

### THE 'DEAD COCKROACH' ISSUE 1

Unfortunately, the first large batch of ULA chips were manufactured before an error in the design was noticed. Obviously to throw these chips out and produce a new design would have represented a large financial loss. The 'Dead Cockroach' circuit was therefore devised (presumably this nickname has grown up due to the similarity between the additional inverted chip and an inverted cockroach!). The correction is shown in fig 7c, its circuit diagram can be seen in fig 7b. A small 74LS00 logic chip on its own small printed circuit board is used to correct the fault within the early ULA's. Its position is shown dotted in the component layout diagram of Appendix D.

The correction circuit combines the  $\overline{\text{IORQ}}$  line with address lines A14 and A15 to the ULA to produce new address lines ULA14 and ULA15. ULA14 and ULA15 are forced to logic 1 and logic 0 respectively during any I/O operation. Before this correction was incorporated, the ULA interrupted the CPU even when it was reading the keyboard or performing any other IN operation. This resulted in 50% of INKEY\$ scans for example being missed.

Note: Later batches of the ULA have been corrected so that the dead cockroach will no longer be required.

However some of these later batches of the ULA appear to have a totally different bug. A small transistor is soldered across the Z80A chip in many issue 2 Spectrums to solve the problem.

The connections to the transistor are illustrated in fig 7e. The effect of this patch is to pull the  $\overline{\text{IORQ}}$  input to the ULA high whenever address line zero (A0) is at logic 1. The ULA will therefore only be selected when A0 and  $\overline{\text{IORQ}}$  from the Z80A are low together.

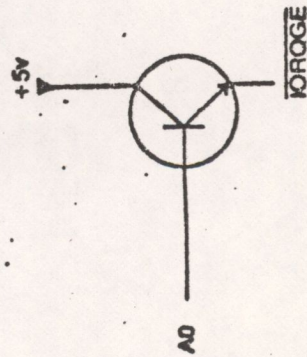


FIG 7c — TRANSISTOR PATCH FOR ISSUE 2

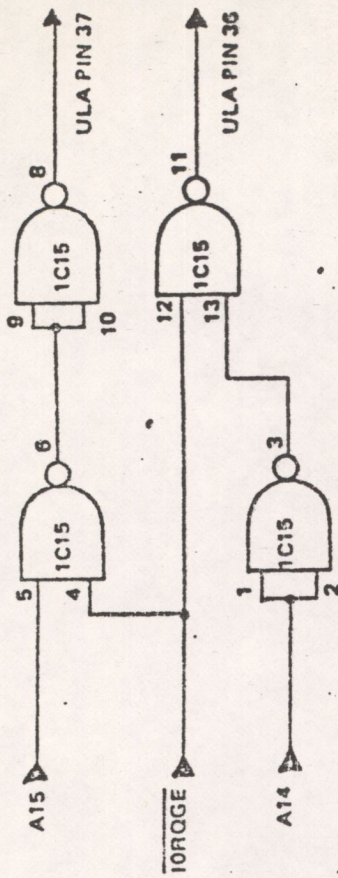


FIG 7b — THE "DEAD COCKROACH" CORRECTION CIRCUIT

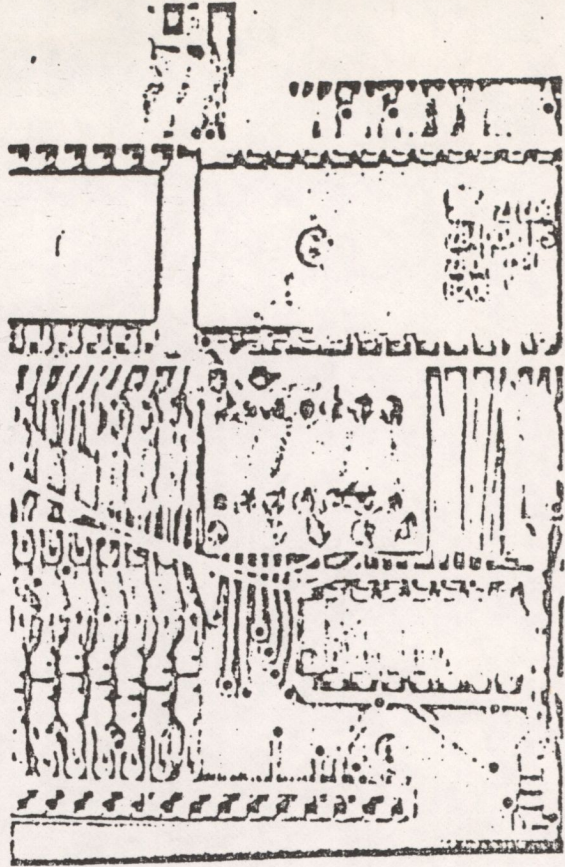


FIG 7c — THE "DEAD COCKROACH"