

K6/266 on a VX-Pro?

YES

and you might even get 350Mhz working too!

I've upgraded my PC with a K6/266, my motherboard is a PCChips VX-Pro+ (537DMA) V.5.2A.

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First things first, the following information is what I did to my hardware - I will not be responsible for any damage that occurs to your hardware if you try any of following or follow my advices.

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Why ?

I had been running my VX-Pro board with an SGS manufactured Cyrix 6x86 PR166 and whilst this was providing a reasonable turn of speed I felt that there was room for improvement so I considered that;

- My motherboard could only support processors upto 233Mhz (with the official 66Mhz front side bus)
- The Intel processor supplies are running out (Intel now having stopped production)
- Cyrix processors get poor reviews in terms of FPU performance
- AMD K6 and K6-2 have a good reputation for performance (FPU not as good as Intel, but 2nd best)

- IDT Winchips would be an unknown quantity in my motherboard and probably wouldn't give the 'rounded' performance required

After thinking about things for a while, I decided that a K6 or K6-2 would be the 'best bet'. In terms of which processor speed to choose, well I thought that as my system could officially run to 233 and with a 75Mhz FSB a processor could do 266, and near 300 with 83Mhz FSB I thought that a rating of 266 would be preferable. By doing so I wasn't paying the price premium for a 300Mhz part and would limit my over-investment if I really could only run at 233.

The next decision was as to a straight K6 or a K6-2 with the 3D support.

Pricing for the different chips was not significant, there was about a £15 premium for the K6-2 per clock speed.

I contacted a couple of suppliers and visited the WWW technical posts to gauge opinion, at that time most people and both suppliers said that "motherboard support" was required for the 3D support. So I went for a straight K6 at 266 Mhz.

** I now understand that, although motherboard support will enable a K6-2 to be identified and reported as such, the words of wisdom now seem to say that; If your motherboard will report a straight K6 (and hence configure the board to set the cache write enable etc) then it will also configure a K6-2 correctly - 3D support is in application software NOT the motherboard.

Too late for this time, but maybe next...

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Core voltages

Anyway, Having plugged my new chip into the motherboard I came across my first problem - Voltage levels.

The K6, model6 (upto 233) was fabricated on the 0.35 micron facility and ran at a higher voltage than the K6 model7 (266/300) and K6-2 which are made on the 0.25 fab and run at 2.2V in the core.

My VX-Pro board has a lowest voltage setting of 2.5V - meaning, return to supplier, restocking fee etc.....arrggggghhhhhh.

So,

At first I was using the chip at 2.5V core (the lowest the board will go to) with an overclocked bus speed of 75Mhz and a (default) 1.5/3.5 multiplier to give a 266 performance, the chip remained fairly cool with a top case temp of around 33 degrees 'C'.

Newsflash - motherboard now modified to provide 2.28V to 2.52V !!!!!!

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Cooling!!!

As any 'overclocker' will know, speed = heat, and that heat needs to be removed somehow.

To monitor the temperature I use a low cost temperature module from Maplin electronics, with the sensor probe strapped to the lowest part of the heatsink I can reach - the LCD display is then mounted in a spare 5.25 slot cover so that I can keep an eye on things. The module also has an alarm feature whereby a maximum temperature setting can be set and a sounder will activate if the measured temperature exceeds this threshold. I've not bothered with that yet, but perhaps I should!

I have used a 'standard' high performance heatsink and fan combination without any problems to date. It is recommended that thermal transfer grease is used (sparingly) between the heatsink and the cpu casing to help improve the efficiency of the cooling.

My full size tower case is also fitted with extra case fans, one at the lower front sucking air into the case, and another mounted above the power supply extracting air from the case (these supplement the existing power supply fan) - this produces a flow of air across and up the case which helps to further cool the cpu (which is more or less directly in front of the lower fan).

There are a number of people who have experimented with exotic Peltier and even water cooled systems but these are for serious overclocking situations, so long as you are going one or two steps up in processor performance then they should not be necessary.

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Bios

The main problem was one of 'cosmetics'- the BIOS didn't recognise the new chip. At bootup it just displayed that it found "-MMX CPU 66Mhz", it certainly appeared much faster than my previous Cyrix PR166 but I suspected that the internal CPU registers were not set for a K6. I scouted around on the 'net for some help and found a handful of 'optimiser' programs that would correctly set the CPU for optimum performance but I still had doubts, at about the same time a new BIOS file for my motherboard was posted but with almost no details as to the enhanced capability - I emailed PCChips for confirmation of the K6 Model7 identification but as you might expect I got no reply!

The 'new' BIOS date is 4/30/1998S and the markings for my bios chip (which is 12V) was not listed on the PCChips Website either. The files were still available on the Taiwan PCChips website as of late October 1998.

So with nothing to loose but a cheap motherboard - I 'flashed' the Bios, which was completely painless and very quick! It solved the problem - I now had a correct BIOS identification of the K6 chip, mind you I still don't know if it would identify a K6-2 (or 3 for that matter) has anyone tried it?

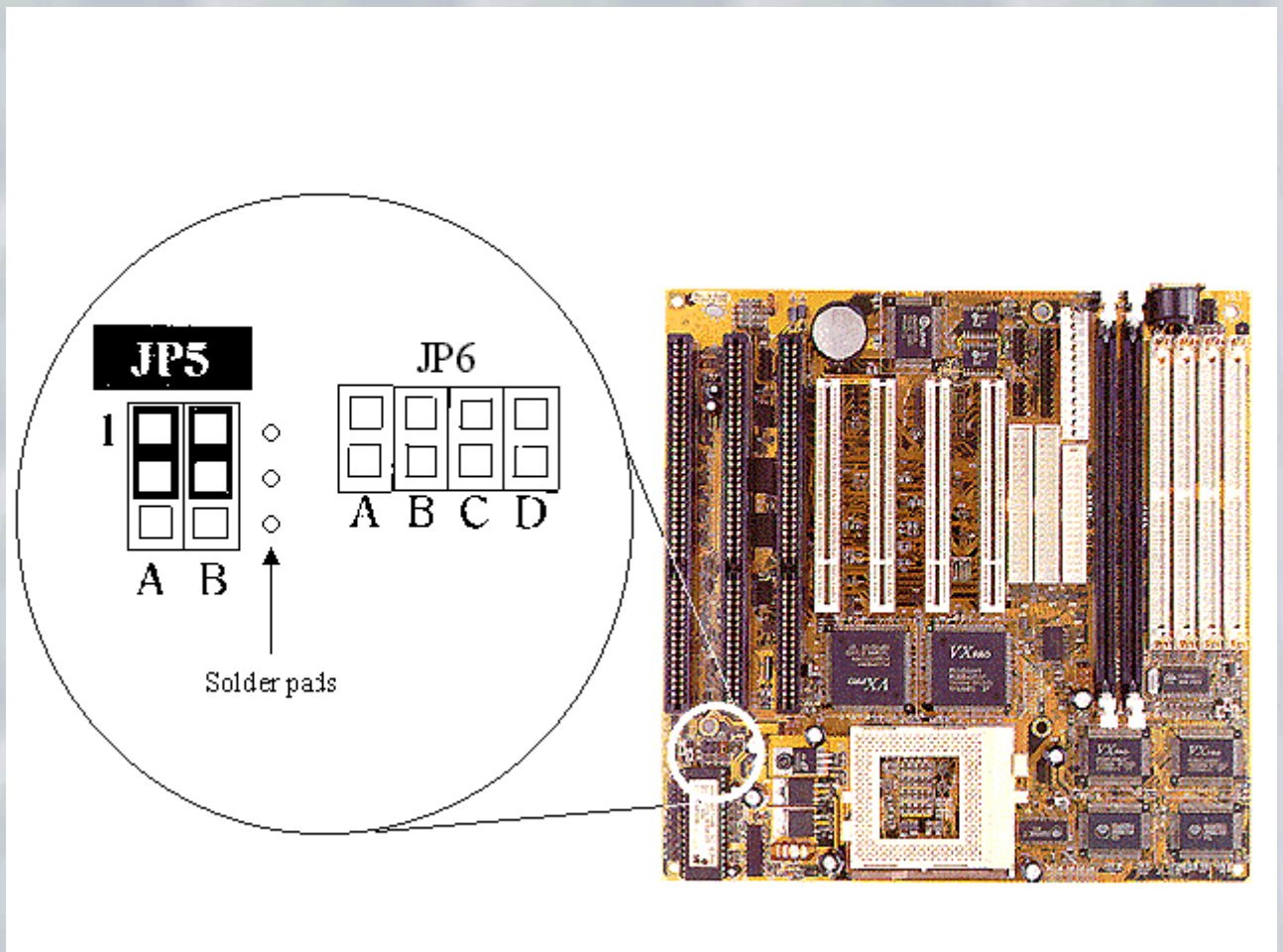
Having tried altering the jumpers to give 3.5x66Mhz -233 and 3.5x75Mhz -266 and having the system stable like this for a little while, I thought I'd really like to get more speed out of this chip!

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Motherboard modifications

I was aware that certain people had modified their motherboards to ground the BF2 pin on the CPU so that the higher multipliers (3.5,4.0, 4.5 etc) were available. So I decided to have a go on my board!

Once I'd extracted board from the PC and inspected it 'on the bench' I could see a set of solder pads next to the existing multiplier jumpers, and once I'd checked out the connections with a multimeter I couldn't believe my luck - the extra solder pad centre IS connected to the BF2 pin and ground is available on the other!



This what my VX-Pro+ board looks like (V.5.2)

I cleaned out the flow soldered spoil using a desolder pump (desolder braid might actually be better here), fitted a new strip of jumper pins and checked out the continuity - just as it should be!

Once reassembled I ran the board in the 3.5 multiplier mode (still with 75Mhz bus) to verify that everything was OK, it was (sigh of relief!) then changed the BF jumpers to give x4 and powered up - perfect, the bios recognises the chip as a 300! Benchmarks show an improvement too.

Temperature has risen slightly, now running around 35 degree C but well within the limits! System has now been running for 3 months, often for more than 9 hours at a time - looking good!

Now I've got some SDRAM maybe I'll try the 83Mhz bus and some higher clock multipliers!

A little investigation, and some time with the soldering iron can pay dividends - perhaps the board designers at PCChips are not so bad after all!

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Jumper settings

These are the jumper settings that have worked for me;

With 75Mhz FSB

JP5

A B C ○ ○ 4 x ○ (300Mhz)	A B C ○ ○ ○ 4.5 x (337.5Mhz)
A B C ○ ○ 5 x (375Mhz) ○ No W95 boot	A B C ○ 5.5 x (412.5Mhz) ○ ○ No DOS boot - not changed any memory timings-yet!

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The bottom line - performance!

I have now been running my system at 4.5x75 giving a CPU core clock rate of **337.5Mhz** for about 2 months, the system is completely stable in both 'normal' applications and 3D games (flight sim/combat FS). I'm certainly impressed with the sense of speed in the machine, this is probably helped by the fact that I've got a Creative Labs Banshee video card in here as well.

Running the front side bus at 83Mhz has so far been unsuccessful, perhaps my board is not good enough to handle it, but I have yet to experiment with changing the memory timings to x3333 which might well allow a further increase to 350 or 375 in which case, if the system remains as stable as it is now I'll be very happy indeed!

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