



\*1 Connect the following pins of 74LS00 together before installing Cockroach mod  
 1 - 2  
 3 - 13  
 4 - 12  
 6 - 9-10

\*2 R27 was later removed from the circuit, breaking the connection between the BP 26 on the CPU and R26 on the ULA. This connection was no longer needed as the ULA could keep the optional RAM operational. Remove to avoid excessive CPU power consumption.  
 Recommended modification are denoted in red, these are general improvements made to increase reliability or function of the circuit over the life of the issue one. They may also fix issues. A board may have some, all or none of these modifications.

Part Number	ULA Type	Notes
D14 Diode	SC102E	CPU CLK, R73 (R) added with C67
R24 Resistor	3K	CPU CLK
R27 Resistor	500K	470K
R47 Resistor	220R	150K
R48 Resistor	4K7	2K2
R49 Resistor	18K	82K
Cockroach Mod IC15	Yes	No

**SINCLAIR ZX SPECTRUM  
 CIRCUIT DIAGRAM  
 ISSUE 1**  
 ORIGINALLY DRAWN - JULY 1983  
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 Version 2.0