# BATTERY BACKED CLOCK
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Original text edited slightly and picture added in-line, Martyn Hill 2017

Getting the Battery-backed clock to work on the QL involves modifying the Reset circuitry, to provide a Power-up AND a Power-down reset. This is achieved by building a new Reset generator.

The file CLOCK_SCR contains a circuit diagram to do this, after downloading and de-compacting, LBYTES the file to address 131072 you can then copy it or screen dump it to a printer.
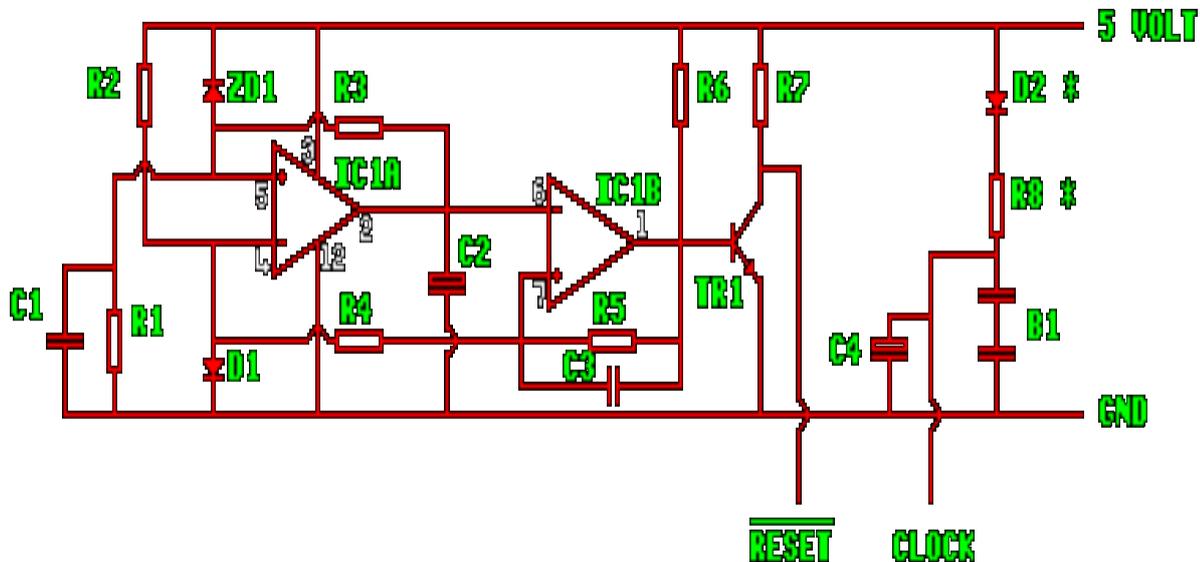
NB: 'CLOCK' above refers to the Battery output, which is routed to Vcc/Vdd of the ZX8302.

PARTS LIST.

These parts can be obtained from Maplin etc. The value of R8 should be calculated to provide a trickle charge to the battery as follows:-

$$R8 = \frac{(5 \text{ Volt supply} - \text{Battery Voltage})}{\text{Trickle Current of Battery}}$$

e.g.
Battery Voltage = 3.6V
Trickle Charge Current = 1mA

$$R8 = \frac{1.4}{.001} = 1400 \text{ ohms} \text{ Nearest preferred value 1K5}$$

If you wished to use a Non rechargeable battery, you could do away with D2 and R8, or replace R8 with a Diode, its cathode connected to the Cathode of D2.

If you have an Issue 5 QL, D2 can be mounted on the main QL PCB.

For TR1 you can use just about any small signal switching NPN Transistor.

R1	120R	Brn-Red-Brn
R2	1K	Brn-Blk-Red
R3	100K	Brn-Blk-Yel
R4	10K	Brn-Blk-Org
R5	220K	Red-Red-Yel
R6	4K7	Yel-Vio-Red
R7	100R	Brn-Brn-Brn
R8	1K5	Brn-Grn-Red
C1	0.1uF	
C2	1uF	Electrolytic
C3	470pF	
C4	22uF	Electrolytic
D1	1N4148	
D2	1N4148	* SEE TEXT
ZD1	BZY88C3V9	3.9 Volt Zenner
IC1	LM339	Comparator
TR1	BC109	
B1	BATTERY	* SEE TEXT

BUILDING AND FITTING INSTRUCTIONS

Build the Reset generator on a piece of Veroboard. You may be able to make the PCB small enough to fit into the QL case, mounted on one of the microdrive regulators. With the battery glued to the side of the case by the expansion port.

Issue 5 PCB
Remove from QL PCB, R8 (just to the right of the ZX8302 by the LED socket), C4 (behind and between the Serial sockets) and the link in place of D22 (just above R8). Fit a 1N4148 Diode in the location D22 (note this is D2 of the Reset generator), fit a link at location D23 (next to D22). Connect the CLOCK output of the Reset generator to the + Battery connection just behind the power socket. Connect the RESET output of the Reset generator to the + connection on the print of C4.

Issue 6 PCB
Remove from QL PCB, R8 and C4 as above. (R8 is located in the centre of three resistors just to the right of the SER1 socket). Connect the RESET output of the Reset generator to the + connection on the print of C4 as above. Getting the Battery supply to Pin 40 of the ZX8302 is a bit more awkward, you have to isolate pin 40 of the ZX8302. You could just lift the leg of the IC and solder directly to it, or cut the print underneath it and link the 5 Volt past it, and connect the CLOCK output of the Reset generator to the isolated pin on the back of the PCB.

Issue 7 PCB (MH)
The above for Issue 6 seems to apply equally well to later Issue-7 QL boards.