APPENDIX B
HP 18174A
RS-449 INTERFACE POD

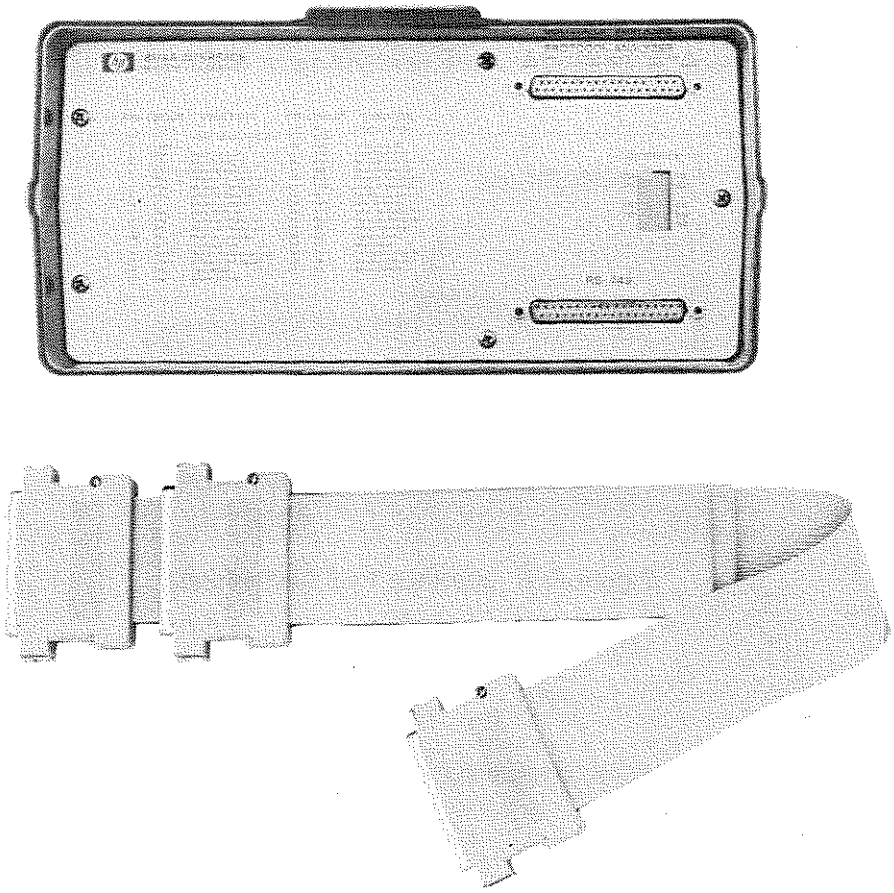


Figure B-1. HP 18174A Interface Pod

B-1. INTRODUCTION

The HP 18174A is an RS-449 Interface Pod designed to provide the connection between the HP 4951C Protocol Analyzer and Data Terminal Equipment (DTE) and/or Data Circuit-Terminating Equipment (DCE). The HP 18174A is compatible with EIA RS-449/422A/423A electrical, mechanical, functional, and procedural specifications.

This appendix includes information to install, operate, and service the HP 18174A.

B-2. INSTALLATION

To connect the Interface Pod to the HP 4951C Protocol Analyzer, turn the power off and attach the 37 pin connector to the port on the back of the Protocol Analyzer as shown in Figure B-2. Tighten the screws to ensure that the cable will not pull off during operation.

CAUTION

Turn off the Protocol Analyzer before connecting or disconnecting any Interface Pod.

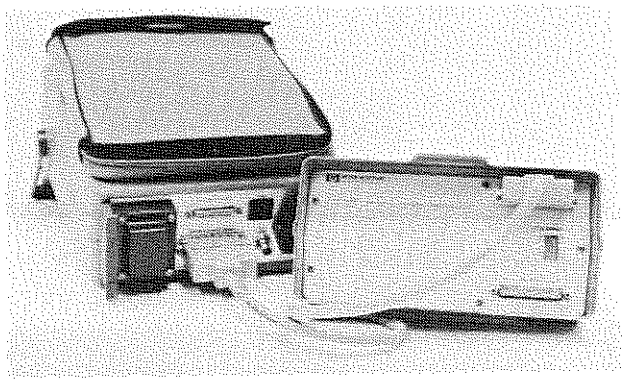


Figure B-2. Interface Pod Connections

B-3. OPERATION

Once the Interface Pod is installed, all operations are performed from the keyboard. See the Operating Manual for procedures.

B-4. PERFORMANCE VERIFICATION

The Performance Verification test is performed by the operator. Follow the procedure described below.

HP 18174A Self Test -

Description

This test checks that there is an Interface Pod connected to the Protocol Analyzer and verifies that the lines work.

Set Up

1. Turn on the HP 4951C.
2. Press MORE.
3. Select <SELFTEST>.
4. Select <EXT DLC>.

Procedure

1. When the <EXT DLC> softkey is pressed, the Interface Pod test is automatically performed.

2. If there are no failures DLC TEST PASSED will be displayed.

B-5. ADJUSTMENTS

There are no adjustments for the HP 18174A.

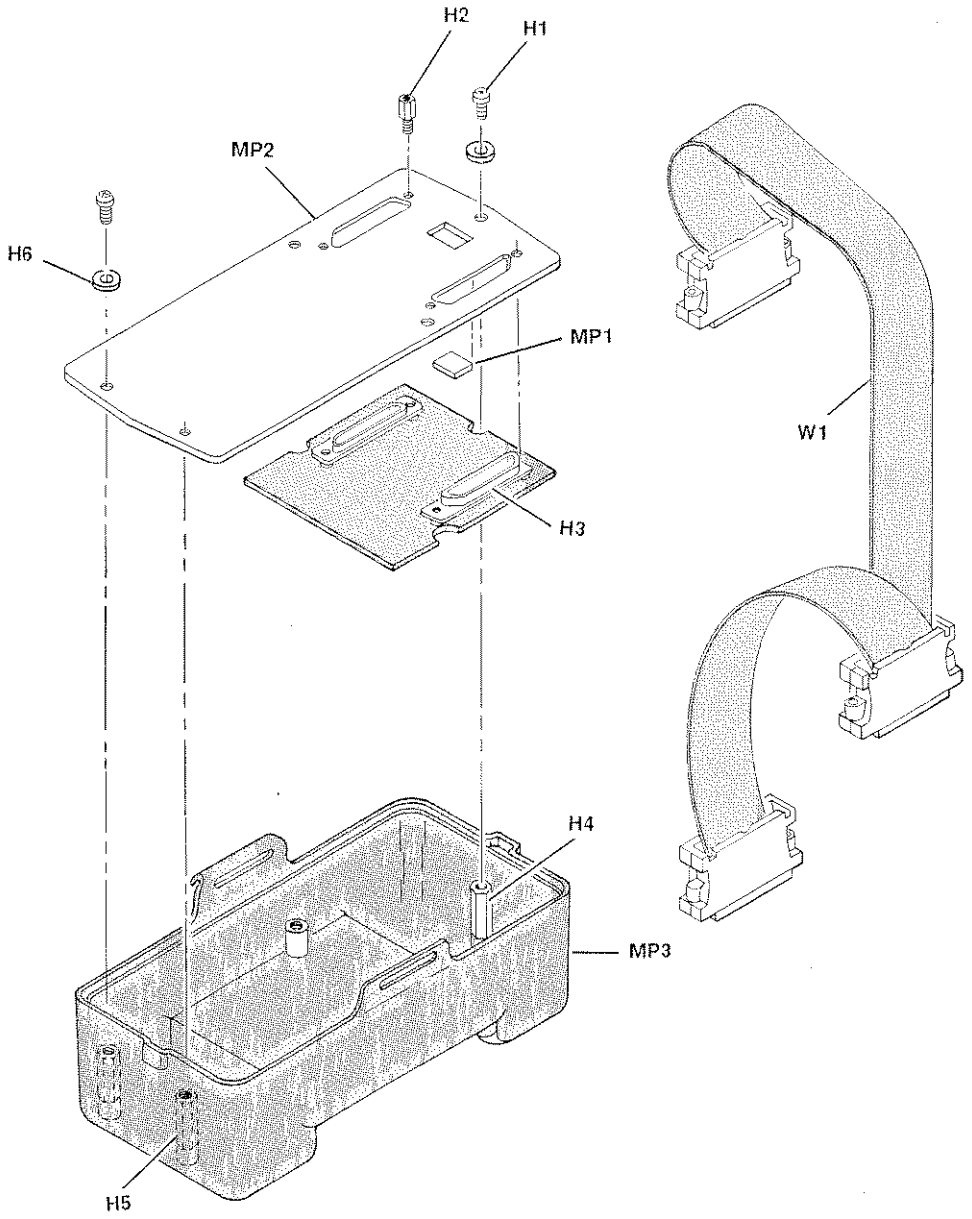
B-6. REPLACEABLE PARTS

The following tables and figure give information for ordering replacement parts. Table B-1 is the Manufacturer's Code List. Table B-2 lists the replaceable parts in Reference Designator order. Information is given for the description, Quantity, HP Part Number, and Manufacturers Part Number. Chassis and mechanical parts are listed in Figure B-2. To order a listed part, include the HP Part Number, indicate the quantity needed, and send the order to the nearest Hewlett-Packard office.

When ordering a part not listed, include the instrument model number, serial number, and a physical and functional description of the part. Send the order to the nearest Hewlett-Packard office.

Table B-1. HP 18174A Manufacturers Code List

MFR NO.	MANUFACTURER NAME	ADDRESS		ZIP CODE
00000	ANY SATISFACTORY SUPPLIER			
01121	ALLEN-BRADLEY CO	MILWAUKEE	WI	53204
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX	AZ	85008
11236	CTS OF BERNE INC	BERNE	IN	46711
13606	SPRAGUE ELECT CO SEMICONDUCTOR DIV	CONCORD	NH	03301
19701	MEPCO/ELECTRA CORP	MINERAL WELLS	TX	76067
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD	PA	16701
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO	CA	94304
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS	MA	01247



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
H1	2360-0195	3	5	SCR, MCH, 6-32-.312	04771	ORDER BY DESCRIPTION
H2	1251-2942	4	4	SCR POST LOCK	01380	206509-1
H3	1251-6074	4	2	CONNECTOR-37 PIN	04486	DC375V
H4	0380-1719	6	1	STANDOFF	28480	0380-1719
H5	0380-1720	9	2	STANDOFFS	28480	0380-1720
H6	2190-0878	3	5	WASHER, FLAT, #6	00000	ORDER BY DESCRIPTION
MP1	5040-4478	5	1	LENS	28480	5040-4478
MP2	18174-00001	5	1	RS-449 PANEL	28480	18174-00001
MP3	5041-6749	4	1	HOUSING, COATED	28480	5041-6749
W1	18174-61601	8	1	CABLE, RS-449	28480	18174-61601
J1	8120-4218	4	4	CABLE JUMPER	28480	8120-4218
J2	8120-4219	5	2	CABLE JUMPER	28480	8120-4219

Figure B-3. HP 18174A Exploded View

Table B-2. HP 18174A Replaceable Parts List

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	18174-60003	1	1	RS-449 POD	28480	18174-60003
A1C1	0180-1846	6	2	CAPACITOR-FXD 2.2UF+-10% 35VDC TA	56289	150D225X9035B2
A1C2	0180-1846	6		CAPACITOR-FXD 2.2UF+-10% 35VDC TA	56289	150D225X9035B2
A1C3	0180-1746	5	2	CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C4	0180-1746	5		CAPACITOR-FXD 15UF+-10% 20VDC TA	56289	150D156X9020B2
A1C5	0160-0576	5	3	CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C6	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C7	0160-0576	5		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1DS1	1990-0883	7	1	DISPLAY-LIQ-XTAL	28480	1990-0883
A1J1	1251-6074	4	2	CONNECTOR 37-PIN F D SUBMINIATURE	28480	1251-6074
A1J2	1251-6074	4		CONNECTOR 37-PIN F D SUBMINIATURE	28480	1251-6074
A1R1	0698-3266	5	2	RESISTOR 237K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2373-F
A1R2	0698-3266	5		RESISTOR 237K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2373-F
A1R3	0699-0556	2	2	RESISTOR 5.11 1% .125W F TC=0+-100	28480	0699-0556
A1R4	0699-0556	2		RESISTOR 5.11 1% .125W F TC=0+-100	28480	0699-0556
A1R5	0757-0442	9	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R6	0757-0442	9		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R201	1810-0680	2	10	RES NETWK SIP 2	28480	1810-0680
A1R202	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R203	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R204	1810-0732	5	1	NETWORK-RES 10.0K OHM X 5	28480	1810-0732
A1R301	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R302	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R303	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R304	1810-0369	4	2	NETWORK-RES 6-SIP100.0K OHM X 5	11236	750-61-R100K
A1R401	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R402	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R403	1810-0780	3	2	RES NETWK SIP 2	28480	1810-0780
A1R404	1810-0680	2		RES NETWK SIP 2	28480	1810-0680
A1R405	1810-0780	3	2	RES NETWK SIP 2	28480	1810-0780
A1U100	1820-3373	7	1	IC MV CMOS/74HC MONOSTBL CLEAR DUAL	28480	1820-3373
A1U101	1820-3396	4	1	IC GATE CMOS/74HC AND-OR-INV DUAL 2-INP	28480	1820-3396
A1U103	1820-3081	4	1	IC FF CMOS/74HC D-TYPE POS-EDGE-TRIG	28480	1820-3081
A1U104	1820-3007	4	3	IC GATE CMOS/74HC EXCL-OR QUAD 2-INP	28480	1820-3007
A1U200	1826-0759	9	3	IC COMPARATOR GP QUAD 14-DIP-C PKG	04713	LM339J
A1U202	1820-2831	0	3	ICD 75174 DRIVER	28480	1820-2831
A1U300	1826-0759	9		IC COMPARATOR GP QUAD 14-DIP-C PKG	04713	LM339J
A1U302	1820-2831	0		ICD 75174 DRIVER	28480	1820-2831
A1U400	1826-0759	9		IC COMPARATOR GP QUAD 14-DIP-C PKG	04713	LM339J
A1U402	1820-2831	0		ICD 75174 DRIVER	28480	1820-2831
A1U403	1820-3007	4		IC GATE CMOS/74HC EXCL-OR QUAD 2-INP	28480	1820-3007
A1U404	1820-3007	4		IC GATE CMOS/74HC EXCL-OR QUAD 2-INP	28480	1820-3007
	0380-0332	7	4	STANDOFF-RVT-ON .187-IN-LG 4-40THD	00000	ORDER BY DESCRIPTION
	1251-7642	4	1	KEYING PLUG	28480	1251-7642

B-7. SERVICE

The following paragraphs contain service information for the HP 18174A. Included is the Theory of Operation, RS-449 Signal Mnemonics, Troubleshooting, Component Locators, and Schematics.

B-8. THEORY OF OPERATION

The HP 4951C operates in three modes.

1. Monitor mode: The HP 4951C monitors traffic on a communication line.
2. DTE simulate: The HP 4951C drives the data lines and acts as a terminal.
3. DCE simulate: The HP 4951C drives the data lines and acts as the digital side of a modem or another piece of Data Circuit-Terminating Equipment.

The Interface Pod is configured for the correct mode of operation by the DTESIM and DCESIM output signals from the protocol analyzer.

The RS-449 Interface Pod has the following capabilities.

1. Translates voltages to and from RS-449 and HP 4951C logic levels.
2. Displays EIA line signal status (of selected lines only).
3. Programmable for monitoring and DTE or DCE simulation.
4. Supports differentially driven category I circuits.

Drivers

U202, U302, and U402 convert the HP 4951C signals from single-ended logic levels to differential voltage waveforms. These drivers are tristate devices and are disabled when the pod is in the monitor mode to isolate them from the RS-449 interface.

Receivers

Receivers U200, U300, and U400 operate over a common mode voltage range from -7 to +7 volts and require a minimum differential off 200 millivolts to change states. They maintain operation over a differential voltage range from 200 millivolts to 6 volts; however, the positive common mode signal voltage cannot exceed the RS-449 specification of 10 volts. The receivers are protected by divider resistors from signals up to 12 volts.

The EIA status of the selected interface lines is displayed on a bargraph LCD. Clock and data indicators are flashed at a 2Hz rate when line state transitions are detected. Table B-3 lists these RS-449 lines.

Table B-3. HP 18174A Front Panel LCD Display

CS	Clear to Send
DM	Data Mode
RD	Receive Data
RR	Receiver Ready
RS	Request to Send
RT	Receive Timing
SD	Send Data
ST	Send Timing
TR	Terminal Ready

Table B-4. RS-449 Signal Mnemonics

	RS449 PIN #	CIRCUIT	DESCRIPTION
	1	Shield	
	2	SI	Signaling-rate Indicator
	3	Space	
*	4	SDa	Send Data (a)
	5	STa	Send Timing (a)
*	6	RDa	Receive Data (a)
*	7	RSa	Request to Send (a)
	8	RTa	Receive Timing (a)
*	9	CSa	Clear to Send (a)
	10	LL	Local Loopback
*	11	DM	Data Mode (a)
	12	TR	Terminal Ready (a)
*	13	RR	Receiver Ready (a)
	14	RL	Remote Loopback
	15	IC	Incoming Call
	16	SF	Select Frequency/ Signaling-rate Selector
	17	TT	Terminal Timing (a)
	18	TM	Test Mode
	19		Signal Ground
	20		Receive Common
	21	Spare	
	22	DTE	Send Data (b)
	23	ST	Send Timing (b)
	24	DCE	Receive Data (b)
	25	RS	Request to Send (b)
	26	RT	Receive Timing (b)
	27	CS	Clear to Send (b)
	28	IS	Terminal in Service
	29	DM	Data Mode (b)
	30	TR	Terminal Ready (b)
	31	RR	Receiver Ready (b)
	32	SS	Select Standby
	33	SQ	Signal Quality
	34	NS	New Signal
	35	TT	Terminal Timing (b)
	36	SB	Standby Indicator
	37		Send Common

*Indicates lines for which parameters can be selected from HP 4951C display.

B-9. TROUBLESHOOTING

Troubleshoot the portion of the Interface Pod that has failed (DTE or DCE). When entering the test programs below, "Press" indicates a hardkey and "Select" indicates a softkey.

DCE TROUBLESHOOTING PROCEDURE

WARNING

Turn off the HP 4951C when connecting or disconnecting the Interface Pod.

1. Enter the following DCE test program.

Table B-5. DCE Test Program

Select	Set Up	
	SDLC	(Protocol)
	ASCII 8	(Code)
	9600	(Bits/sec)
	Sync	(Mode)
	Data & State	(Display)
	DCE	(DTE clock)
Press	(HALT)EXIT	
The Top Level Menu will be displayed.		
Select	Simulate DCE	
Press	MORE	
Select	Set Lead CS Off and then	
Press	MORE	
Select	Set Lead DM Off and then	
Press	MORE	
Select	Set Lead RR Off and then Send	
Type in	CS OFF	
Press	RTN (return)	

Table B-5. DCE Test Program (continued)

Select	Next Block
Press	MORE
	Set Lead
	CS
	On
	and then
Press	MORE
Select	Set Lead
	DM
	On
	and then
Press	MORE
Select	Set Lead
	RR
	On
	and then
	Send
Type in	CS ON
Press	RTN (return)
Select	and then
Press	MORE
Select	Wait
Type in	500
Press	RTN (return)
Select	Next Block
	When Trig
	Lead
	CS
	On
	then goto
Type in	1
Press	RTN (return)
	(HALT)EXIT

2. Run the program entered in Table B-5.

Select	Run Menu
	Simulate

a. All lines on the HP 4951C display should be active except DTE and RS.

b. Segments RD, ST, and RT should be flashing. Segments CS, DM, and RR should be on, and segments SD, RS, and TR should be off.

3. If any of the above conditions fail, troubleshoot that part of the circuit.

DTE TROUBLESHOOTING PROCEDURE

WARNING

Turn off the HP 4951C when connecting or disconnecting the Interface Pod.

1. Enter the following DTE test program.

Table B-6. DTE Test Program

Select	Set Up	
	SDLC	(Protocol)
	ASCII 8	(Code)
	9600	(Bits/sec)
	Sync	(Mode)
	Data & State	(Display)
	DTE	(DTE clock)
Press	(HALT)EXIT	
The Top Level Menu will be displayed.		
Select	Simulate DTE	
Press	MORE	
Select	Set Lead RS Off and then MORE Set Lead TR Off and then Send	
Type in	RS OFF	
Press	RTN (return)	
Select	Next Block	
Press	MORE	
Select	Set Lead RS On and then	
Press	MORE	
Select	Set Lead TR On and then Send	
Type in	RS ON	
Press	RTN (return)	

Table B-6. DTE Test Program (continued)

Select	and then
Press	MORE
Select	Wait
Type in	500
Press	RTN (return)
Select	Next Block
	When Trig
	Lead
	RS
	On
	then goto
Type in	1
Press	RTN (return)
	(HALT)EXIT

2. Run the program entered in Table B-6.

Select	RUN MENU
	SIMULATE

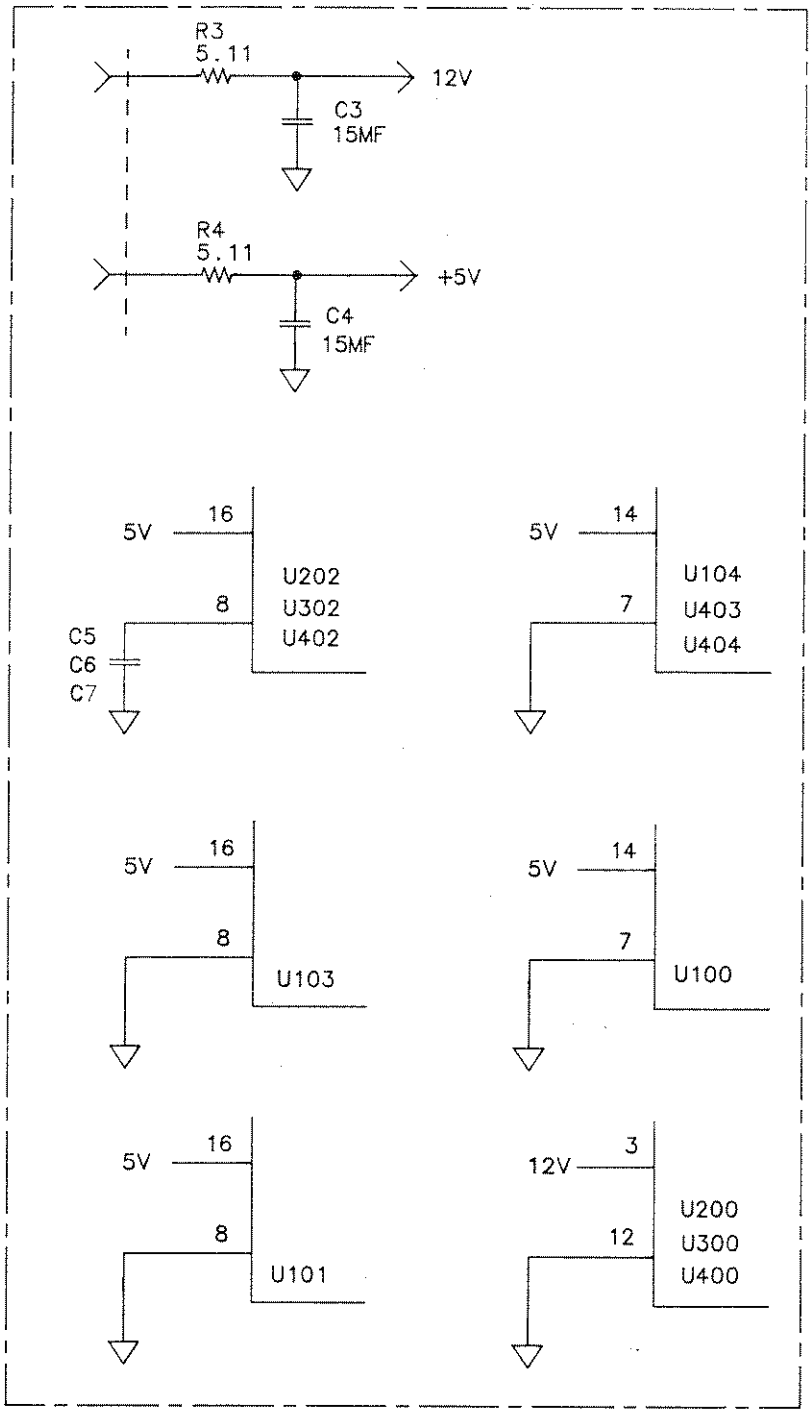
3. Segments SD and ST should be flashing, RS and TR should be on, and all of the other segments should be off (-- is never active).

4. If any of the conditions in step 2 fail, check items a through c.

   a. The inputs to U202, U302, and U402 should be at TTL levels (between 0 and 5 volts).

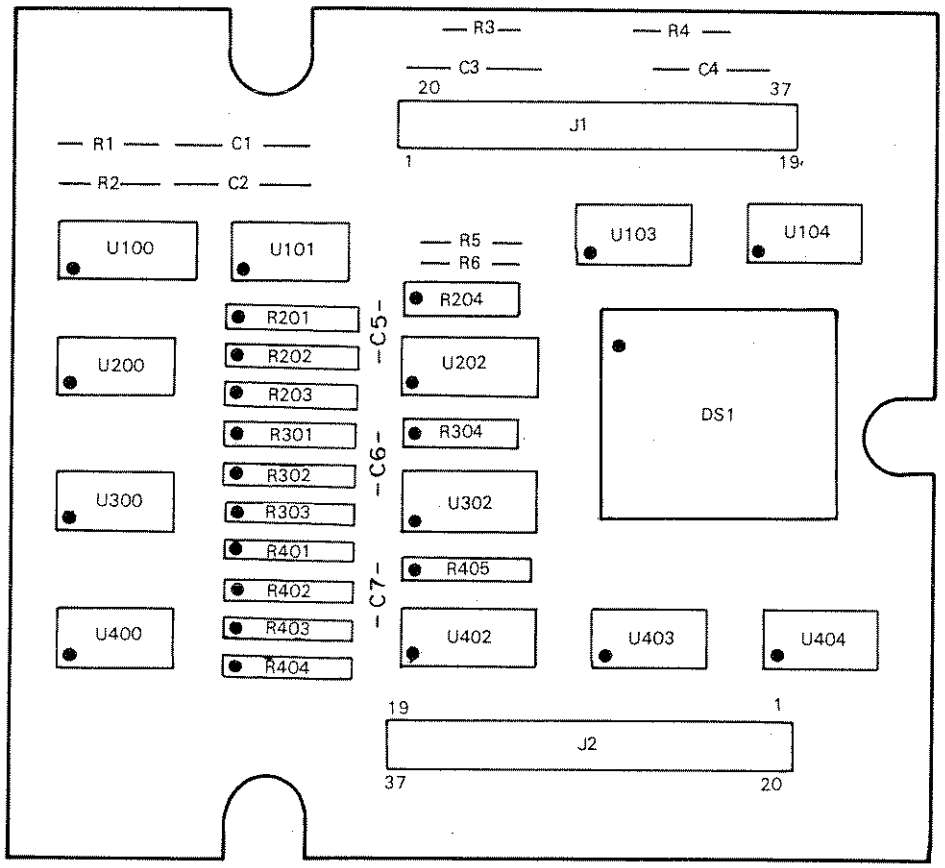
   b. The outputs of U202, U302, and U402 should be RS-449 levels (+- 12V).

   c. The inputs and outputs of all other circuits should be at TTL levels. Check for correct amplitudes and pulsing signals.



Power and Grounds

Figure B-4. HP 18174A Component Locator



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