# CPC Universal 512K Ram Expansion RC-2-Bulldog Release Notes

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## Summary

This is a universal 512K RAM expansion card for all Amstrad CPC models.

The board has an 'M4' connector so requires a suitable motherboard or adapter to mount

On the 6128 and later computers the board provides a full 512K RAM expansion following

On 464 and 664 computers the board will provide either

- a full 512K RAM expansion with the same limitations on mode C3 which the DK'Troni X-MEM, Zaxon), or
- a slightly smaller 448K expansion with full CPC6128 compatibility in mode C3, where internal RAM.

Current status is that the card is fully working for the 6128/Plus computers, but the 464/66 follow with more detail.

## Release Notes

RC-2-Bulldog is the second release candidate for alpha testing.

The ability to run in overdrive mode without shadow memory is restored - this was disable

The code has been improved to be able to backdrive ADR15 in mode 3 if required before th Previously this was being driven based on the value of a FF clocked by that edge and there and CPC clock. This showed up as a voltage dependency in FutureOS which meant that the ramped up above 5V. This issue is resolved in the new code and Future OS works down to a voltage.

At the other end of the valid MREQ cycle the RD* overdriving, if required, has been extend MREQ* after seeing slightly different behaviour between the original prototype card (alwa mode testing (very occasional base RAM fails in the TEST.bin memory test). With this fix bo correctly

on the CPC.

the DK'Tronics/Amstrad specification.

cs and other available '464 RAM cards have (e.g.

one 64K banks is given up and used to shadow

64 modes are still in development. Release notes

d in the previous release candidate.

he first rising clock edge in a valid mreq cycle.
was a race between the CPLD version of the clock
cursor was only visible when the supply was
around 4.25V as all other tests attempted at that

ed to the next trailing clock edge after rising
ys reliable) and a second card just made up for
oth cards now appear to behave identically and

correctly.

The DIP Switches work as follows

| DIP | Function |
|---|---|
| 1 | ON selects 464 mode which overdrives RD_B and ADR15 as required, OFF selects |
| 2 | turns on shadow memory |
| 3 | selects partial shadow memory for mode3 only (OFF), or<br>full shadow memory (ON) using SRAM instead of CPC base RAM for all addresses. |
| 4 | selects shadow memory bank as low bank 3 (OFF) or high bank 7 (ON). |

When setting DIP4 be careful because the DK'Tronics Silicon Disk software does not do a go
declare banks 4-7 available for the disk even if DIP4 is set ON which effectively means that

***NB - for DIP switches 3 and 4 to take effect you need to power cycle the CPC. These switch***

Recommended DIP settings in this release candidate are

| Configuration | DIP1 | DIP2 | DIP3 | DIP4 | Application | Comment |
|---|---|---|---|---|---|---|
| 1 | OFF | OFF | OFF | OFF | 6128 or Plus computers | Disable overdriv expansion |
| 2 | ON | ON | OFF | OFF | 464 or 664 computer using DK'Tronics silicon disk | Provides a 448K disk + a 192K RA |
| 3 | ON | ON | OFF | ON | 464 or 664 computer not using DK'T silicon disk | Provides a 448K |
| 4 | ON | ON | ON | OFF | 464 or 664 computer using DK'Tronics silicon disk | Provides a 448K disk + a 192K RA all memory read |
| 5 | ON | ON | ON | ON | 464 or 664 computer not using DK'T silicon disk | Provides a 448K all memory read |
| 6 | ON | OFF | OFF | OFF | 464 or 664 computers | This is the true D mode C3 in the |

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| 6128/Plus mode |
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ood check of the memory available. SDISC will
bank7 is not available.

***nes are read and latched only on startup.***

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|---|
| ve and shadow memory and provide a full 512K |
| B extension which can be used as a 256K silicon AM expansion |
| B extension |
| B extension which can be used as a 256K silicon AM expansion using full shadow memory so that ds always come from the SRAM |
| B extension, using full shadow memory so that ds always come from the SRAM |
| DK'Tronics mode which does not fully support same way as on the 6128, but does provide a full |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | 512K expansion<br>results table bel |

Other configurations are possible, but not currently tested or recommended.

Note when running a 464 in configurations 4 or 5 (full shadow memory) the base RAM of t
card can potentially revive dead CPCs which have faulty base RAM with the only proviso th
pixel corruption on screen. Full shadow mode has been tested with Gerald's RamTest ROM

## Testing Results

Several cards have been tested now using 3 different CPCs: 1x CPC464 and 2xCPC6128s

Full tests have been run at 4.8V, but some additional tests have been run in the voltage ran

Full Test results are visible on Google Sheets here

https://docs.google.com/spreadsheets/d/11wxhIDWy2wNmKSXZwBqjqQjMN2nNZDtILEvy

## Power Consumption

| **Supply Voltage** | **Current** | **Comment** |
|---|---|---|
| 4.25V | 70mA | Technically below the minimum operating voltage of the CPLD, b<br>have passed |
| 4.5V | 85mA | |
| 4.75V | 95mA | Likely supply voltage if used on Mother X4 due to schottky diode |
| 5.0V | 105mA | Nominal 5V to match CPC |
| 5.25V | 120mA | |
| 5.5V | 145mA | |

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|---|
| and for most purposes is sufficient - see the ow. |

he CPC is only ever used for video data. Thus this at any faults in video RAM will result in visible - see below.

nge 4.25V through 5.5V.

6_GrM8I/edit?usp=sharing

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| |
| ut all tests tried at this voltage (see table above) |
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| drop |
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