SECTION V

Sol KEYBOARD

Sol TERMINAL COMPUTER™

5.1 PARTS AND COMPONENTS

Check all parts and components against the "Parts List", Table 5-1. If you have difficulty in identifying any parts by sight, refer to Figure 3-1 on Page III-5 in Section III of this manual.

5.2 ASSEMBLY TIPS

For the most part the assembly tips given in Paragraph 3.2 of Section III (Page III-1) apply to assembling the Sol keyboard.

In addition, be sure your hands are clean before handling the circuit board, especially the area containing the keyboard switch pads.

5.3 ASSEMBLY PRECAUTIONS

For the most part the assembly precautions given in Paragraph 3.3 in Section III (Page III-6) apply to assembling the Sol keyboard.

5.4 REQUIRED TOOLS, EQUIPMENT AND MATERIALS

The following tools, equipment and materials are recommended for assembling the personality module:

1. Needle nose pliers
2. Diagonal cutters
3. Screwdriver (thin blade)
4. Controlled heat soldering iron, 25 watt
5. 60-40 rosin-core solder (supplied)

5.5 ORIENTATION

Light emitting diode location LED3 will be located in the lower left-hand corner of the board when locations J1 and U4 through U16 are at the top of the board. In this position the component (front) side of the board is facing up and all horizontal reading legends will read from left to right. Subsequent position references related to the keyboard circuit board assume this orientation.

Table 5-1. Sol Keyboard Parts List.

INTEGRATED CIRCUITS

1 555 (U3)	1 74LS30 (U25)
1 2101 or 9101 (U20)	2 7442 (U17 & 21)
2 4051A (U19 & 22)	5 74LS74 (U8,9,11,15,26)
4 74LS00 (U4,10,14,16)	2 7493 (U6,U5)
1 74LS04 (U23)	1 74LS132 (U7)
1 7406 (U24)	2 74LS175 (U1,U2)
2 74LS10 (U13 & 27)	1 8334, 9334 or 83L34 (U12)
	1 8574 (U18)

TRANSISTORS

6 2N3640
3 2N4274

DIODES (ZENER)

1 1N5221B (D1)

DIODES (LIGHT EMITTING)

3 MV5752 (LED1,2,3)

RESISTORS

1	10	ohm, ¼ watt, 5%
3	150	ohm, ¼ watt, 5%
1	390	ohm, ¼ watt, 5%
1	680	ohm, ¼ watt, 5%
7	1 K	ohm, ¼ watt, 5%
10	1.5K	ohm, ¼ watt, 5%
1	2.2K	ohm, ¼ watt, 5%
5	3 K	ohm, ¼ watt, 5%
2	33 K	ohm, ¼ watt, 5%
2	68 K	ohm, ¼ watt, 5%
2	2.2K	ohm resistor network
2	33 K	ohm resistor network

CAPACITORS

2	220	pfd, disc
1	470	pfd, disc
1	.0022	ufd, disc
2	.01	ufd, disc
5	.047	ufd, disc
1	.1	ufd, Mylar tubular
2	15	ufd, tantalum dipped

Table 5-1. Sol Keyboard Parts List (Continued).

	MISCELLANEOUS
1	Sol-KBD Printed Circuit Board
1	8-pin DIP Socket
17	14-pin DIP Socket
8	16-pin DIP Socket
1	22-pin DIP Socket
1	20-pin Header, 3M3492-2002
1	9-3/4" 20-conductor Rainbow Cable Assembly
1	70-key (Sol-10) or 85-key (Sol-20) Keyboard Assembly
1	Plastic Insert (Sol-10) for Key Pad
18	Torx Screw
3	Fiber Spacer
1	Length Solder

5.6 ASSEMBLY-TEST

5.6.1 Circuit Board Check

( ) Visually inspect circuit board for obvious flaws. (The design of the board includes numerous unconnected traces and traces that are shorted to each other.)

( ) Check circuit board to insure that the +5-volt bus is not shorted to ground. Using an ohmmeter, measure between the GND and +5V pads located in the upper left corner of the board. There should be no continuity.

If no visual inspection reveals any defect, or you measure continuity between the GND and +5V pads, return the board to Processor Technology for replacement. If the board is not defective, proceed to next paragraph.

5.6.2 Assembly-Test Procedure

Refer to keyboard assembly drawing in Section IX.

CAUTION

SOME MOS INTEGRATED CIRCUITS ARE USED ON THE Sol KEYBOARD. THEY CAN BE DAMAGED BY STATIC ELECTRICITY DISCHARGE. HANDLE MOS 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.)

(✓ 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 "Installation Tip" on Page III-9 in Section III.)

LOCATION	TYPE SOCKET
(✓ U1 and 2	16 pin
(✓ U3	8 pin
(✓ U4 through U11	14 pin
(✓ U12	16 pin
(✓ U13 through U16	14 pin
(✓ U17 through U19	16 pin
(✓ U20	22 pin
(✓ U21 and 22	16 pin
(✓ U23 through U27	14 pin

(✓ 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. Insert leads, pull down snug to board, 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.

LOCATION	VALUE	TYPE	ORIENTATION
(✓ C1	15 ufd	Tantalum	"+" lead top
(✓ C2	.047 ufd	Disc	None
(✓ C3	.1 ufd	Mylar	"

(Continued on Page V-5.)

LOCATION	VALUE	TYPE	ORIENTATION
( ) C4	.01 ufd	Disc	None
( ) C5	.047 ufd	"	"
( ) C6	.047 ufd	"	"
( ) C7	.0022 ufd	"	"
( ) C8	470 pfd	"	"
( ) C9	220 pfd	"	"
( ) C10	220 pfd	"	"
( ) C11	.01 ufd	"	"
( ) C12	.047 ufd	"	"
( ) C13	.047 ufd	"	"
( ) C14	15 ufd	Tantalum	"+" lead top

( ) Step 3. 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
( ) R1	150	brown-green-brown
( ) R2	150	" " "
( ) R3	150	" " "
( ) R4	68 K	blue-gray-orange
( ) R5	560 K	green-blue-yellow
( ) R6	33 K	orange-orange-orange
( ) R7	1 K	brown-black-red
( ) R8	1.5K	brown-green-red
( ) R9	3 K	orange-black-red
( ) R10	3 K	" " "
( ) R11	3 K	" " "
( ) R12	3 K	" " "
( ) R13	1.5K	brown-green-red
( ) R14	1.5K	" " "
( ) R15	1.5K	" " "
( ) R16	1 K	brown-black-red
( ) R17	390	orange-white-brown
( ) R18	1 K	brown-black-red
( ) R19	10	brown-black-black
( ) R20	1 K	brown-black-red
( ) R21	1 K	" " "
( ) R22	3 K	orange-black-red
( ) R23	1 K	brown-black-red
( ) R24	1 K	" " "
( ) R25	1.5K	brown-green-red
( ) R26	680	blue-gray-brown
( ) R27	33 K	orange-orange-orange
( ) R28	1.5K	brown-green-red
( ) R29	1.5K	" " "

(Continued on Page V-6.)

LOCATION	VALUE (ohms)	COLOR CODE
( ) R30	1.5K	brown-green-red
( ) R31	1.5K	" " "
( ) R32	68 K	blue-gray-orange
( ) R33	1.5K	brown-green-red
( ) R34	2.2K	red-red-red

( ) Step 4. Install Zener diode D1 (1N5221B) in its location to the left of R17. Position D1 with its dark band (cathode) at the bottom.

( ) Step 5. Install Q1, Q2 and Q9 (2N4274) and Q3 through Q8 (2N3640) in their respective locations at the top center of the board. The emitter lead (closest to flat side of case) is oriented toward the right of the board and the base is oriented toward the top. Insert leads until transistor is approximately 3/16" above surface of circuit board, solder and trim.

( ) Step 6. Install resistor networks RX1 and RX3 (2.2K ohms) and RX2 and RX4 (33K ohms) in their respective locations just above the keyboard pads. Install each network so that the dot on its package is positioned next to the dot on the circuit board. Recheck values before soldering.

CAUTION

THESE RESISTOR NETWORKS ARE DELICATE.
HANDLE WITH CARE.

( ) Step 7. Install light emitting diodes LED1, 2 and 3 (MV5752) in their respective locations in the lower left corner of the circuit board. Insert leads through fiber spacer, position each diode with its cathode lead (longer lead and/or the lead next to flat edge of LED package) at the bottom, insert leads into mounting holes in circuit board, pull down so that spacer and LED are snug to board, solder and trim. (If fiber spacers are not supplied with your kit, install LED's so they are approximately 3/16" above surface of circuit board.)

( ) Step 8. Install 20-pin header in location J1 (upper left corner of board). Position header so pin 1 is in the lower left corner. (An arrow on the header points to pin 1.)

( ) Step 9. Using an ohmmeter, measure between GND and +5V pads in upper left corner of the board. You should measure some resistance. Zero resistance indicates a short. If required, find and correct the problem before proceeding to Step 10.

( ) Step 10. 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.

IC NO.	TYPE
( ) U1	74LS175
( ) U2	74LS175
( ) U3	555
( ) U4	74LS00
( ) U5	7493
( ) U6	7493
( ) U7	74LS132
( ) U8	74LS74
( ) U9	74LS74
( ) U10	74LS00
( ) U11	74LS74
( ) U12	8334,9334 or 83L34
( ) U13	74LS10
( ) U14	74LS00
( ) U15	74LS74
( ) U16	74LS00
( ) U17	7442
( ) U18	8574 or 74187A
( ) U19*	4051A*
( ) U20*	2101 or 9101*
( ) U21	7442
( ) U22*	4051A*
( ) U23	74LS04
( ) U24	7406
( ) U25	74LS30
( ) U26	74LS74
( ) U27	74LS10

*MOS device. Refer to CAUTION on Page V-4.

( ) Step 11. Connect 20-conductor ribbon cable between J1 on keyboard to J3 on Sol-PC so that cable goes left from J3.

( ) Step 12. Check keyboard operation.

( ) Set S1 switches on Sol-PC as follows:

No. 1 through 4: OFF

No. 5: ON

No. 6: OFF

( ) Connect TV monitor to Sol-PC.

( ) With personality module installed, apply power to Sol-PC.

( ) Using a CLEAN finger, touch key pad #62 (MODE SELECT).

( ) You should get a carriage return and line feed and see a "greater than" sign (>) on the screen above the cursor.

NOTE

You may have to touch pad #62 several times to obtain the specified display.

( ) If you are unable to obtain the specified display, locate and correct the problem before proceeding.

( ) If the keyboard is operating correctly, turn monitor and Sol-PC power off, disconnect 20-conductor ribbon cable at J1 on the keyboard and go on to Step 13.

( ) Step 13. Place keyboard assembly carefully over key pads on PC board. Carefully align holes in PC board (18 in all) with threaded mounting holes on bottom of keyboard assembly. Insert Torx screws from solder (back) side of board and, using a thin blade screwdriver, drive into keyboard assembly mounting holes. Drive screws evenly and tighten just enough to hold keyboard assembly in place.

CAUTION

DO NOT OVERTIGHTEN THESE SCREWS.

( ) Step 14. Reconnect 20-conductor ribbon cable to J1 on keyboard.

( ) Step 15. Test keyboard for proper operation.

( ) Apply power to monitor and Sol-PC.

( ) Strike MODE SELECT key.

( ) Strike UPPER CASE key. Indicator light should come on.

( ) Strike UPPER CASE key again. Indicator light should go off.

( ) Strike LOCAL key. Indicator light should come on.

( ) Strike LOCAL key again. Indicator light should go off.

(Step 15 continued.)

( ) Strike SHIFT LOCK key. Indicator light should come on.

( ) Strike either SHIFT key. Indicator light should go off.

( ) Verify operation of all alphanumeric keys. (As you strike each key you should observe the corresponding character on the monitor.)

( ) Should the keyboard fail any of the preceding checks, locate and correct the problem before proceeding.

( ) If the keyboard passes all of the preceding tests, congratulations on a job well done.

At this point you have successfully assembled the Sol keyboard and tested it for proper operation. It is now ready for use with the Sol-PC Single Board Terminal Computer™.

Having completed the Sol keyboard, power supply, Sol-PC and personality module, you are now ready to assemble the Sol cabinet-chassis. Cabinet-chassis assembly instructions are provided in Section VI.