

## 11. POWER SUPPLIES

11.1 A block diagram of the power supply circuits is given in Figure 1.5. The basis of the circuit is a flyback converter, driven by a blocking oscillator, providing voltage outputs of +12V, +5.5V, -6V and -18V. Voltage regulation is effected by sensing the +5.5V rail and turning the blocking oscillator on and off as the voltage falls or rises above this level. Input power is supplied by four AA size batteries or a plug-in mains adaptor; battery/adaptor positive is connected to ground. A 'supercapacitor' across the +5.5V rail retains its charge for a maximum of 6 minutes during battery changes, sufficient to preserve the contents of the RAM memory and keep the real-time clock running.

11.2 Input voltage and current levels are monitored together with current drawn from the +5.5V rail. Overcurrent on either supply or undervolts on the input supply causes the Z88 to adopt the coma state in which the Z80 CPU and the display are switched off to conserve battery life. Low battery voltage is a condition flagged to the CPU resulting in the 'battery low' message being displayed on the LCD display.

### 11.3 Battery Input Circuits

11.3.1 Referring to the circuit diagram in Figure 1.6, primary power is provided by the internal batteries or a Z88 adaptor supplying a 6.5V dc input via SK1. D23 provides reverse voltage protection; D24 isolates the battery from the negative rail when the adaptor is connected and delivering its full output.

11.3.2 TR10 monitors the input supply, generating a 'battery low' signal for the gate array on IC4 pin 96 when the battery -ve line falls below 4.2V. Provided the Z88 is not in its coma state, this signal prompts the array to send a maskable interrupt to the CPU, the CPU in turn 'writing' the 'battery low' message to the LCD. This message is not cleared until the Z88 is turned off and then on again. Under marginal battery conditions, the interrupt can be generated as the adaptor is plugged in. This occurs as a result of the battery voltage drop across D24 when the insulated shirt on the adaptor plug body initially opens the spring contact on SK1.

11.3.3 A second transistor (TR25) also monitors the input supply, driving the sense line input to the gate array on IC4 pin 94 low when the battery -ve line falls below 3.2V. At this level the battery is unable to sustain full operation of the Z88 and thus the machine must be forced into the coma state. This action is initiated by the sense signal which prompts the gate array to send a non-maskable interrupt to the CPU, the CPU in turn executing a HALT instruction. The resultant HALT signal output by the CPU to the gate array on IC4 pin 6 is responsible for triggering the shut-down sequence. Principally this entails turning off the LCD display and stopping the clock supplying the CPU.