Keyboard Serial Terminal
Bill of Materials
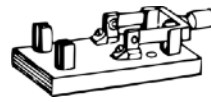
Part	Value	Remarks	Qty	Reference	Provided
Standoffs [1]	M3	nylon stands 8 mm	**2**		
	M3	nylon nuts	**2**		
	M3	washer ring 7 x 3,2 x 0,5 mm [2]	**2**		
	M3	rubber end cap 3 mm [2]	**2**		
Pin header	1 x 2 pins [1]	male horizontal	**1**	JP1	
	8 pin [1]	female in-line machined pin socket	**8**	J1-J8	
Jumper	1 x 2 pin [1]	jumper	**1**	JP1	
Connector	9-pin D-Sub	male RS232 connector	**1**	J9	
Socket	14 pin	machined pin, *optional*	**1**	U3	
	16 pin	machined pin, *optional*	**1**	U1	
	16 pin	male-male DIP IC adapter rounded pins	**1**	J1-J4	
	20 pin	machined pin, *recommended* [3]	**2**	U2,U4	
Resistor	330 Ω [1, 4]	1/4 W - orange, orange, black, black, brown	**2**	R1,R2	
	1 kΩ [4]	1/4 W - brown, black, black, brown, brown	**1**	R3	
Capacitor	22 pF	marked with '22'	**2**	C10,C11	
	100 nF	marked with '104'	**3**	C7-C9	
	1 µF	elco radial	**5**	C1-C5	
	47 µF	elco radial	**1**	C6	

Notes:

1) Some or all of these parts have to be mounted at the back (solder) side of the PCB.

2) Use the washers on the solder side between the stands and the PCB. Screw (turn clockwise) and push the rubber end caps in the bottom side of the stands. This to protect the Apple computer mainboard.

3) One IC socket is recommended for the ATtiny microcontroller, handy for future firmware updates.

4) Some provided resistor-values could differ slightly, as could their band colors, this has no effect on the working of the board. Carbon composition resistors can be used to match the ones on the Apple-1, for example 220 Ω (red, red, brown, gold) and 1 kΩ (brown, black, red, gold) resistors can be used instead.

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Crystal	11.0592 MHz [5]	providing clock	1	Y1	
IC	MAX232	Dual EIA-232 Driver/Receiver	1	U1	
	ATtiny2313A-20PU	8-bit AVR microcontroller [6], 20 MHz	1	U2	
	74LS00	Quad 2-Input NAND Gate	1	U3	
	74LS244	Octal Buffer and Line Driver with 3-State	1	U4	
Switch	Push	Tactile contact push buttons ON	3	SW1-SW3	
LED	green	3 mm, round	2	D1,D2	
	red [7]	3 mm, round	1	D3	
Misc	adhesive felt [7]	affix on the backside, see markings on PCB	1		
		Parts	50		
		Types	27		

Notes:

5) The programmed microcontroller needs a crystal of exactly this value to operate correctly.

6) This microcontroller comes pre-programmed with the latest firmware revision. The version number is on the label at the back side of the chip. <u>The 20MHz variant of the ATtiny is needed</u>, the 10MHz variant is too slow.

7) These parts have to be mounted at the back (solder) side of the PCB.

<u>**Important:**</u>

- Use the 16 pin male-male DIP IC adapter as a guide to solder the 8 x 8 pin female in-line machined pin socket perfectly right-angled (at positions J1-J8).

- After soldering, cut short the pins of SW1-SW3 to make sure they do not stand out. Solder again the soldered spots to make sure there is no break in their contacts.

- Before applying power, check J1-J8 for shorts between all side to side pins using a multimeter in continuity mode.

- **Affix the adhesive felt** on the solder side of the board, as indicated by the dotted rectangle. Otherwise soldered pins can come in contact with the ICs of the Apple computer.