.047	"	"
() C6	.047	"	"
() C7	.047	"	"
() C8	.047	"	"

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<u>LOCATION</u>	<u>VALUE (ufd)</u>	<u>TYPE</u>	<u>ORIENTATION</u>
(✓) C10	.047	Disc	None
(✓) C11	.047	"	"
(✓) C13	.047	"	"
(✓) C14	.047	"	"
(✓) C15	15	Tantalum	"+" lead bottom
(✓) C16	.047	Disc	None

- (✓) Step 3. Check for +5-volt bus to ground shorts. Using an ohmmeter, measure between positive and negative mounting pads for C58. There should be no continuity. If there is, find and correct the problem before proceeding to Step 4.
- (✓) Step 4. Install the following capacitors in the indicated locations. Take care to observe the proper value, type and orientation, if applicable, for each installation. Bend leads outward on solder (back) side of board, solder and trim. (refer to NOTE in Step 2.)

<u>LOCATION</u>	<u>VALUE (ufd)</u>	<u>TYPE</u>	<u>ORIENTATION</u>
(✓) C19	.047	Disc	None
(✓) C20	.047	"	"
(✓) C21	.047	"	"
(✓) C24	.047	"	"
(✓) C25	.047	"	"
(✓) C26	.047	"	"
(✓) C33	.047	"	"
(✓) C38	.047	"	"
(✓) C40	15	Tantalum	"+" lead bottom
(✓) C41	.047	Disc	None
(✓) C42	.047	"	"
(✓) C45	.047	"	"
(✓) C56	.047	"	"
(✓) C58	15	Tantalum	"+" lead top
(✓) C59	15	Tantalum	"+" lead top
(✓) C60	15	Tantalum	"+" lead top
(✓) C65	.047	Disc	None

- () Step 5. Check for +5-volt bus to ground shorts. Using an ohmmeter, measure between the positive and negative leads of C58. You should measure at least 100 ohms. Less than 100 ohms indicates a short. If required, find and correct the problem before proceeding to Step 6.

- (✓) Step 6. Install the following capacitors in the indicated locations. Take care to observe the proper value and type for each installation. Bend leads outward on solder (back) side of board, solder and trim. (Refer to NOTE in Step 2.)

(Step 6 continued on Page III-12.)

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LOCATION	VALUE (ufd)	TYPE	ORIENTATION
() C9	.047	Disc	None
() C12	.047	"	"
() C17	.047	"	"
() C18	.047	"	"
() C22	.047	"	"
() C23	.047	"	"
() C27	.047	"	"
() C28	.047	"	"
() C46	.047	"	"

- (✓) Step 7. Check for +5-volt bus to ground shorts. Using an ohmmeter, measure between the positive and negative leads of C58. You should measure some resistance. Zero resistance indicates a short. If required, find and correct the problem before proceeding to Step 8.

- (✓) Step 8. Install diodes D8 (1N4148 or 1N914), D11 (1N5231B) and D12 (1N4001) in their locations (in the area below U90 through U92). Position D8 with its dark band (cathode) to the right, D11 with its band at the bottom, and D12 with its band at the top.

NOTE

The leads of D12 and its mounting holes are a snug fit. Take care when installing this diode.

- (✓) Step 9. Install the following resistors in the indicated locations. Bend leads to fit distance between mounting holes, insert leads, pull down snug to board, solder and trim.

LOCATION	VALUE (ohms)	COLOR CODE
() R104	10 K	brown-black-orange
() R105	1.5K	brown-green-red
() R106	1.5K	" " "
() R130	100, $\frac{1}{2}$ watt	brown-black-brown
() R131	100, $\frac{1}{2}$ watt	" " "
() R132	100, $\frac{1}{2}$ watt	" " "
() R133	330	orange-orange-brown
() R134	330	" " "
() R135 & 136	10 K	brown-black-orange
() R137 & 138	47	yellow-violet-black

- (✓) Step 10. Install the following capacitors in the indicated locations. Take care to observe the proper value and type for each installation. Bend leads outward on solder (back) side of board, solder and trim. (Refer to NOTE in Step 2.)

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LOCATION	VALUE	TYPE
(✓) C39	.1 ufd	Disc
(✓) C43	680 pfd	Monolythic or Disc
(✓) C44	680 pfd	Monolythic or Disc
(✓) C61	.001 ufd	Disc
(✓) C62	.68 ufd	Monolythic
(✓) C63	.1 ufd	Disc
(✓) C64	10 pfd	Disc

- (✓) Step 11. Install 14.318 MHz crystal in its location just above C61. Insert leads and pull down until the case is 1/16" above the front surface of the board. Solder quickly and trim.
- (✓) Step 12. Install male locking Molex connector in location J10. Position connector so the pins are closer to the bottom edge of the board than they are to the crystal (XTAL), insert shorter pins in mounting holes and solder.
- (✓) Step 13. In the jumper area labeled CLK on the assembly drawing (between U90 and U91), install Augat pins in mounting holes A,B,C,D and E. (Refer to "Installing Augat Pins" in Appendix IV.) Using #24 bare wire, install a jumper between the A and B pins and another jumper between the D and E pins.
- (✓) Step 14. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation. DO NOT SUBSTITUTE FOR ANY OF THESE IC's.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

IC NO.	TYPE
(✓) U77	8T97
(✓) U90	74LS175 or 25LS175
(✓) U91	74H00
(✓) U92	74S04
(✓) U104*	AM0026 or DM0026*

*Solder this IC in its location.
See "Loading DIP Devices" in
Appendix IV.

- (✓) Step 15. Connect power to power connector J10. Power and interconnection requirements are as follows:

(Step 15 continued on Page III-14.)

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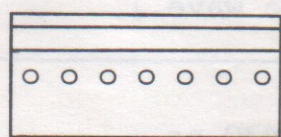
SECTION III

CAUTION 1

NEVER CONNECT POWER CABLE TO J10 WITH POWER SUPPLY ENERGIZED.

CAUTION 2

MAKE SURE POWER CABLE CONNECTOR MATES EXACTLY WITH J10; THAT IS, PIN 1 TO PIN 1, PIN 2 TO PIN 2, ETC. ANY OTHER MATING RELATIONSHIP WILL "BLOW" THE IC's.



1 2 3 4 5 6 7
(J10, Top View)

J10 PIN NO.

1
2 and 6
3 and 5
4
7

POWER

Ground
+5 V dc $\pm 5\%$, 2 A max
-12 V dc $\pm 5\%$, 300 mA max
+12 V dc $\pm 5\%$, 100 mA max
Ground

NOTE

Though not labeled on the connector, J10 pins are designated 1 through 7, reading from left to right.

- (✓) Step 16. Check clock circuits. If you have an oscilloscope, use part A of this step. If you do not, use part B.

A. Oscilloscope Check

- () Using an oscilloscope, check for the waveforms given in Figure 3-2 on Page III-15 at the indicated observation points and in the order given. The waveforms shown in Figure 3-2 approximate actual waveforms. If any waveforms are incorrect, determine and correct the cause before proceeding with assembly.

NOTE

Irregularities up to 1 volt are acceptable on positive portions of waveforms. Negative portions, however, should be relatively flat.

B. Volt-ohm Meter Check

- () Using the test probe shown in Figure 3-3 on Page III-16, set meter to DC volts and make the following measurements:

(Volt-ohm Meter Check continued on Page III-16.)

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CHECK POINTSIGNALWAVEFORM(✓) U77,
Pin 7Oscillator
Output

14.3 MHz square wave. (This is not a perfect square wave. It in fact more resembles a poor sine wave.)

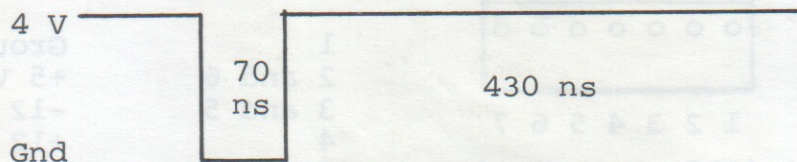
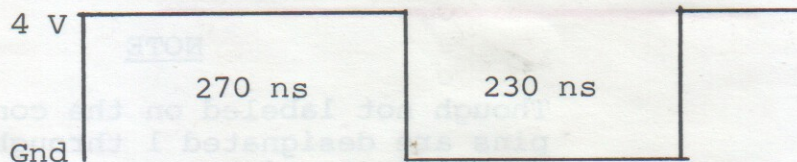
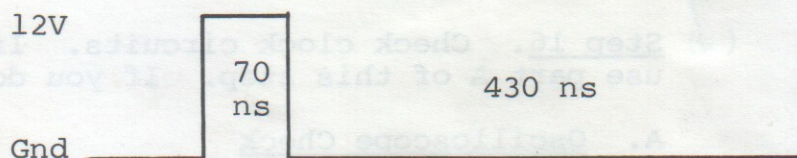
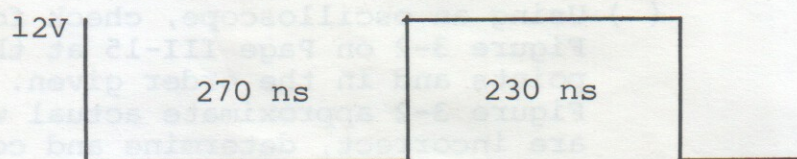
✓ () U91,
Pin 6Clock
Divider
Output✓ () U91,
Pin 11Clock
Divider
Output✓ () U104,
Pin 7CPU
Clock
Ø1✓ () U104,
Pin 5CPU
Clock
Ø2

Figure 3-2. Clock circuit waveforms.

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

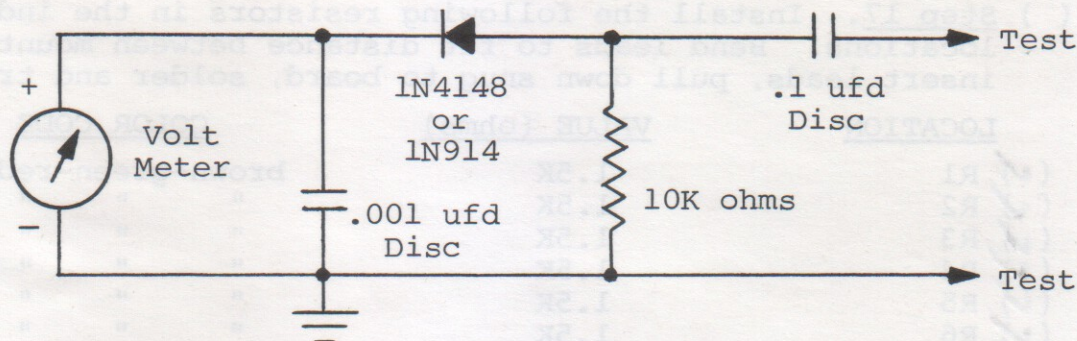


Figure 3-3. Test probe for Steps 16B and 25B.

NOTE 1

The probe shown in Figure 3-3 can be made using parts supplied with your Sol-PC kit. Since these parts will be used later in the Sol-PC assembly, DO NOT shorten the leads or otherwise alter the components. Assemble the probe using tack soldering technique.

NOTE 2

Make sure you have a good ground connection between the meter, probe and Sol-PCB.

- 4.00 ✓ At pin 7 of U77 you should measure approximately 1.5 V dc. (A significantly lower reading indicates a faulty oscillator circuit.)
- 1.6 ✓ At pin 6 of U91 you should measure approximately 0.25 V dc. (A significantly lower reading indicates a faulty clock divider. U90.)
- 1.75 ✓ At pin 11 of U91 you should measure approximately 1.25 V dc. (A significantly lower reading indicates a faulty clock divider, U90.)
- 11.00 ✓ At pin 5 of U104 you should measure approximately 4 V dc. (A significantly lower reading indicates a problem with U104.)
- 14.00 ✓ At pin 7 of U104 you should measure approximately 8 V dc. (A significantly lower reading indicates a problem with U 104.)
- ✓ If any voltages are incorrect, determine and correct the cause before proceeding with assembly.
- ✓ If all voltages are correct, turn power supply off and disconnect power cable.

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- () Step 17. Install the following resistors in the indicated locations. Bend leads to fit distance between mounting holes, insert leads, pull down snug to board, solder and trim.

<u>LOCATION</u>	<u>VALUE (ohms)</u>	<u>COLOR CODE</u>
() R1	1.5K	brown-green-red
() R2	1.5K	" " "
() R3	1.5K	" " "
() R4	1.5K	" " "
() R5	1.5K	" " "
() R6	1.5K	" " "
() R7	1.5K	" " "
() R8	1.5K	" " "
() R9	1.5K	" " "
() R10	1.5K	" " "
() R11	1.5K	" " "
() R16	1.5K	" " "
() R17	1.5K	" " "
() R19	1.5K	" " "
() R30	1.5K	" " "
() R80*	330, ½ watt	orange-orange-brown
() R81	75	violet-green-black
() R82	200	red-black-brown
() R83	1.5K	brown-green-red
() R84	3.3M	orange-orange-green
() R85	1.5K	brown-green-red
() R86	1.5K	" " "
() R87	330	orange-orange-brown
() R88	680	blue-gray-brown
() R89	1.5K	brown-green-red
() R90	1.5K	" " "
() R96	1.5K	" " "
() R97	1.5K	" " "
() R98	10 K	brown-black-orange
() R99	1.5K	brown-green-red
() R100	10 K	brown-black-orange
() R101	1.5K	brown-green-red
() R102	3.3M	orange-orange-green
() R103	1.5K	brown-green-red
() R120	100 K	brown-black-yellow
() R121	10 K	brown-black-orange
() R122	10 K	" " "
() R123	39 K	orange-white-orange
() R124	1.5K	brown-green-red
() R125	1.5K	" " "
() R126	39 K	orange-white-orange
() R127	10 K	orange-black-orange
() R128	3.3K	orange-orange-red
() R129	10 K	orange-black-orange
() VR1 & VR2	50 K	Potentiometer

*The leads of R80 and its mounting holes form a snug fit. Take care when installing this resistor.

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SECTION III

- (✓) Step 18. Install the following capacitors in the indicated locations. Take care to observe the proper value and type for each installation. Bend leads outward on solder (back) side of board, solder and trim. (Refer to NOTE in Step 2.)

CAUTION

REFER TO FOOTNOTE AT END OF THIS STEP BEFORE
INSTALLING C31.

<u>LOCATION</u>	<u>VALUE</u>	<u>TYPE</u>
(✓) C31*	100 ufd	Aluminum Electrolytic
(✓) C32	.1 ufd	Disc
(✓) C34	680 pfd	Monolythic or Disc
(✓) C35	.1 ufd	Mylar Tubular
(✓) C36	.1 ufd	Disc
(✓) C37	.1 ufd	Disc
(✓) C52	.001 ufd	Mylar Tubular
(✓) C53	.01 ufd	Mylar Tubular
(✓) C54	.001 ufd	Disc
(✓) C55	.001 ufd	Disc
(✓) C57	.1 ufd	Disc

*Install C31 with "+" lead at the top.

- (✓) Step 19. Install Q2 (2N2907 or 2N3460) in its location below and to the right of U88. The emitter lead (closest to tab on can) is oriented toward the left of the board and the base is oriented toward the bottom. Push straight down on transistor until it is stopped by the leads. Solder and trim.
- (✓) Step 20. Install diodes D9 and D10 (1N4148 or 1N914) in their locations below U88. Position D9 with its dark band (cathode) to the left and D10 with its band to the right.
- (✓) Step 21. Install coaxial cable, composite video output. (See Figure 3-4 for details on how to prepare cable.)
- (✓) Strip away about 1¼" of the outer insulation to expose shield. Unbraid shield, gather and twist into a single lead. Then strip away the inner conductor insulation, leaving about ¼" at the shield end.

CAUTION

WHEN PREPARING AND INSTALLING SHIELD, BE
SURE BITS OF BRAID DO NOT FALL ONTO BOARD.
SUCH DEBRIS CAN CREATE HARD-TO-FIND SHORT
CIRCUITS.

- (✓) Insert inner conductor in mounting hole P1 (left side of board), solder and trim.

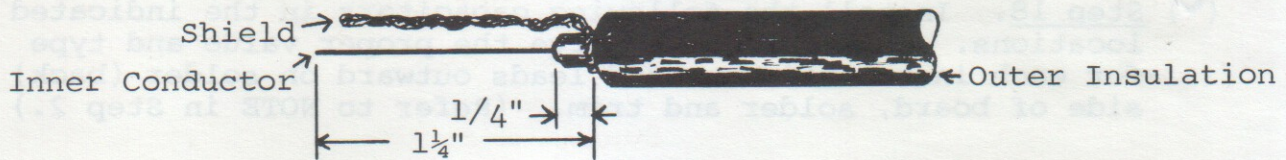


Figure 3-4. Coaxial cable preparation.

- (✓) Insert twisted shield in mounting hole P2, solder and trim. Using the two large holes to the right of VR1 and VR2, tie cable to board with tie wrap (see CAUTION below).

CAUTION

AFTER INSTALLATION, FINE BITS OF THE BRAID FROM THE SHIELD MAY WORK LOOSE AND FALL ONTO THE BOARD AND CREATE HARD-TO-FIND SHORT CIRCUITS. TO PREVENT THIS, COAT ALL EXPOSED BRAID WITH AN ADHESIVE AFTER SOLDERING AND TIEING. USE AN ADHESIVE SUCH AS SILICONE, CONTACT CEMENT OR FINGERNAIL POLISH. DO NOT USE WATER BASE ADHESIVES.

- (✓) Step 22. Install 6-position DIP switch in location S1 on left end of board. Position Switch No. 1 at the bottom.
- (✓) Step 23. Install 20-pin header in location J4 (video expansion connector) between U28 and U29. Position header so pin 1 is in the lower right corner. (An arrow on the connector points to pin 1.)
- (✓) Step 24. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
(✓) U28	74LS163 or 25LS163
(✓) U31	74LS163 or 25LS163
(✓) U33	74LS163 or 25LS163
(✓) U40	74LS163 or 25LS163
(✓) U43	74LS109
(✓) U47	74LS10
(✓) U49	74LS04

(Step 24 continued on Page III-20.)

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

<u>IC NO.</u>	<u>TYPE</u>
() U59	74LS20
() U60	74LS02 or 9LS02
() U62	93L16
() U74	74LS86
() U75	74LS109
() U87	7406
() U88*	4049*
() U102*	4001*

*MOS device. Refer to CAUTION on Page III-8.

- () Step 25. Apply power to Sol-PC and check display section timing chain operation. If you have an oscilloscope, use part A of this step. If you do not, use part B.

A. Oscilloscope Check

- () Using an oscilloscope, check for the waveforms given in Figure 3-5 at the indicated observation points and in the order given. The waveforms shown in Figure 3-5 approximate actual waveforms. If any waveforms are incorrect, determine and correct the cause before proceeding with assembly.

NOTE

Irregularities up to 1 volt are acceptable on positive portions of waveforms. Negative portions, however, should be relatively flat.

B. Volt-ohm Meter Check

- () Using the test probe made in Step 16B, measure the voltage at pin 12 of U28. You should measure approximately 1 V dc. If you get a significantly lower reading, find and correct the cause before you proceed with assembly.
- () Turn off power supply and disconnect power connector.
- () Step 26. Check synchronization circuits.
- () Set all S1 switches to OFF.
- () Connect Sol-PC video output cable to video monitor.

SEE CAUTION ON PAGE III-22 BEFORE CONNECTING MONITOR.

(Step 26 continued on Page III-22.)

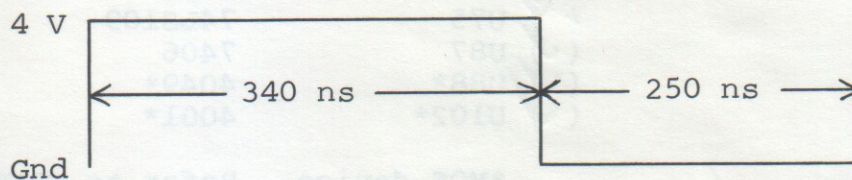
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Sol-PC SINGLE BOARD TERMINAL COMPUTER™

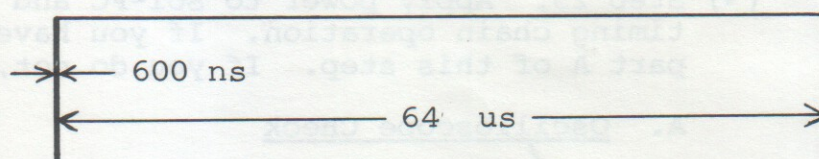
SECTION III

CHECK POINTWAVEFORM

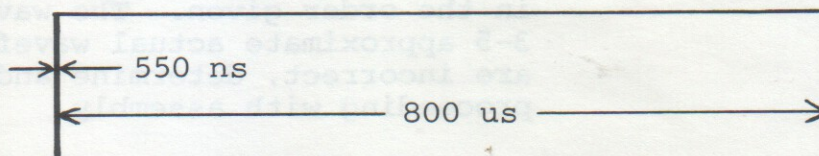
✓ () U28, Pin 12



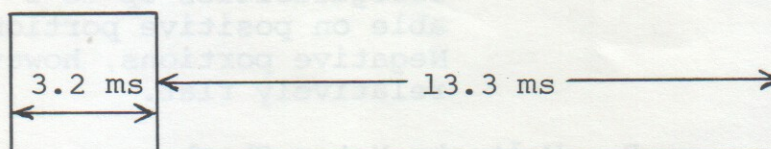
✓ () U47, Pin 8



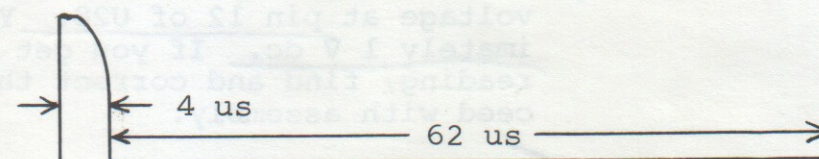
✓ () U59, Pin 8



✓ () U43, Pin 9



✓ () U88, Pin 10



✓ () U88, Pin 4

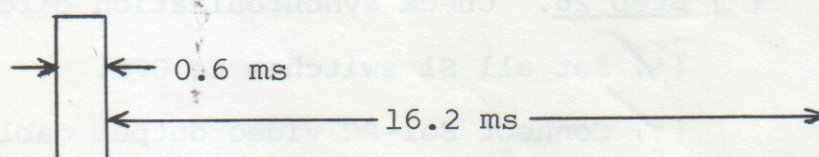


Figure 3-5. Display section timing waveforms.

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

<u>IC NO.</u>	<u>TYPE</u>
(<input checked="" type="checkbox"/>) U59	74LS20
(<input checked="" type="checkbox"/>) U60	74LS02 or 9LS02
(<input checked="" type="checkbox"/>) U62	93L16
(<input checked="" type="checkbox"/>) U74	74LS86
(<input checked="" type="checkbox"/>) U75	74LS109
(<input checked="" type="checkbox"/>) U87	7406
(<input checked="" type="checkbox"/>) U88*	4049*
(<input checked="" type="checkbox"/>) U102*	4001*

*MOS device. Refer to CAUTION on Page III-8.

- () Step 25. Apply power to Sol-PC and check display section timing chain operation. If you have an oscilloscope, use part A of this step. If you do not, use part B.

A. Oscilloscope Check

- () Using an oscilloscope, check for the waveforms given in Figure 3-5 at the indicated observation points and in the order given. The waveforms shown in Figure 3-5 approximate actual waveforms. If any waveforms are incorrect, determine and correct the cause before proceeding with assembly.

NOTE

Irregularities up to 1 volt are acceptable on positive portions of waveforms. Negative portions, however, should be relatively flat.

B. Volt-ohm Meter Check

- () Using the test probe made in Step 16B, measure the voltage at pin 12 of U28. You should measure approximately 1 V dc. If you get a significantly lower reading, find and correct the cause before you proceed with assembly.

- () Turn off power supply and disconnect power connector.

- () Step 26. Check synchronization circuits.

- () Set all S1 switches to OFF.

- () Connect Sol-PC video output cable to video monitor.

SEE CAUTION ON PAGE III-22 BEFORE CONNECTING MONITOR.

(Step 26 continued on Page III-22.)

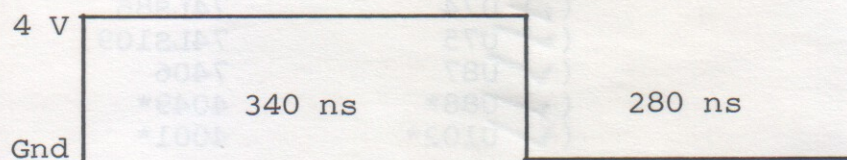
PROCESSOR TECHNOLOGY CORPORATION

Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

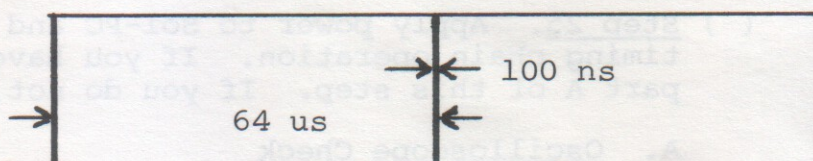
SECTION III

CHECK POINTWAVEFORM

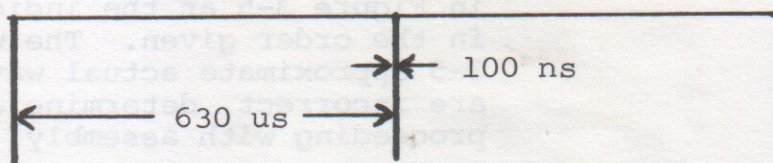
() U28, Pin 12



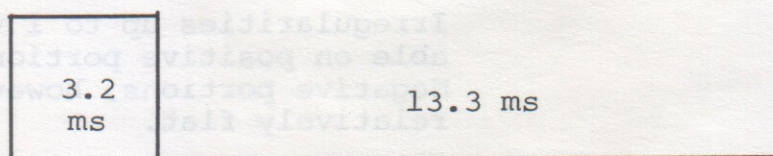
() U47, Pin 8



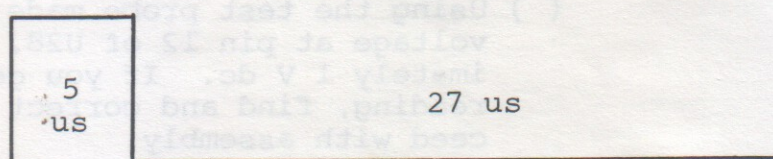
() U59, Pin 8



() U43, Pin 9



() U88, Pin 10



() U88, Pin 4

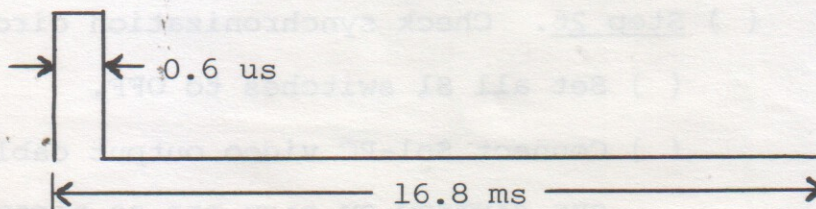


Figure 3-5. Display section timing waveforms.

PROCESSOR TECHNOLOGY CORPORATION

Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

CAUTION

DO NOT CONNECT THE Sol-PC VIDEO OUTPUT TO A MONITOR OR TV RECEIVER THAT IS NOT EQUIPPED WITH AN ISOLATION TRANSFORMER. (SEE PAGE AVI-7 IN APPENDIX VI.)

- (✓) Set VR2 (VERT) and VR1 (HORIZ) on the Sol-PC to their mid-range settings. Turn monitor on and apply power to the Sol-PC.

- (✓) The display raster will be pulled in. Using the monitor Vertical Hold, you should be able to obtain a slow roll (black horizontal bar moves slowly down the screen) and a stationary raster. Using the monitor Horizontal Hold, you should be able to adjust for an out of sync raster (numerous black lines cutting across the raster) and a stable raster. If you cannot obtain these conditions, locate and correct the cause before proceeding.

NOTE

For a stable presentation, a few monitors (especially modified TV sets) may require a higher sync amplitude than that supplied by the Sol-PC. In such cases, increase sync amplitude by reducing the value of R80. DO NOT DECREASE R80 BELOW 225 OHMS.

- (✓) If the synchronization circuits are operating correctly, turn monitor and power supply off, disconnect the power cable and go on to Step 27.
- (✓) Step 27. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

(Step 27 continued on Page III-23.)

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<u>IC NO.</u>	<u>TYPE</u>
(✓) U1*	4029*
(✓) U2	74LS175 or 25LS175
(✓) U11*	4029*
(✓) U12	74LS157
(✓) U13	74LS175 or 25LS175
(✓) U25*	MCM6574 or MCM6575*
(✓) U26	74LS175 or 25LS175
(✓) U27	74LS175 or 25LS175
(✓) U29	74LS367
(✓) U30	74LS157
(✓) U32	74LS157 or 25LS157
(✓) U41	74166
(✓) U42	74LS175 or 25LS175
(✓) U44	74LS00
(✓) U61	74LS10
(✓) U89	74LS367

*MOS device. Refer to CAUTION on Page III-8.

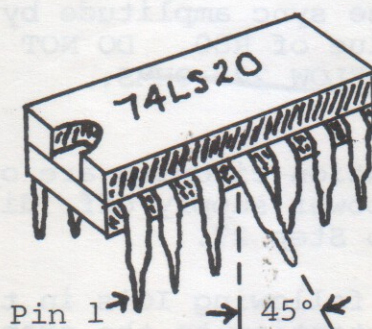
(✓) Step 28. Check display circuits.

(✓) Set S1 switches as follows:

No. 1 through 5: OFF

No. 6: ON

(✓) Remove U42 and bend pin 6 out 45° to its normal position. (See Figure 3-6.) Re-install U42 with pin 6 out of the socket.

Bend desired pin
out 45° to
vertical.Figure 3-6. Bending selected pins on U42, 59 and 75 (U59 shown).

(✓) Remove U59 and bend pin 4 in same manner as U42. Re-install U59 with pin 4 out of the socket.

(Step 28 continued on Page III-24.)

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

- (✓) Remove U75 and bend pin 5 in same manner as U42. Re-install U75 with pin 5 out of the socket.
- (✓) Using #24 wire, install the following TEMPORARY jumpers in the sockets for U14 through U21. Double check jumpers after installing for correctness. (See Figure 3-7.)

<u>IC SOCKET</u>	<u>JUMPER</u>
(✓) U14	Pin 12 to 6
(✓) U15	Pin 12 to 5
(✓) U16	Pin 12 to 4
(✓) U17	Pin 12 to 8
(✓) U18	Pin 12 to 2
(✓) U19	Pin 12 to 7
(✓) U20	Pin 12 to 1
(✓) U21	Pin 12 to 16

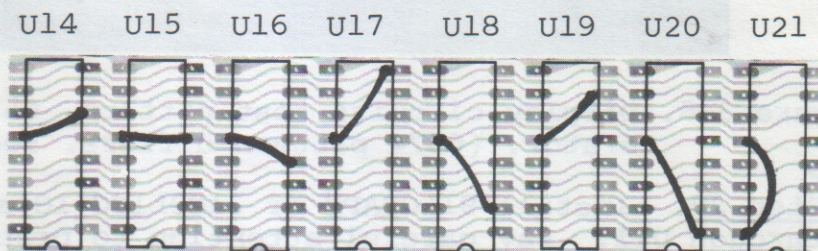


Figure 3-7. U14 through U21 socket jumpers.

- (✓) Turn monitor on and apply power to Sol-PC.
- (✓) Momentarily ground pin 1 of U2 and pin 5 of U75. The display shown in Figure 3-8 should appear on the monitor screen.
- (✓) If the display circuits do not pass this test, determine and correct the cause before proceeding with assembly.
- (✓) If the display circuits are operating correctly:
 - (✓) Turn monitor and power supply off and disconnect the power cable.
 - (✓) Remove jumpers from U14 through U21 sockets.
 - (✓) Bend pin 6 on U42, pin 4 on U49 and pin 5 on U75 back to their normal position and re-install these three IC's in their appropriate sockets.

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SECTION III

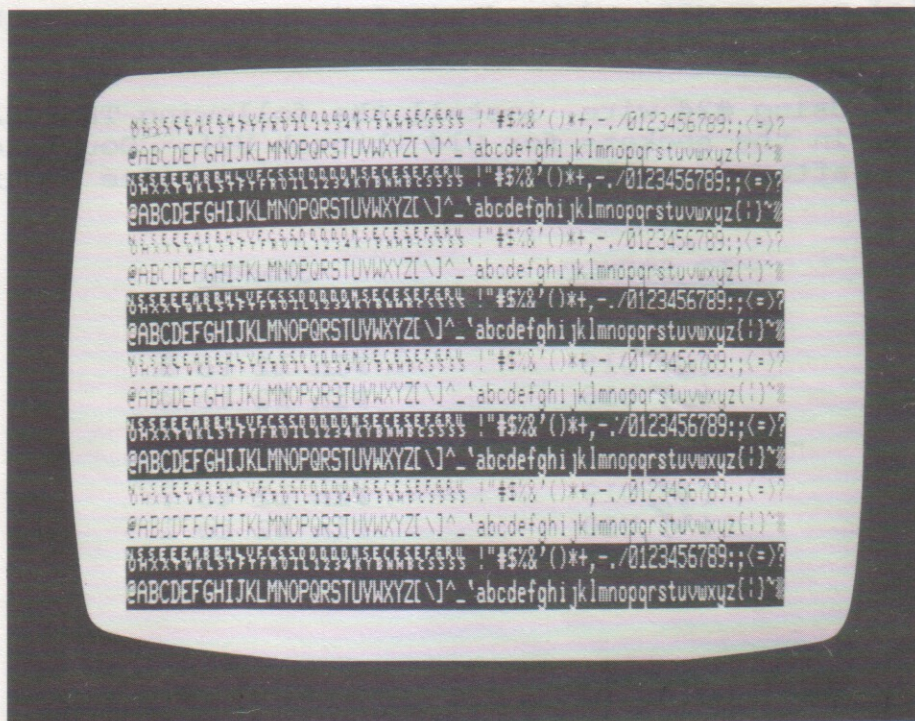


Figure 3-8. Display circuits test pattern, 6575 character generator. (6574 pattern differs. See Section VIII.)

- (✓) Step 29. Install 91L02APC or 2102L1PC IC's in locations U14 through U21. Pay careful attention to proper orientation.

CAUTION

IC's U14 THROUGH U21 ARE MOS DEVICES. REFER TO CAUTION ON PAGE III-8 BEFORE YOU INSTALL THESE IC's.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

- () Step 30. Install the following resistors in the indicated locations. Bend leads to fit distance between mounting holes, insert leads, pull down snug to board, solder and trim.

<u>LOCATION</u>	<u>VALUE (ohms)</u>	<u>COLOR CODE</u>
(✓) R12	1.5K	brown-green-red
(✓) R18	10 K	brown-black-orange

(Step 30 continued on Page III-26.)

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

LOCATION	VALUE (ohms)	COLOR CODE
(✓) R20	1.5K	brown-green-red
(✓) R31	1.5K	" " "
(✓) R32	1.5K	" " "
(✓) R33	1.5K	" " "
(✓) R34	1.5K	" " "
(✓) R35	1.5K	" " "
(✓) R36	1.5K	" " "
(✓) R41	1.5K	" " "
(✓) R50	1.5K	" " "
(✓) R51	1.5K	" " "
(✓) R52	1.5K	" " "
(✓) R53	1.5K	" " "
(✓) R54	1.5K	" " "
(✓) R55	1.5K	" " "
(✓) R56	1.5K	" " "
(✓) R57	1.5K	" " "
(✓) R58	330	orange-orange-brown
(✓) R91	1.5K	brown-green-red
(✓) R107	10 K	brown-black-orange
(✓) R108	10 K	" " "
(✓) R109	10 K	" " "
(✓) R110	10 K	" " "
(✓) R111	10 K	" " "
(✓) R112	10 K	" " "
(✓) R113	10 K	" " "
(✓) R114	10 K	" " "
(✓) R115	1.5K	brown-green-red

- (✓) Step 31. Install diode D7 (1N4148 or 1N914) in its location between U46 and U47. Position D7 with its dark band (cathode) at the bottom.
- (✓) Step 32. Install 20-pin header in location J3 (keyboard interconnect) between U64 and U65. Position header so pin 1 is in the upper left corner. (An arrow on the connector points to pin 1.)
- (✓) Step 33. In the jumper area labeled PHTM on the assembly drawing (below U64), install Augat pins in mounting holes F and G. (Refer to "Installing Augat Pins" in Appendix IV.) Using #24 bare wire, install a jumper between pins F and G.
- (✓) Step 34. In the jumper area labeled RST on the assembly drawing (between U76 and U77), install Augat pins in mounting holes N and P. (Refer to "Installing Augat Pins" in Appendix IV.) Using #24 bare wire, install a jumper between pins N and P.

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SECTION III

- () Step 35. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
() U45	74LS04
() U46	8T380 or 8836
() U48	74LS00
() U50	74LS367
() U54	74LS04
() U63	74LS109
() U64	74LS109
() U67	8T97
() U68	8T97
() U76	74LS175
() U94	74LS367
() U107	74LS367

- (✓) Step 36. Apply power to Sol-PC and make the following voltage measurements:

<u>MEASUREMENT POINT</u>	<u>VOLTAGE*</u>
Pin 11 of U105 Socket	-5 V dc
Pin 20 of U105 Socket	+5 V dc
Pin 28 of U105 Socket	+12 V dc
Pin 1 of U51 Socket	+5 V dc
Pin 2 of U51 Socket	-12 V dc

*All voltages referenced to ground.

- (✓) If any voltages are incorrect, locate and correct the cause before going on to Step 37.
- (✓) If voltages are correct, turn power supply off, disconnect power cable and go on to Step 37.
- (✓) Step 37. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

(Step 37 continued on Page III-28.)

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Sol-PC SINGLE BOARD TERMINAL COMPUTERTM

SECTION III

<u>IC NO.</u>	<u>TYPE</u>
(✓) U51*	TMS6011NC*
(✓) U105* #	8080,8080A or 9080A* #

*MOS device. Refer to CAUTION on Page III-8.

#Note that pin 1 of this IC is in the upper left corner.

(✓) Step 38. Perform Functional Test No. 1 of CPU circuits.

(✓) Set S1 switches as follows:

No. 1 through 5: OFF

No. 6: ON

(✓) Turn monitor on and apply power to Sol-PC.

(✓) Momentarily ground pin 1 of U2. You should see a full display (64 characters x 16 lines) on the monitor.

(✓) Momentarily ground pin 2 of U75. The display should blank while pin 2 of U75 is grounded. When you remove the ground, the display shown in Figure 3-9 on Page III-29 should appear.

NOTE

The pattern shown in Figure 3-9 (delete characters) results from all bits of the DIO Bus being high. If you do not see the delete characters, one or more bits of the DIO bus are low. Consult the MCM6575 or MCM6574 pattern, as appropriate, in Section VIII of this manual to determine which bits are low.

() If the test fails, determine and correct the cause before proceeding with assembly.

() If the Sol-PC passes this test, turn monitor and power supply off, disconnect power cable and proceed to Step 39.

(✓) Step 39. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

(Step 39 continued on Page III-29.)

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NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
(✓) U80	8T97#
(✓) U81	8T97#

#DO NOT substitute.

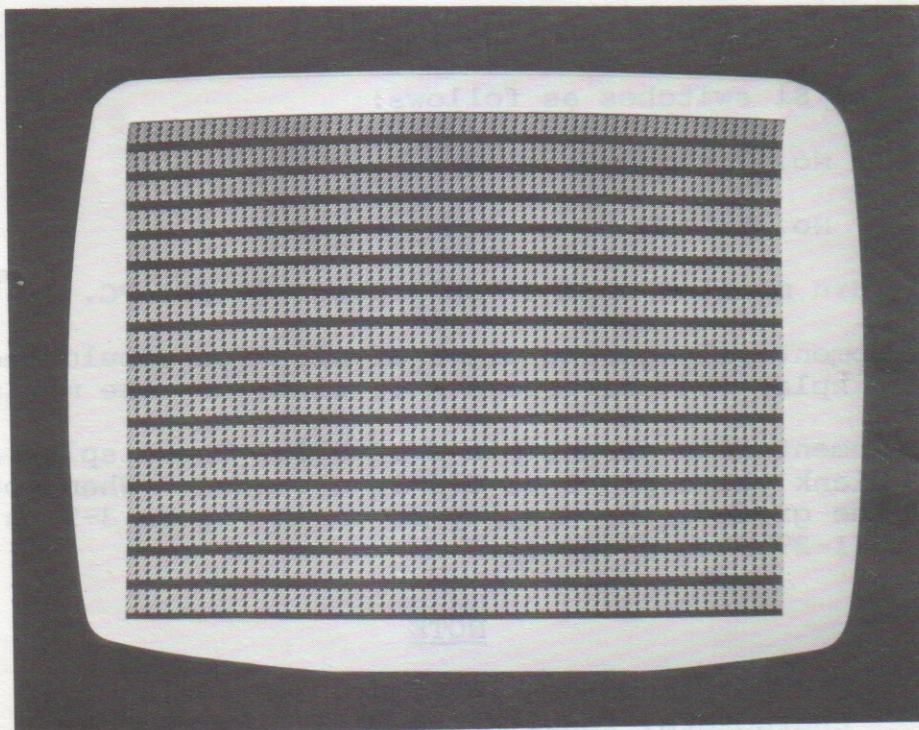


Figure 3-9. CPU Functional Test No. 1 display, 6574 character generator. (6574 pattern differs. See Section VIII.)

() Step 40. Perform Functional Test No. 2 of CPU circuits.

(✓) Check that S1 switches are set as specified in Step 38.

(✓) Turn monitor on and apply power to Sol-PC.

(✓) Momentarily ground pin 1 of U2 and pin 2 of U75. The display shown in Figure 3-10 on Page III-31 should appear on the monitor.

(✓) If the test fails, determine and correct the cause before proceeding with assembly.

(✓) If the Sol-PC passes this test, turn monitor and power supply off, disconnect power cable and proceed to Step 41.

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- (✓) Step 41. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
(✓) U65	74LS253
(✓) U66	74LS253
(✓) U78	74LS253
(✓) U79	74LS253
(✓) U93	74LS175
(✓) U106	74LS175

- (✓) Step 42. Turn monitor on, apply power to Sol-PC and perform the test described in Step 40, except ground pin 5 of U75 instead of pin 2. You should get the same results.
- (✓) If the test fails, determine and correct the cause before proceeding with assembly.
- (✓) If the Sol-PC passes this test, turn monitor and power supply off, disconnect power cable and proceed to Step 43.
- (✓) Step 43. Install the following resistors in the indicated locations. Bend leads to fit distance between mounting holes, insert leads, pull down snug to board, solder and trim.

<u>LOCATION</u>	<u>VALUE (ohms)</u>	<u>COLOR CODE</u>
(✓) R13	1.5K	brown-green-red
(✓) R14	1.5K	" " "
(✓) R15	1.5K	" " "
(✓) R60	1.5K	" " "

- (✓) Step 44. Using two 4-40 x 5/8 binder head screws, two #4 insulating washers, two lockwashers and hex nuts, install 30-pin right angle edge connector in location J5. Insert screws from back (solder) side of board and place an insulating washer on each screw on front (component) side of board. Position connector with socket side facing right, place over screws and seat pins in mounting holes. Then place lockwasher on each screw, start nuts and tighten. Solder pins to board.

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- (✓) Step 45. Using four 4-40 x $\frac{1}{4}$ binder head screws, lockwashers and hex nuts, install two brackets (Sol-1040) for personality module in area to right of J5. Position brackets over the mounting holes as shown in Figure 3-11. Insert screws from front (component) side of board, place lockwasher on each screw on back (solder) side of board, start nuts and tighten.

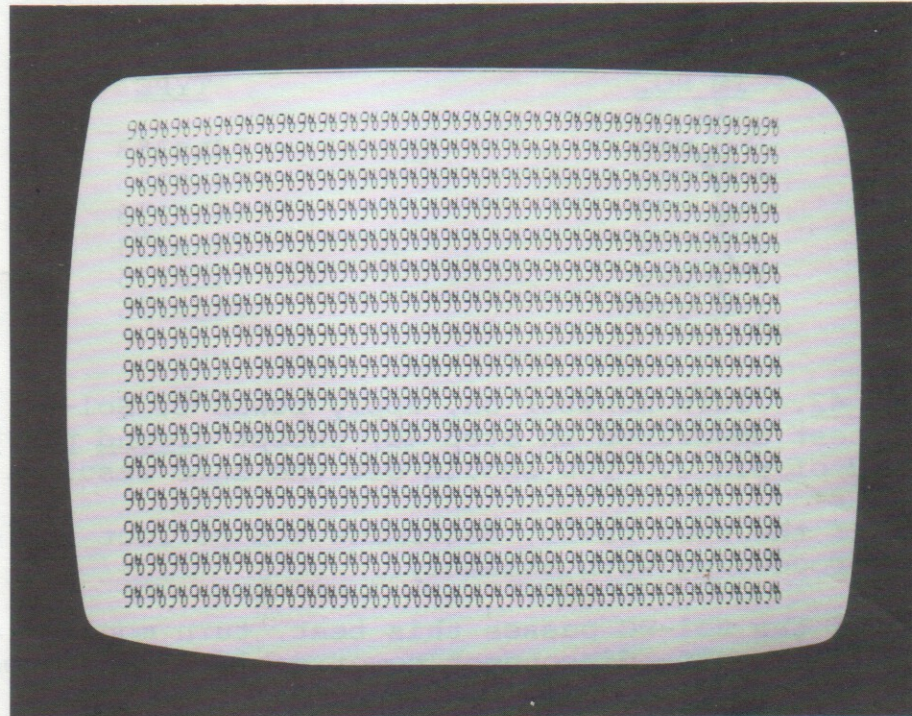


Figure 3-10. CPU Functional Test No. 2 display, 6575 character generator. (6574 pattern differs. See Section VIII.)

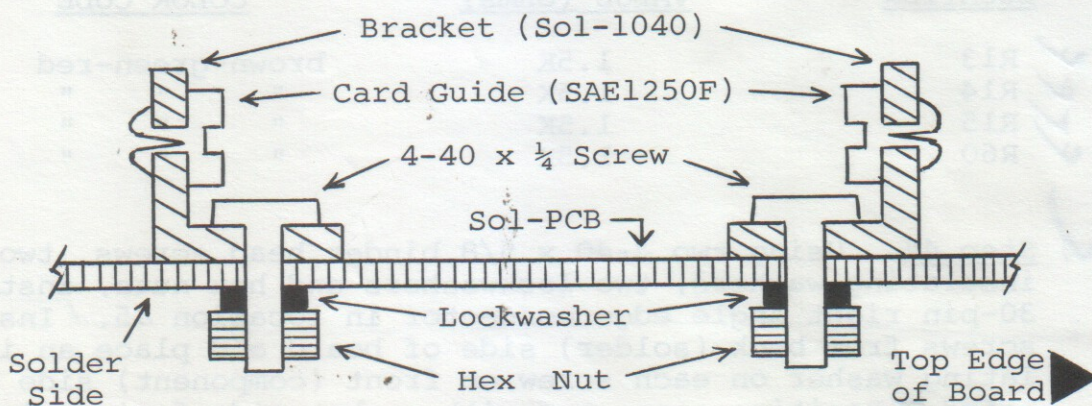


Figure 3-11. Personality module bracket/guide installation (Viewed from right end of Sol-PCB).

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- (✓) Step 46. Attach plastic card guide (SAE1250F) to each of the brackets installed in Step 45. (See Figure 3-11.) Insert posts on guides into bracket holes and push in until they snap into place.
- (✓) Step 47. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
(✓) U3*	91L02APC or 2102L1PC*
(✓) U4*	91L02APC or 2102L1PC*
(✓) U5*	91L02APC or 2102L1PC*
(✓) U6*	91L02APC or 2102L1PC*
(✓) U7*	91L02APC or 2102L1PC*
(✓) U8*	91L02APC or 2102L1PC*
(✓) U9*	91L02APC or 2102L1PC*
(✓) U10*	91L02APC or 2102L1PC*
(✓) U22	74LS136
(✓) U23	74LS20
(✓) U24	74LS04
(✓) U34	74LS138
(✓) U35	74LS138
(✓) U36	74LS138
(✓) U53	74LS02 or 9LS02
(✓) U70	74LS109
(✓) U71	74LS367
(✓) U83	74LS20

*MOS device. Refer to CAUTION on Page III-8.

- () Step 48. Test memory and decoder circuits.
- (✓) Set S1 switches as specified in Step 38.
- (✓) Turn monitor on and apply power to Sol-PC.
- (✓) Ground pin 1 of U2. You should see the same display as shown in Figure 3-10 on Page III-31. In this case, however, there should be a vertical "flickering" movement with an apparent flicker rate of approximately three times per second.
- (✓) Turn Switch No. 1 of S1 to ON. The flicker should stop.

(Step 48 continued on Page III-33.)

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- (✓) If the test fails, determine and correct the cause before proceeding with assembly.
- (✓) If the Sol-PC passes this test, turn monitor and power supply off, disconnect power cable, set Switch No. 1 of S1 to OFF and go on to Step 49.
- (✓) Step 49. Assemble personality module if you have not yet done so. (See Section IV.) If you have, go to Step 9 in Section IV and complete the personality module assembly.
- () Step 50. Install the following resistors in the indicated locations. Bend leads to fit distance between mounting holes, insert leads, pull down snug to board, solder and trim.

<u>LOCATION</u>	<u>VALUE (ohms)</u>	<u>COLOR CODE</u>
(✓) R21	470	yellow-violet-brown
(✓) R22	470, $\frac{1}{2}$ watt	" " "
(✓) R23	470, $\frac{1}{2}$ watt	" " "
(✓) R24	1.5K	brown-green-red
(✓) R25	10 K	brown-black-orange
(✓) R26	10 K	" " "
(✓) R27	470	yellow-violet-brown
(✓) R28	10 K	brown-black-orange
(✓) R29	10 K	" " "
(✓) R37	1.5K	brown-green-red
(✓) R38	1.5K	" " "
(✓) R39	5.6K	green-blue-red
(✓) R40	1.5K	brown-green-red
(✓) R42	1.5K	" " "
(✓) R43	1.5K	" " "
(✓) R44	1.5K	" " "
(✓) R45	330	orange-orange-brown
(✓) R46	5.6K	green-blue-red
(✓) R47	10 K	brown-black-orange
(✓) R48	10 K	" " "
(✓) R49	1.5K	brown-green-red
(✓) R59	1.5K	" " "
(✓) R61	1.5K	" " "
(✓) R62	5.6K	green-blue-red
(✓) R63	5.6K	" " "
(✓) R64	330	orange-orange-brown
(✓) R65	330	" " "
(✓) R66	330	" " "
(✓) R67	330	" " "
(✓) R68	330	" " "
(✓) R69	330	" " "
(✓) R70	330	" " "
(✓) R71	330	" " "

(Step 50 continued on Page III-34.)

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<u>LOCATION</u>	<u>VALUE (ohms)</u>	<u>COLOR CODE</u>
(✓) R72	680	blue-gray-brown
(✓) R73	680	" " "
(✓) R74	680	" " "
(✓) R75	680	" " "
(✓) R76	680	" " "
(✓) R77	680	" " "
(✓) R78	680	" " "
(✓) R79	680	" " "
(✓) R92	5.6K	green-blue-red
(✓) R93	1.5K	brown-green-red
(✓) R94	10 K	brown-black-orange
(✓) R95	15 K	brown-green-orange
(✓) R116	1.5K	brown-green-red

- (✓) Step 51. Install the following capacitors in the indicated locations. Take care to observe the proper value and type for each installation. Bend leads outward on solder (back) side of board, solder and trim. (Refer to NOTE in Step 2.)

<u>LOCATION</u>	<u>VALUE</u>	<u>TYPE</u>
(✓) C29	.1 ufd	Disc
(✓) C30	330 pfd	Disc

- (✓) Step 52. Install diodes D1 (1N4148 or 1N914), D2 (1N4001) and D3 through D6 (1N4148 or 1N914) in their locations in the area of U39. Position all diodes with their dark band (cathode) to the right.

- (✓) Step 53. Install the following DIP switches in the indicated locations. Take care to observe proper orientation.

<u>LOCATION</u>	<u>TYPE</u>	<u>ORIENTATION</u>
(✓) S2	8-position	Switch No. 1 at top
(✓) S3	8-position	Switch No. 1 at top
(✓) S4	6-position	Switch No. 1 at top

- (✓) Step 54. Install Q1 (2N2907 or 2N3460) in its location between U55 and U56. The emitter lead (closest to tab on can) is oriented toward the bottom and the base lead toward the right. Push straight down on transistor until it is stopped by the leads. Solder and trim.

- (✓) Step 55. Using two 4-40 x 7/16 binder head screws, hex nuts and lockwashers, install 25-pin female connector in location J1 (serial I/O interface). Position connector with socket side facing right and insert pins into their holes in the circuit board. Insert screws from back (solder) side of board, place lockwasher on each screw, start nuts and tighten. Then solder connector pins to board.

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- (✓) Step 56. Using two 4-40 x 7/16 binder head screws, hex nuts and lockwashers, install 25-pin male connector in location J2 (parallel I/O interface). Install J2 in the same manner as you did J1.
- (✓) Step 57. Install Augat pins in mounting holes K, L and M. (Refer to "Installing Augat Pins" in Appendix IV.) These holes are located between U85 and U86. No jumper will be installed.
- (✓) Step 58. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
(✓) U37	74LS367
(✓) U38*	1489A*
(✓) U39#	4N26#
(✓) U52	74LS109
(✓) U55	74LS00
(✓) U56	1458CP or 1558CP
(✓) U57	7406
(✓) U58	8T94
(✓) U72	74LS109
() U73	74LS109
(✓) U84*	4029*
(✓) U85*	4046*
(✓) U86*	4024*
(✓) U95	74173
(✓) U96	74173
() U97	74LS175

*MOS device. Refer to CAUTION on Page III-8.

#Solder this IC in its location. See "Loading DIP Devices" in Appendix IV.

- (✓) Step 59. Check input/output (I/O) circuits.

NOTE

The parallel I/O interface should be tested with the device you will be using. Refer to "I/O Interfacing" in Section VII.

(Step 59 continued on Page III-36.)

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To check the serial I/O circuits, proceed as follows:

(✓) Set S3 switches as follows:

No. 1: ON

No. 2 through 8: OFF

(✓) Set all S4 switches to OFF.

(✓) Connect Sol-PC video output cable to monitor, turn monitor on and apply power to Sol-PC.

(✓) Set Sol-PC to local by depressing LOCAL key on keyboard to turn keyboard indicator light on.

(✓) Data entered from the keyboard should appear on the monitor.

(✓) If the Sol-PC fails this test, locate and correct the cause before proceeding.

(✓) If the Sol-PC passes this test, turn monitor and power supply off, disconnect power cable and video output cable and go on to Step 60.

(✓) Step 60. Install the following resistors in the indicated locations. Bend leads to fit distance between mounting holes, insert leads, pull down snug to board, solder and trim.

LOCATION	VALUE (ohms)	COLOR CODE
(✓) R117	10 K	brown-black-orange
(✓) R118	10 K	" " "
(✓) R119	10 K	" " "
(✓) R139	1.0M	brown-black-green
(✓) R140	10 K	brown-black-orange
(✓) R141	150 K	brown-green-yellow
(✓) R142	10 K	brown-black-orange
(✓) R143	1 M	brown-black-green
(✓) R144	47 K	yellow-violet-orange
(✓) R145	10 K	brown-black-orange
(✓) R146	10 K	" " "
(✓) R147	2.2M	red-red-green
(✓) R148	100 K	brown-black-yellow
(✓) R149	100	brown-black-brown
(✓) R150	470	yellow-violet-brown
(✓) R151	5.6K	green-blue-red
(✓) R152	150 K	brown-green-yellow
(✓) R153	100 K	brown-black-yellow
(✓) R154	100 K	" " "
(✓) VR3	50 K	Potentiometer

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- (✓) Step 61. Install the following capacitors in the indicated locations. Take care to observe the proper value and type for each installation. Bend leads outward on solder (back) side of board, solder and trim. (Refer to NOTE in Step 2.)

CAUTION

REFER TO FOOTNOTE AT END OF THIS STEP
BEFORE INSTALLING C67.

<u>LOCATION</u>	<u>VALUE (ufd)</u>	<u>TYPE</u>
(✓) C47	.001	Disc
(✓) C48	.047	"
(✓) C49	.001	"
(✓) C50	.01	Mylar Tubular
(✓) C51	.1	Disc
(✓) C66	.1	"
(✓) C67*	1	Tantalum
(✓) C68	.1	Disc
(✓) C69	.1	"
(✓) C70	.1	"
(✓) C71	.001	"
(✓) C72	.001	Mylar Tubular
(✓) C73	.047	Disc

*Install C67 with "+" lead at top right.

- (✓) Step 62. Install miniature phone jacks in locations J6 and J7 located to the right of U101. Position J6 and J7 with jack facing right, insert pins in mounting holes and solder.
- (✓) Step 63. Install subminiature phone jacks in locations J8 and J9 in lower right corner of board. Install J8 and J9 as you did J6 and J7.
- (✓) Step 64. Install Q3 (2N4360) in its location to the left of C67. Install Q3 with its flat "side" at the bottom. Push straight down on transistor until it is stopped by the leads, solder and trim.

CAUTION

THE 2N4360 IS STATIC SENSITIVE. REFER TO
CAUTION ON PAGE III-8.

- (✓) Step 65. Install Q4 and Q5 (2N2222) in their locations above and to the left of U108. For both transistors, the emitter lead (closest to tab on can) is oriented toward the left and the base lead toward the right. Push straight down on transistor until it is stopped by the leads, solder and trim.

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- (✓) Step 66. Install diodes D13 and D14 (1N4001) in their locations in the lower right corner of the board. Position both diodes with their dark band (cathode) at the bottom.
- (✓) Step 67. Install DIP reed relays in locations K1 and K2 to the right of U113. Be sure to install K1 and K2 with their end notch at the bottom (pin 1 in lower right corner). These relays are soldered to the board. (Refer to "Loading DIP Devices" in Appendix IV.)
- (✓) Step 68. Install the following IC's in the indicated locations. Pay careful attention to the proper orientation.

NOTE

Dots on the assembly drawing and PC board indicate the location of pin 1 of each IC.

<u>IC NO.</u>	<u>TYPE</u>
(✓) U69*	TMS6011NC*
(✓) U98*	4023*
(✓) U99*	4030*
(✓) U100*	4013*
(✓) U101*	4027*
(✓) U108	1458CP or 1558CP
(✓) U109*	4049*
(✓) U110*	4046*
(✓) U111*	4019*
(✓) U112*	4520*
(✓) U113*	4013*

*MOS device. Refer to CAUTION on Page III-8.

- (✓) Step 69. Install Augat pins in mounting holes H, I and J (located to left of C70). (Refer to "Installing Augat Pins" in Appendix IV.) Using #24 bare wire, install a jumper between pins I and J.
- () Step 70. Adjust VR3.
- (✓) Using a cable with a male phono jack on both ends, connect ACI audio output (J6) to ACI audio input (J7).
- (✓) Apply power to Sol-PC.
- (✓) Set VR3 fully clockwise (CW).
- (✓) Measure the DC voltage at pin 13 of U110 and write the measured voltage down. (Call this Voltage A.)
- (✓) Set VR3 fully counterclockwise (CCW).
- (Step 70 continued on Page III-39.)

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- (✓) Measure the DC voltage at pin 13 of U110 and write the measured voltage down. (Call this Voltage B.)
- (✓) Add Voltages A and B and divide the sum by 2. (Call the result Voltage C.) An example follows:

Voltage A (VR3 full CW): 3.45 V dc
Voltage B (VR3 full CCW): 1.80 V dc

$$A + B = 5.25 \text{ V dc}$$

$$\text{Voltage C} = 5.25 \text{ V dc} / 2 = 2.63 \text{ V dc}$$

- (✓) Adjust VR3 so that the voltage at pin 13 of U110 equals Voltage C. (In the preceding example this would be 2.63 V dc.)
- (✓) Step 71. If your recorder has only a microphone input, remove the I-to-J jumper you installed in Step 69 and install a jumper (#24 bare wire is recommended) between the I and H pins.

Otherwise, leave the I-to-J jumper in and go on to Step 72.

- (✓) Step 72. Install 100-pin edge connector, J11. Using two 4-40 x 7/16 binder head screws, install 100-pin edge connector in location J11 (center of PC board). Seat the pins in the mounting holes. Then thread screws from front (component) side of board into the threaded inserts that are pre-installed in the J11 mounting holes. Tighten screws and solder pins to board.

CONGRATULATIONS! At this point you have successfully assembled your Sol-PC Single Board Terminal Computer and tested it for proper operation. It is now ready for use.

*** NOTICE TO ALL Sol-PC OWNERS ***

The "Parts List" (Table 3-1 on Pages III-2, 3 & 4 in this manual) includes components for the Sol-ACI Audio Cassette Interface section of the Sol-PC Single Board Terminal Computer™ as well as sockets (Sol-SS IC Socket Kit) for the IC's used in the unit.

If you did not order sockets with your original purchase, ignore Step 1 of the Sol-PC Assembly and Test instructions (Section III in this manual); if you did not order the ACI option, ignore Steps 58 through 66. Also delete the following items as appropriate from Table 3-1:

INTEGRATED CIRCUITS

1 1458CP or 1558CP (U108)
1 TMS6011NC (U69)
2 4013 (U100,113)
1 4019 (U111)
1 4023 (U98)
1 4027 (U101)
1 4030 (U99)
1 4046 (U110)
1 4049 (U109)
1 4520 (U112)

RESISTORS

1 100 ohm, $\frac{1}{4}$ watt, 5%
1 470 ohm, $\frac{1}{4}$ watt, 5%
1 5.6K ohm, $\frac{1}{4}$ watt, 5%
7 10K ohm, $\frac{1}{4}$ watt, 5%
1 47K ohm, $\frac{1}{4}$ watt, 5%
1 50K ohm, Potentiometer
3 100K ohm, $\frac{1}{4}$ watt, 5%
2 150K ohm, $\frac{1}{4}$ watt, 5%
1 1M ohm, $\frac{1}{2}$ watt, 5%
1 2.2 ohm, $\frac{1}{4}$ watt, 5%

CONNECTORS

2 Miniature Phone Jack (J6,7)
2 Subminiature Phone Jack (J8,9)

TRANSISTORS

1 2N4360 (Q3)
2 2N2222 (Q4,5)

DIODES

2 1N4001 (D13,14)

RELAYS

2 DIP Reed, Sigma
191-TE1A15S
(K1,2)

CAPACITORS

3 .001 ufd disc
1 .001 ufd Mylar Tubular
1 .01 ufd Mylar Tubular
3 .047 ufd disc
5 .1 ufd disc
1 1 ufd, tant dip

MISCELLANEOUS

4 8-pin DIP Socket
29 14-pin DIP Socket
74 16-pin DIP Socket
1 24-pin DIP Socket
3 40-pin DIP Socket

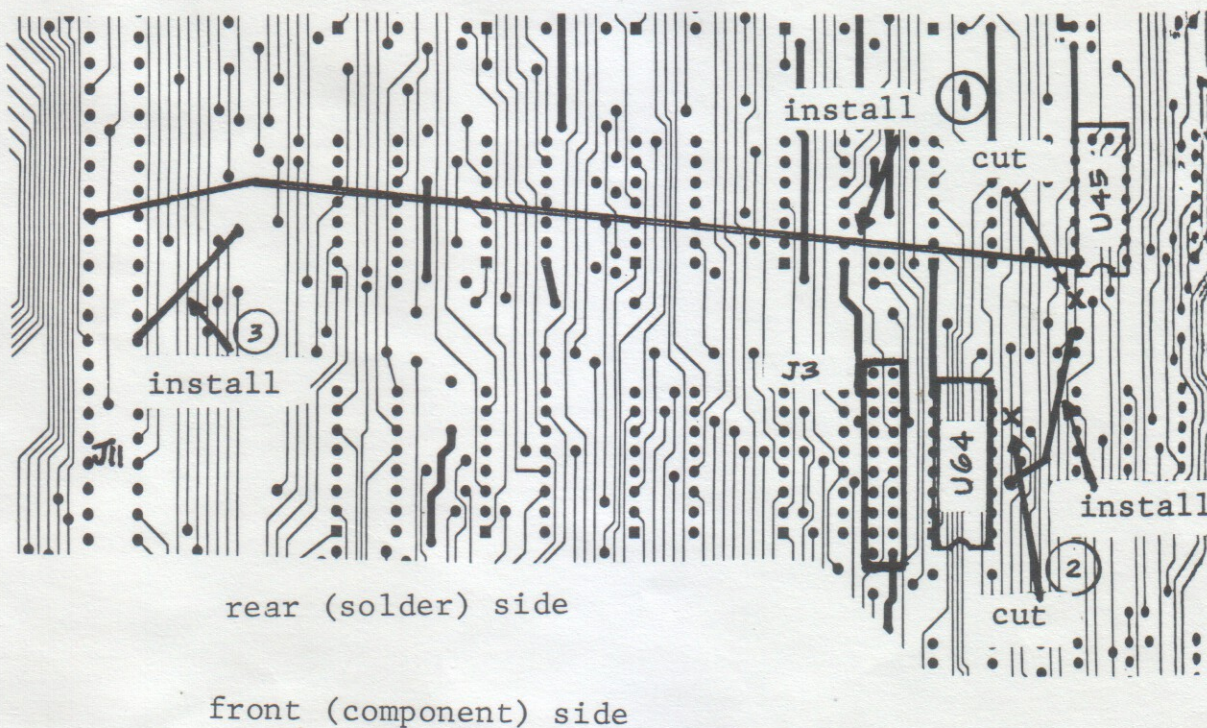
Both the Sol-ACI and Sol-SS are available from Processor Technology at the following prices*: (The Sol-SS IC socket kit is highly recommended for kit construction.)

Sol-SS IC Socket Kit \$40
Sol-ACI Audio Cassette Interface \$55

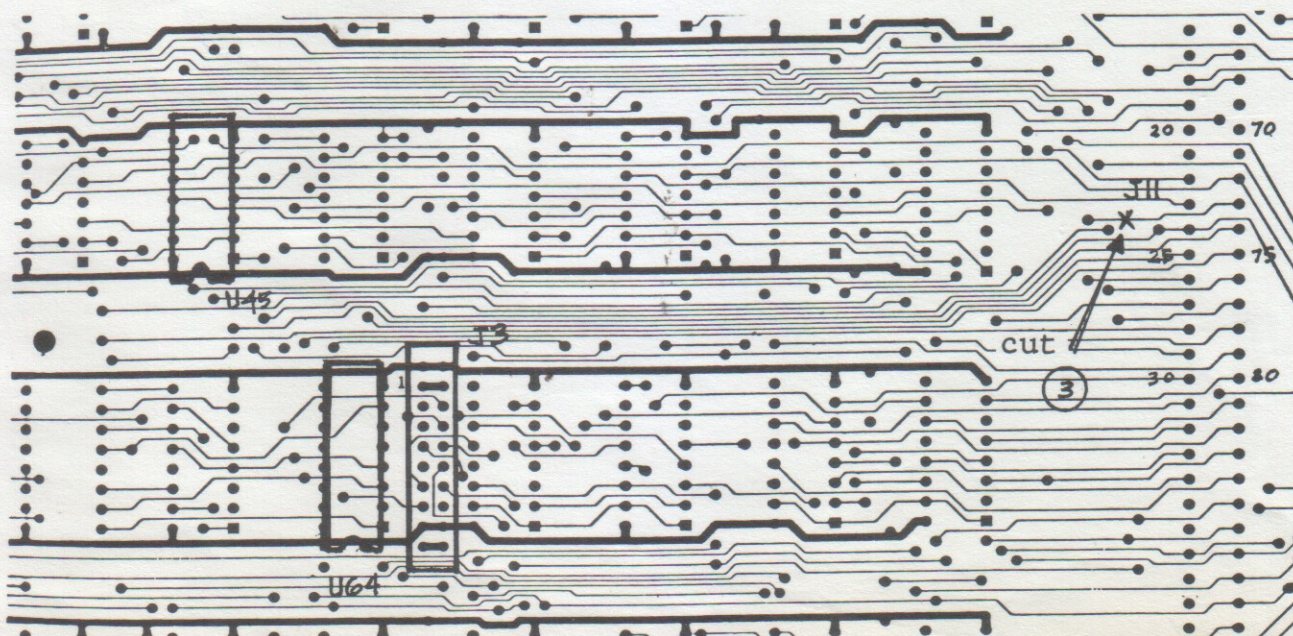
*Prices are net and subject to change without notice.

Due to layout errors connections to pins 28, 73 and 74 have been interchanged. These signals are used by DMA and interrupt devices. Correction requires three cuts and installation of three jumpers. Use 24 gauge wire supplied with the kit for these changes.

1. Cut trace on rear side of board connecting pin 1 of U45 with feedthrough directly below. Install jumper wire on rear side of board connecting pin 1 of U45 with pin 73 of J11.
2. Cut trace connecting the feedthrough adjacent to pins 13 and 14 of U64 with the feedthrough directly above (on rear side of board). Install jumper wire as shown on the rear side of the board.
3. Cut trace on front side of the board connecting the feedthrough immediately below and to the left of the "J11" designation with pin 73 of J11. Install a jumper wire from this feedthrough to pin 28 of J11 on the rear side of the board.



front (component) side



not 70
 20
 25