

# DIGITAL RESEARCH COMPUTERS

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COMPACTA UNIBOARD  
CONSTRUCTION AND ALIGNMENT MANUAL  
VERSION 1.0

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COMPACTA INCORPORATED  
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## CONSTRUCTION AND ALIGNMENT

### 1.0 ASSEMBLY INSTRUCTIONS

[ ] Examine the PC board for obvious defects or shorts. A high intensity light directed from the underside of the board will simplify visual inspection. A few components may have been installed at the factory in areas where there may be room for errors.

[ ] Use an ohmmeter to verify that there are no shorts between the +5, ground, +12, and -12 pads in the power connector (P12).

[ ] To simplify the following steps, refer to the parts reference drawing.

[ ] Install and solder 14 pin IC sockets in locations U4, 5, 6, 9, 13, 16, 17, 20, 21, 25, 27, 30, 33, 64, 74, 76, 86, and 88.

[ ] Install and solder 16 pin IC sockets in locations U22, 26, 31, 34, 35, 37, 38, 39, 41, 42, 43, 46, 47, 48, 49, 50, 52, 53, 54, 55, 56, 60, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 77, 78, 79, 80, 81, 82, 83, 84, 85, 87, 90, 91, 92, and 93.

[ ] Install and solder an 18 pin IC socket at location U45.

[ ] Install and solder 20 pin IC sockets at locations U1, 2, 3, 7, 8, 29, 32, 36, 40, 44, 51, 57 and **58**.

[ ] Install and solder 24 pin IC sockets at locations U14, and 59.

[ ] Install and solder a 28 pin IC socket at location U12.

[ ] Install and solder 40 pin IC sockets at locations U15, 19, 23, 24 and 28.

[ ] Install and solder the bypass capacitors (.1 mf) at locations C2-6, C8, C10-11, C13-25, C27-32, C34-38, C40, C42-46, C48-51, C54-58, C61-65, C67-71, C74-82.

[ ] Install and solder C1, C7, C12, C39, C47, C60, C83, C84, and C86, the 33 MF, radial electrolytic capacitors. (**TANTALUM**)

[ ] Install and solder C66 and C85, the 47 MF electrolytic capacitors.

[ ] Install and solder C9, a 33 pf disc ceramic capacitor.

[ ] Install and solder C26, a 220 pf disc ceramic capacitor.

[ ] Install and solder C33, a 47 pf mica capacitor. (**MAY BE MARKED "470 J"**)

[ ] install and solder C41, a .33 mf tantalum

[ ] Install and solder C52, a .68 mf tantalum capacitor.

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- [ ] Install and solder C53, a 100 mf tantalum capacitor.
- [ ] Install and solder C59, a 10 mf tantalum capacitor.
- [ ] Install and solder C87-90, 10 mf tantalum capacitors.
- [ ] Install and solder 2.2K resistors at locations R1, R2, R4-7, R11, R12, R13-15, and R22.
- [ ] Install and solder a 270 ohm resistor at location R8.
- [ ] Install and solder 150 ohm resistors at locations R9 and R10.
- [ ] Install and solder 6.8K resistors at locations R16 and R18.
- [ ] Install and solder 47K resistors at locations R17, R32, and R35.
- [ ] Install and solder 470 ohm resistors at locations R19, R20, and R47.
- [ ] Install and solder a 680 ohm resistor at location R21.
- [ ] Install and solder 10 ohm resistors at locations R25-31 and R44. (10 TO 33 ohm OK)
- [ ] Install and solder a 33 ohm resistor at location R33.
- [ ] Install and solder 220K resistors at locations R36, R37, and R38. [ ] Install and solder 1k resistors at locations R42, R43, and R45.
- [ ] Install 100 ohm resistors at R46 and R48.
- [ ] Install and solder a 5K trimpot at location R23.
- [ ] Install and solder a 50K trimpot at location R24.
- [ ] Install and solder a 100K trimpot at location R34.
- [ ] Install and solder a 2.2K 8-pin resistor SIP at location RP1.
- [ ] Install and solder 33 ohm resistor DIP packs at locations RP2 and RP3.
- [ ] Install and solder 2.2K, 10-pin resistor SIPs at locations RP4 and RP5. (2.2K TO 5.6K Res. Packs OK.)
- [ ] Install and solder the 4-position switch at location S1. Notice orientation of switch number one.
- [ ] Install and solder 1N4148 diodes at locations CR1 and CR2.
- [ ] Install and solder a 2N2222 transistor at location Q1.



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- [ ] Install and solder a 79L05 voltage regulator at location VR1.
- [ ] Install and solder a 1.8432 MHZ crystal in location Y1.
- [ ] Install and solder a 32.000 MHZ crystal in location Y2.
- [ ] Install and solder jumper sticks at P5, P6 and P7.
- [ ] Install and solder a 40-pin connector at location P1.
- [ ] Install and solder a DB25 female connector at location P2.
- [ ] Install and solder a 16-pin connector at location P3.
- [ ] Install and solder a 34-pin connector at location P4.
- [ ] Install and solder a 50-pin connector at location P8.
- [ ] Install and solder a 34-pin connector at location P9.
- [ ] Install and solder a 4-pin connector at location P10.
- [ ] Install and solder a 3-pin connector at location P11.
- [ ] Install and solder a 4-position power strip at location P12.
- [ ] *BE CAREFUL, AND NOTICE WHICH PARTS ARE "S" AND WHICH ARE "Ls" TT.*
- [ ] Install 74LS245 ICs in locations U1, U36, and U44.
- [ ] Install 74LS241 ICs in locations U2, U7, U8, and U29.
- [ ] Install a 74LS240 in location U3.
- [ ] Install a 1489 (MC1489 or 75189) in location U4.
- [ ] Install a 1488 (MC1488 or 74188) in location U5.
- [ ] Install 7407 ICs in locations U6, U13, U64, and U76. (OR 7417)
- [ ] Install 7406 ICs in locations U9 and U88. (OR 7416)
- [ ] Install 4N28 opto-isolator ICs in locations U10 and U11.
- [ ] Install a 6551 IC in location U12.
- [ ] Install the "monitor" EPROM in location U14.
- [ ] Install a 6844 IC in location U15.
- [ ] Install 74LS32 ICs in locations U16 and U25.



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- [ ] Install a 74S04 in location U17. (NOTE: U18 NOT USED.)
- [ ] Install a 6522 IC in location U19.
- [ ] Install a 74LS08 IC in location U20.
- [ ] Install a 74S74 IC in location U21.
- [ ] Install a 74S161A IC in location U22.
- [ ] Install a 1793-02 IC in location U23. (OR FUJI. 8877)
- [ ] Install a 6809E IC in location U24.
- [ ] Install a 74LS139 IC in location U26.
- [ ] Install 74LS74 ICs in locations U27 and U30.
- [ ] Install a 6845 IC in location U28.
- [ ] Install 74LS257 ICs in locations U31, U35, U39, and U43.
- [ ] Install the programmed PAL12L6 IC in location U32.
- [ ] Install a 74LS00 IC in location U33.
- [ ] Install a 74S175 IC in location U34.
- [ ] Install 74LS174 ICs in locations U37 AND U87.
- [ ] Install a 74LS157 IC in location U38.
- [ ] Install the programmed PAL10L8 IC in location U40.
- [ ] Install a 74LS368 IC in location U41.
- [ ] Install a 74LS367 IC in location U42.
- [ ] Install a WD2143 IC in location U45.
- [ ] Install a 74S124 IC in location U46.
- [ ] Install a WD1691 IC in location U51.
- [ ] Install 74LS123 ICs in locations U52 and U65.
- [ ] Install 74LS374 ICs in locations U57 and U58.
- [ ] Install the "character generator" EPROM in location U59.
- [ ] Install a 74LS86 IC in location U74.
- [ ] Install a 74LS165 IC in location U75.

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[ ] Install a 74LS138 IC in location U77.

[ ] Install a 74LS09 IC in location U86.

[ ] Install 4116 RAM ICs in locations U47-50, U53-56, U60-63, U66-73, U78-85, and U90-93.

Perform the next steps only if installing the -12V regulator option. *(NOT SUPPLIED WITH KIT.)*

[ ] Install and solder a 14 pin IC socket in location U89.

[ ] Install and solder L1, a 390  $\mu$ H inductor.

[ ] Install and solder an 11K resistor in location R39.

[ ] Install and solder a 2.2 ohm resistor in location R40.

[ ] Install and solder a 1.2K resistor in location R41.

[ ] Install and solder a 100 pf capacitor in location C72.

[ ] Install and solder a 150 mf 25V (or higher) tantalum capacitor in location C73.

[ ] Install a TL497C IC in location U89.

NOTE: TTL CALLED OUT AS "S" PARTS MUST NOT SUBSTITUTE  
WITH "LS" EQUIVALENTS.

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### 2.0 SETUP AND ALIGNMENT PROCEDURE

- [ ] Connect a video monitor to either connector P10 or P11. ( P10 - SPLIT VIDEO  
P11 - COMPOSITE
- [ ] Connect a keyboard to connector P3.
- [ ] Recheck all work. Pay particular attention to ensuring that all IC's are in the correct positions.
- [ ] Connect a normally open push button switch to P5. This is the system reset button. If so desired you can also use position 1 of switch S2.
- [ ] Make sure position 1 of switch S2 is open.
- [ ] Apply power. If all is well up to this point, the video screen will be clear with the exception of the monitor prompt on the top left hand corner. Familiarize yourself with the monitor commands by reading the monitor user's manual.
- [ ] If the board does not function properly at this point refer to the troubleshooting section.
- [ ] Use the monitor to test the system memory for at least one hour. The more you test the memory, the higher your confidence will be in the system's reliability.
- [ ] Adjust R34 to obtain 1. volts at U51 pin 13.
- [ ] Adjust R24 to obtain 4 mhz at U46 pin 7.
- [ ] To adjust R23, the pre-compensation adjustment you must have the UNIBOARD execute a continuous floppy disk write operation. This can be easily done by booting any of the available operating systems and then executing a disk format command. R23 must be adjusted until the pulse at U45 pin 7 is 200 nanoseconds.



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### 3.0 TROUBLESHOOTING

[] The most common cause of problems is poor workmanship. Take a few minutes to visually inspect for solder bridges or trace cuts, particularly under IC sockets. A high intensity light is most useful in helping find solder bridges.

[] Verify all IC positions against the parts list. Also ensure that all IC's are properly oriented as shown in the assembly drawing.

[] Familiarize yourself with the operation of the UNIBOARD by studying the user's manual. Try to isolate the problem to one of the functional blocks. Detailed timing is given in sections of the user's manual.

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## 4.0 PARTS LIST

## INTEGRATED CIRCUITS:

QTY	LOCATION	PART NUMBER	DESCRIPTION
3	U1, U36, U44	74LS245	OCTAL BUS TRANSCEIVER
4	U2, U7, U8, U29	74LS241	OCTAL BUS DRIVER
1	U3	74LS240	OCTAL INV. BUS DRIVER
1	U4	MC1489	QUAD RS232 RECEIVER
1	U5	MC1488	QUAD RS232 DRIVER
4	U6, U13, U64, U76	7407 OR 7417	HEX O.C. BUFFER
2	U9, U88	7406 OR 7416	HEX INVERTING O.C. DRIVER
2	U10, U11	4N28	OPTO-ISOLATOR
1	U12	R6551	ACIA
1	U14	2716/2732	EPROM (MONITOR)
1	U15	MC6844	DMA CONTROLLER
2	U16, U25	74LS32	QUAD OR GATE
1	U17	74S04	HEX INVERTER
1	U19	R6522	VIA
1	U20	74LS08	QUAD AND GATE
1	U21	74S74	DUAL D-TYPE FLIP-FLOP
1	U22	74S161	SYNCHRONOUS BIN. CNTR.
1	U23	FD1793-02 (8877)	FLOPPY DISK CONTROLLER
1	U24	MC6809E	MICROPROCESSOR
1	U26	74LS139	DUAL 2-TO-4 DECODER
2	U27, U30	74LS74	DUAL D-TYPE FLIP-FLOP
1	U28	MC6845	CRT CONTROLLER
4	U31, U35, U39, U43	74LS257	QUAD TRI-STATE MUX.
1	U32	PAL12L6	PROG. ARRAY LOGIC
1	U33	74LS00	QUAD NAND GATE
1	U34	74S175	QUAD D-TYPE FLIP-FLOP
2	U37, U87	74LS174	HEX D-TYPE FLIP-FLOP
1	U38	74LS157	QUAD 2-TO-1 MUX.
1	U40	PAL10L8	PROG. ARRAY LOGIC
1	U41	74LS368	HEX INVERTING BFR.
1	U42	74LS367	HEX BFR.
1	U45	WD2143	FOUR PHASE GENERATOR
1	U46	74S124	VCO
32	U47-50, U53-56, U60-63, U66-73, U78-85, U90-93	4116	16K DRAM 200 NS
1	U51	WD1691	DATA SEPARATOR/PRECOMP.
2	U52, U65	74LS123	DUAL ONE-SHOT
2	U57, U58	74LS374	OCTAL D-TYPE LATCH
1	U59	2716	CHARACTER GENERATOR ROM
1	U74	74LS86	QUAD EXOR GATE
1	U75	74LS165	SHIFT REGISTER
1	U77	74LS138	3-TO-8 DECODER
1	U86	74LS09	QUAD O.C. AND GATE
1	VR1	79L05	NEG. 5V REGULATOR

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## RESISTORS:

QTY	LOCATION	VALUE
1	12 R1, R2, R4-7, R11, R12	2.2K 1/4W
	R13-15, R22	
1	R8	270 1/4W
2	R9, R10	150 1/4W
2	R16, R18	6.8K 1/4W
3	R17, R32, R35	47K 1/4W
3	R19, R20, R47	470 1/4W
1	R21	680 1/4W
8	R25-31, R44	10 1/4W — (10 To 33 OHMS O.K.)
1	R33	33 1/4W
3	R36, R37, R38	220K 1/4W
3	R42, R43, R45	1K 1/4W
2	R46, R48	100 1/4W

## CAPACITORS:

QTY	LOCATION	VALUE
9	C1, C7, C12, C39, C47	33 MF 16V ELECTROLYTIC, RADIAL
	C60, C83, C84, C86	
66	C2-6, C8, C10-11, C13-25, C27-32, C34-38, C40, C42-46, C48-51, C54-58, C61-65, C67-71, C74-82	.1 MF 25V MLC CERAMIC
1	C9	33 PF 1KV DISC CERAMIC
1	C26	220 PF 1KV DISC CERAMIC
1	C33	47 PF 1KV 5% MICA
1	C41	.33 MF 25V TANTALUM
1	C52	.68 MF 25V TANTALUM
1	C53	100 MF 10V TANTALUM
1	C59	10 MF 25V TANTALUM
2	C66, C85	47 MF 25V ELECTROLYTIC, RADIAL
4	C87-C90	10MF 25V TANTALUM

## MISCELLANEOUS:

QTY	LOCATION	DESCRIPTION
11		IC SOCKET, 14 PIN
49		IC SOCKET, 16 PIN
1		IC SOCKET, 18 PIN
13		IC SOCKET, 20 PIN
2		IC SOCKET, 24 PIN
1		IC SOCKET, 28 PIN
5		IC SOCKET, 40 PIN
1	Y1	CRYSTAL 1.8432 MHZ, HC6U
1	Y2	CRYSTAL, 32.000 MHZ, HC18U
2	CR1, CR2	SWITCHING DIODE 1N4148
1	Q1	TRANSISTOR, 2N2222



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1	R23	TRIMPOT, 5K BECKMAN 72P
1	R24	TRIMPOT, 50K BECKMAN 72P
1	R34	TRIMPOT, 100K BECKMAN 72P
1	P1	CONNECTOR, 40 PINS, RIGHT ANGLE
1	P2	CONNECTOR, DB25, FEMALE, RIGHT ANGLE
1	P3	CONNECTOR, 16 PINS, RIGHT ANGLE
1	P4	CONNECTOR, 34 PINS, RIGHT ANGLE
1	P8	CONNECTOR, 50 PINS, STRAIGHT
1	P9	CONNECTOR, 34 PINS, STRAIGHT
1	P10	CONNECTOR, 4 PINS, STRAIGHT
1	P11	CONNECTOR, 3 PINS, STRAIGHT
1	P12	CONNECTOR, 4 POSITION, SCREW LEADS
3	RP1, RP4, RP5	SIP RESISTOR PACK, 2.2K, 12 POS.
2	RP2, RP3	DIP RESISTOR PACK, 33 OHM, 8 POS.
1	S1	DIP SWITCH, 4 POSITIONS

PARTS BELOW ARE FOR -12V CONVERTER OPTION: (NOT SUPPLIED IN KIT)

1		14 PIN IC SOCKET
1	U89	TL497C SWITCHING REGULATOR IC
1	R39	RESISTOR, 11K 1/4 W 511
1	R40	RESISTOR, 2.2 OHM 511
1	R41	RESISTOR, 1.2K 1/4 W 511
1	C72	CAPACITOR, DISC CER. 100 PF
1	C73	CAPACITOR, TANTALUM 150 MF 25V
1	L1	INDUCTOR, 390 Uh 100 Ma.

THIS CONVERTER WOULD ONLY BE REQUIRED WHEN -12V IS NOT AVAILABLE.