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### NOTES ON FITTING YOUR NEW ULA

To successfully replace your ULA, you will need to be experienced in desoldering / soldering, and handling static sensitive components.

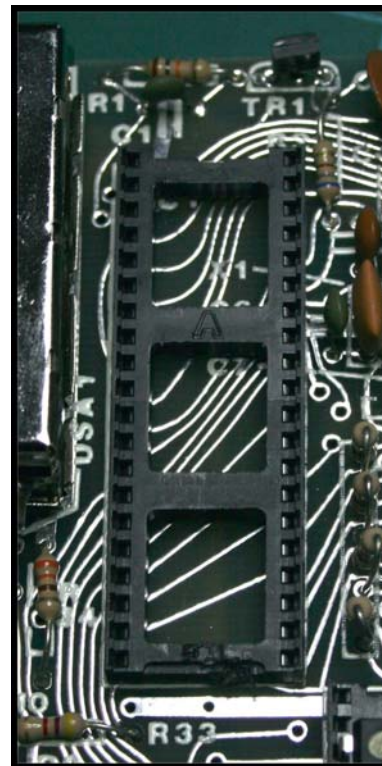
#### **ONLY CARRY OUT THIS REPAIR IF YOU ARE COMPETENT TO DO SO**

All ULA's are fully tested before despatch. To ensure maximum success in repairing your ZX81. **Please read the notes below, before attempting any repair.**

1. **Take anti-static precautions** when handling the ULA, otherwise damage to the chip may occur.
2. If your ULA is already fitted in a socket, all you need to do is remove the faulty ULA and carefully insert the new ULA.
3. **DO NOT SOLDER THE ULA DIRECTLY TO THE CIRCUIT BOARD**, this WILL damage the chip.
4. **DO solder an IC socket to the circuit board**, and carefully plug in your new ULA into the socket.
5. Insert the ULA the correct way round. Notch towards the edge connector. Take care not to bend any pins, and to get all the IC pins in to the socket.

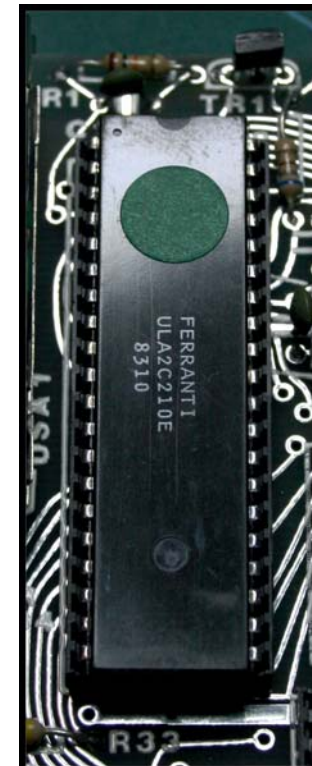
#### **Tip to extend the working life of the ULA. Fit a Heatsink**

All ZX81 ULA's seem to run hotter than designed to. I fit an black aluminium heatsink to mine which significantly reduces the operating temperature of the ULA, and extends it's life. The heatsink fixes to the ULA, very simply with self adhesive gel tape.



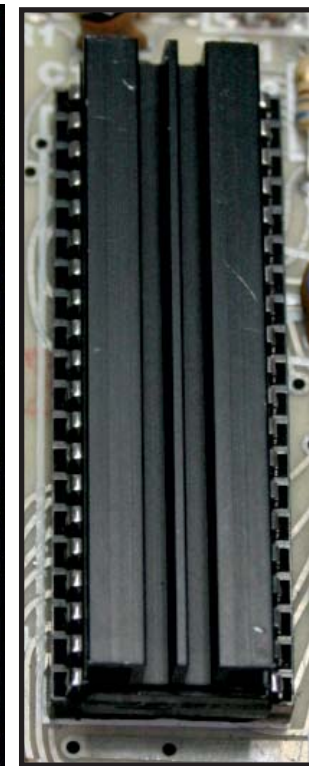
**FIG 1.**

↑  
IC Socket Soldered  
to circuit board.



**FIG 2.**

↑  
ULA Fitted into  
IC Socket

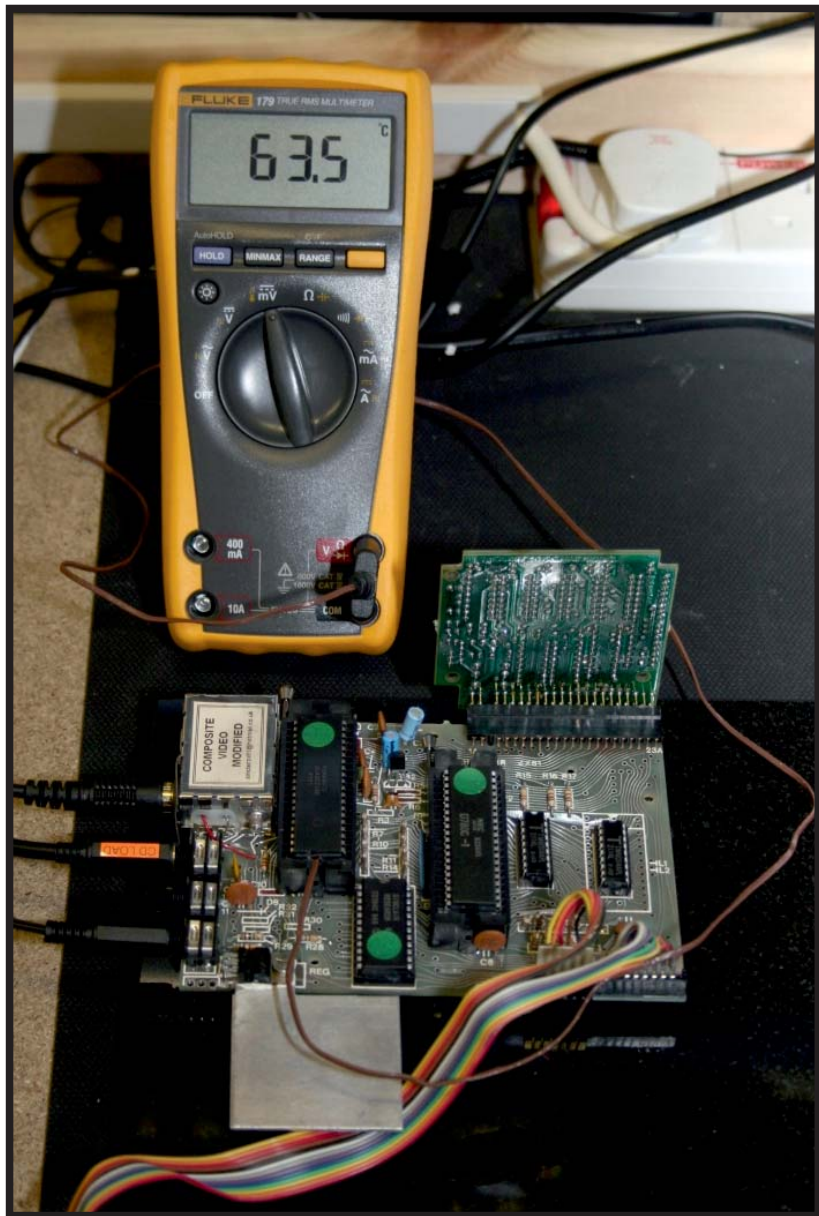


**FIG 3.**

↑  
Heatsink fitted  
to new ULA



## WITHOUT HEATSINK FITTED



## ZX81 HEATSINK TEST

This test was carried out with the temperature sensor attached to the underside, centre of the ULA, this is where the heat is concentrated.

Without the heatsink fitted a temperature of **63°C** is recorded.

With the heat sink fitted a temperature of **50°C** is recorded.

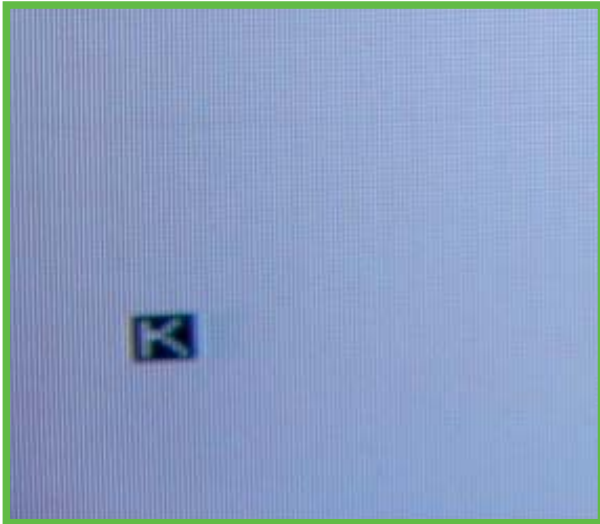
## WITH HEATSINK FITTED



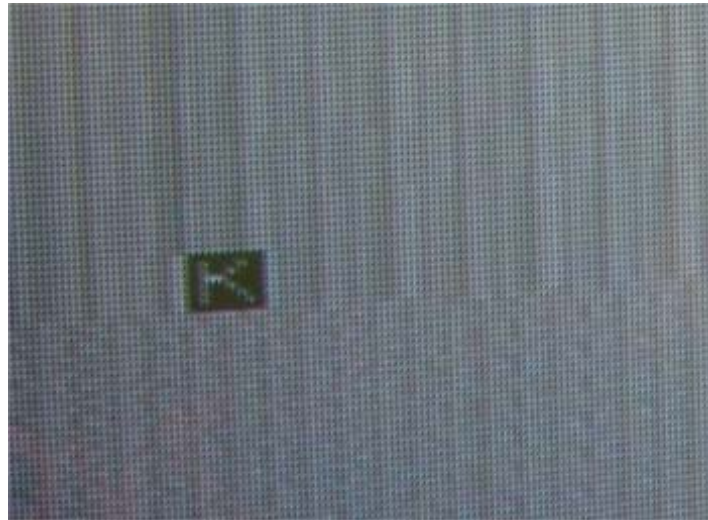


# ZX81 FAULTY ULA SCREEN SHOTS

This screen shot sheet will help you diagnose a faulty ZX81 ULA.  
It is very difficult to photograph the screens clearly, but should give you a good idea what to look for.



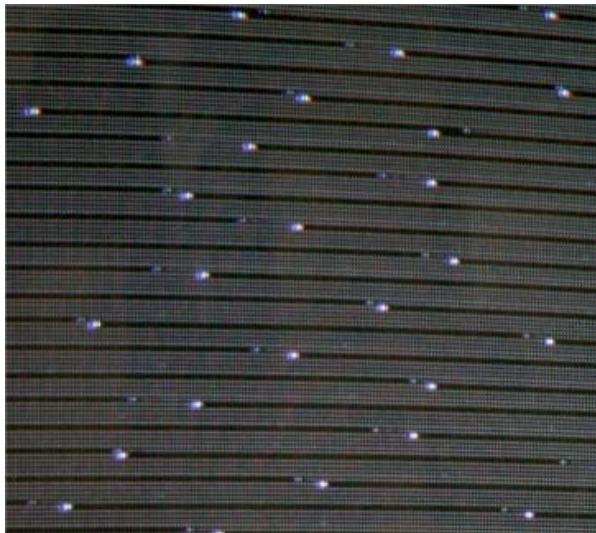
GOOD WORKING ZX81 ULA  
WHITE SCREEN WITH CLEAR CURSOR



FAULY ULA  
DARK SCREEN, CLEAR CURSOR



FAULY ULA  
VERY DARK, SCREEN BLURED CURSOR



FAULY ULA  
DARK PATTERN SCREEN, NO CURSOR



FAULY ULA  
WHITE PATTERN SCREEN, NO CURSOR

A faulty ULA can also display a completely BLACK or WHITE screen. This can also be caused by a power supply fault.

**This information is a guide only, to most of the common display faults caused by a faulty ULA. I can not guarantee a faulty ULA alone will cause the symptoms described within this document.**