(Battery) Backup System for CMI09RAM

Using the following data:
   The 74HCxxx VCC from 7V - 2V
   The GAL VCC from 7V - 0.5V
   The RAM VCC from 5.5V - 1.5V data retention
   Li cell from 3.0V - 4.2V (fully charged)

Because there are too many chips on the VCC trace, it is too complex to modify the board to use standby for just the ram chips.
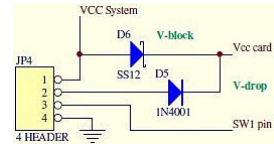So we just put the whole board in standby !   RAM Card.

1: Connect a small 5V/200mA adaptor with:
   Plus to pin 2 (VCC ram)
   Minus to pin 4 (ground)

2: On CPU09BP7 and PC power supply connect the +5VSB pin 9 to pin 2 (VCC ram).
   Handy for the UniFLEX systems.

3: We use a Li-cell from 3.0V - 4.2V, we need to charge the cell outside the system.
   And we have to test ourselves that the cell does not drop below the 3V.
   Backup RAM voltage will be from ~ 2.4V - 3.5V.

   Place a Li cell:
      Li cell plus to pin 2 (VCC ram)
      Li cell minus to pin 4 (ground)
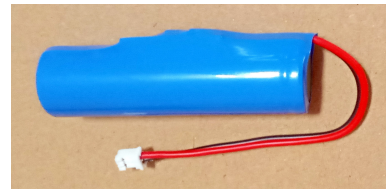
                    18650   3.7V 3600mA with protection

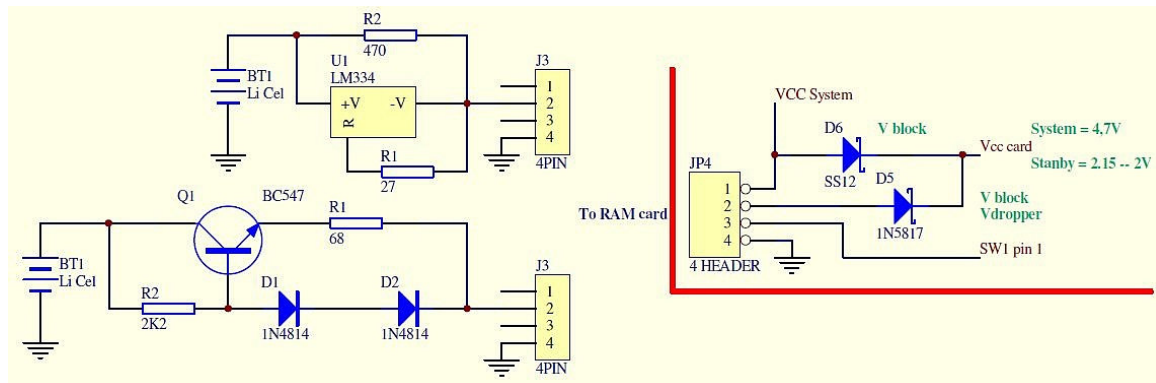   Standby on Li cell 3600/30 ~ 120 hour.
   The ram card will use less power when the voltage drops.
   Expected standby 160 hour, ~6 days.

4: If we keep the voltage just above the 2V the 74HCxxx chips will remain there status.
   We replace the 1N4001 by a 1N5817.
   And use one of these circuits: RAM Card.
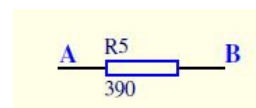

   We apply an average current of ~4.5mA to pin 2 (VCC ram).
   Expected standby ~800 hour, >30 days.

5: After a lot of testing this is the most simple:
    A to Li Cell , B to pin 2
    Current average 3.5mA. ~1000 hour, >40 days.
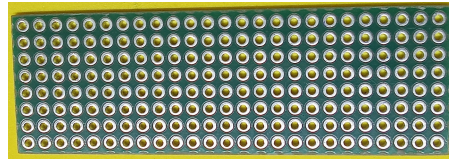
6: Use the RAM UPS
  See 'RAM UPS 1.pdf'.
  A backup system to charge the cell when the system is on
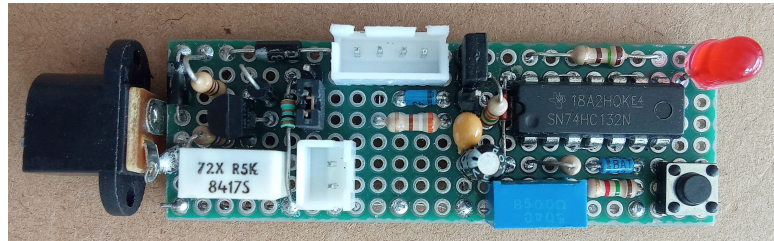 and an external 5V charging option.
  It also generate a battery low signal and has a reset function.
  After restarting and loading FLEX and VIRTUAL, the driver will test for low battery.
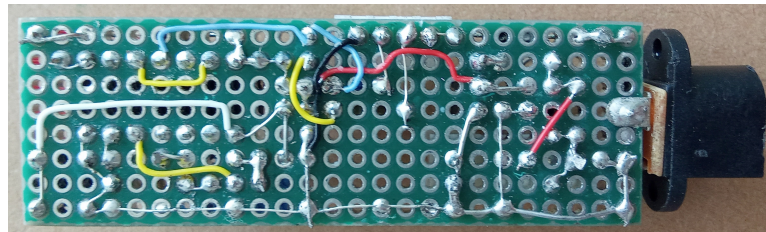
The proto board:

The top:

The bottom:

Li-cell charged to 4.1V, the capacity will be 7% less

Test results

Jumper J2 to 1-2.
Cell voltage at 3.0V, LED turns on and VCC RAM switch off, battery low bit on.
We need to use VDISK.
Estimated standby time ~900 hours.
Cell 1.6V, LED turns off and VCC RAM stays off, battery low bit stays on.
Estimated LED on time ~10 hours..

Jumper J2 on 2-3.
Cell voltage at 3.0V, LED turns on and VCC RAM stays on, battery low bit on.
Estimate standby time >900 hour.
Cell 1.6V, LED turns off and VCC RAM stays on , battery low bit stays on.
Estimate LED on time ~10 hour.
The RAM disk will stay intact with a Cell voltage down to 1.2V.
We need to use VDISK.

We can not let the Cell voltage of the Li Cell drop so low without damage to the cell !
So if the LED is on put on the system or the external 5V supply as soon as possible.
The Cell charging current at the 3.0V level will be ~100mA and drops to ~0 when at 4.1V
.Charging the almost empty cell will take because of the low current many hours.

When the cell voltage reaches 3.2V, press the reset button.
Otherwise, the "Low Battery" area will remain lit and the battery low bit will remain on.

Feature to-do: Test Limiter 2 for longer standby time.
              Increase R9, LED off at 2.5V Cell for longer LED on time.
              Print design.