CPUCool Main Help Index

CPUCooL is a multifunctional utility:
- Cooling the CPU under Windows 95 / 98
- Changing the FrontSideBus (changing the clock frequency of CPU)
- Shutdown Windows by keystroke
- Scans the System Management Bus for EPROMS located on SDRAM modules
- Display's the temperatures, voltages and fan speed of your motherboard
- Optimization of memory
- Optimization of CPU for AMD, Cyrix and Intel processors

Please visit my home page at
http://www.podien.de
for updates of my software and to see my other programs!

You can access CPUCooLs powerfull options quickly via the <u>right mousebutton menu</u>   located in the tray.

To see the values continuously you can select the <u>small display</u>   which stays on top of the screen

If optimization of CPU fails press the right mouse button during initialization, this will stop the optimization process. Or run the RESET.EXE file that comes with the distribution

There are the following menu items:

<u>File</u>
<u>Update Rate</u>
<u>Functions</u>
<u>Display Options</u>
<u>Settings</u>
<u>Register</u>
<u>Help</u>

Please be fair and register. It will help future development of this little program. Remember it costs a lot to buy the latest motherboards.

Dear Hackers!

I am aware of you, so I decided to make an easy registration number, not to mention. I sell my programs inexpensively. If you make cracks of my program or make a public registered version you might cause me to have to stop developing future versions, and that would not be good for that hardware depending on this program. Remember it costs a lot of money to have the latest hardware supported. As a matter of fact I have not made any money with that program, all the money I get goes to new hardware. As you know there are not that many interesting programs as cost effective as this one, so if you can restrain yourselves form cracking an easy registration number, it will ensure the production future of this and other programs to come.

File Menue

Save settings

In the File dialog you can save the settings you have made. Normally CPUCooL saves the settings at the end of each session. But if you shutdown Windows without closing CPUCooL first, the settings are not saved. Please use the option to save the settings before you shutdown Windows if you choose not to close CPUCooL first. If CPUCooL shuts Windows down itself, the settings will be saved.

Log File

The Log File is an ASCII File that contains all the values from the start of the log file till its end. You could display it with a simple editor.
First you must config the behaviour of the log file. Have a look at <u>Log File</u> for details. After you start the logfile, all values are saved to a file. You could choose the name by the Log File Name menu. If you do not choose anything the default Log File name CPUCooLLog.Log would be choosen. You could stop logging at any time you want. Then the file is closed.

Quit CPUCooL

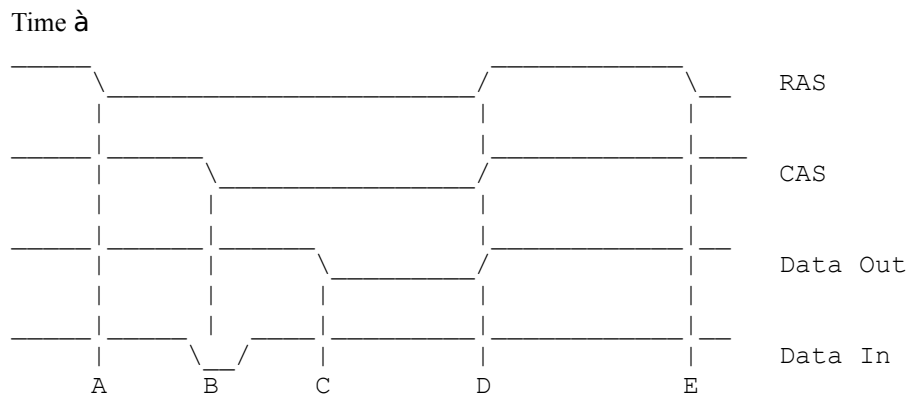With „Minimize" you will leave the dialog mode and go to the tray.
With „Abort"   you will be in the dialog mode again
With Exit you will close CPUCooL.

SD RAM

All SD RAM modules that hold an EPROM can be displayed. Not all values are seen in the shareware version. In the registered version there are **two** displays which show you every bit when   the SDRAM is decoded. There will be no translation for this menu in the language specific versions of CPUCooL. I think that everybody who is able to decode these values is good at English.

Since the beginning of dynamic RAM production there had to be two things solved: to   reduce the number of pins on the package and to have a field of RAM cells organized in the best way. So the manufacturers put the RAM cells into an array with two dimensions. So you have rows and columns. For example if you have a 30 bit memory you can organize it in two ways, one with 5 rows and 6 columns the other with 6 rows and 5 columns.   To access this you first put into the SDRAM the row address with the RAS pulse and then you access the column which the CAS pulse. After a period of time you get the information.

Time à

```
_____                              _____
      _____/             \___      RAS
      |                           |             |
_____|                           |_____|___
      |                           |             |
      |       _____/             |         CAS
      |       |                   |             |
      |       |                   |             |
_____|       |         _____|_____|___
      |       |        /          |             |
      |       |       /           |             |         Data Out
      |       |      |            |             |
_____|_____|_____|_____|_____|___
      |       |      |           |             |
      |       \__/   |           |             |         Data In
      A       B      C           D             E
```

This is the simplified model of RAM access. First of all you put the row addresses on the address bus.   That is done immediately before state A in the timing diagram. Then you have to decide whether you want to get data out of the RAM or put it into the RAM. If you want to read data, you must put the data together with the address on the bus. Then comes the CAS signal that latches the data to the ram (timing diagram state B). Then you have to wait for a moment and you can take back the RAS and CAS signals (timing diagram state D). The next cycle starts at E.

 If you want to get data   you must put only the column address on the bus. Then make the CAS signal active (timing diagram state b). After a short time you will get the data at C. Then you take back   the RAS and CAS impulse. You have to wait a while till you can start the next cycle (timing diagram E).

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Checksum	If the checksum is ok the contents of the EPROM is read out correctly. Checksum error might occur if less values are programmed in EPROM than necessary
Number of bytes	The number of bytes show the amount of bytes being programmed by the manufacturer of the SDRAM. Mostly the manufacturer only programs less values than this number.
Total SPD memory size	This field describes the length of the memory that holds the SDP data
Memory type	Should be SDRAM. EDO is possible too
Number of row address bits	You can see the number of row addresses. 2 power (number of rows + number of columns) * number of rows * number of banks * Module data width / 8 = size of module in bytes
Number of column address bits	You can see the number of column addresses. 2 power (number of rows + number of columns) * number of rows * number of banks * Module data width / 8 = size of module in bytes
Number of rows	You can see the rows of the SDRAM. 2 power (number of rows + number of columns) * number of rows * number of banks * Module data width / 8 = size of module in bytes
Module data width	You can see the data width of the SDRAM module. Normally it is 64 Bit. 2 power (number of rows + number of columns) * number of rows * number of banks * Module

	data width / 8 = size of module in bytes
Module interface signal Levels	You can see the SDRAM module signal voltage interface. Normally it is LVTTL = 3.3 Volt operating voltage
SDRAM cycle time	You can see the total minimum cycle time (clock period) for the SDRAM. In SDRAM mode.
SDRAM access time from clock	You can see the maximum clock to data out time for the SDRAM
Module configuration type	You can see the module's error detection and correction scheme. Mostly it is none as these modules are not so expensive.
Refresh rate / type	You can see the refresh rate and type of the module. Normal refresh period is 15.625 microseconds. If you see a multiplier you must multiply the normal refresh period by that multiplier.
SDRAM width	You can see the data width of the primary SDRAM component uses on the module
Error checking SDRAM width	If the module incorporates error checking then the number of bits used for error checking is expressed here
Min clock delay	You can see the minimal clock delay for back to back random column addresses. Mostly it is 1
Burst length supported	You can see the length of burst accesses for the SDRAM
Number of banks on SDRAM device	You can see the number of banks internal to the SDRAM device for each row of the DIMM. 2 power (number of rows + number of columns) * number of rows * number of banks * Module data width / 8 = size of module
CAS latency	You can see which CAS latencies are supported.
CS latency	You can see which CS (chipselect) latencies are acceptable for the SDRAM.
WE latency	You can see which WE (write enable) latencies are acceptable for the SDRAM.
Redundant row addr	If you have mixed size of RAM's on the module you can have a different number of RAS and CAS rows.
Differential clock input	You can see whether you have a differential clock input. So you have 2 clock signals one being the inverse of the other.
Registered DQMB inputs	You can see whether you have a registered data inputs
Buffered DQMB inputs	You can see whether you have buffered data inputs
On card PLL	You can see whether you have the module has ist own PLL on chip.
Registerd address / control inputs	You can see whether you have registered address and control (RAS,CAS,WE,CKE,S) inputs
Buffered address / control inputs	You can see whether you have buffered address and control inputs.

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Support early RAS # precharge	You can see whether the SDRAM supports early RAS precharge.
Support auto precharge	You can see whether the SDRAM supports auto precharge
Support precharge all	You can see whether the SDRAM supports early all types of precharge
Support write 1 / read burst	You can see whether the SDRAM supports write 1 / read burst
Low VCC tolerance	You can see the low voltage tolerance needed for that SDRAM. Normally it is 10% which is 3.0 volt at 3.3 voltage level
Upper VCC tolerance	You can see the upper voltage tolerance needed for that SDRAM. Normally it is 10% which is 3.6 volt at 3.3 voltage level
SDRAM cycle time 2nd highest CAS latency	If you use the SDRAM in CAS latency mode 2 that is the minimum cycle time
SDRAM Access from Clock 2nd highest CAS latency	If you use the SDRAM in CAS latency mode 2 that is the maximum time data is available from the rising edge of the CAS signal
SDRAM cycle time 3rd highest CAS latency	If you use the SDRAM in CAS latency mode 3 that is the minimum cycle time

Minimum row precharge time	If you use the SDRAM in CAS latency mode 3 that is the maximum time data is available from the rising edge of the CAS signal
Row active to row active min	You can see the minimum time between two rows active
RAS to CAS delay min	You can see the minimum time between RAS and CAS (timing diagram A - timing diagram B)
Minimum RAS pulse width	You can see the minimum RAS pulse width (timing diagram A - timing diagram D)
Density of Each row on module	You can see the memory capacity of each physical row on the DIMM module. Multiply it with the number of rows and you will have the capacity of the SDRAM
Command and address signal input setup time	You can see the minimum time the command and address signals could have before clock
Command and address signal input hold time	You can see the minimum time the command and address signals must hold before clock
Data signal input setup time	You can see the minimum time the input data signals could have before clock
Data signal input hold time	You can see the minimum time the input data signals could have before clock
SPD data revision code	18 = November 97 which is release 1.2 (hex 12!)
Manufacturer	optional values
Manufacturer location	optional values
Part number	optional values
Revision code	optional values
Manufacturing date	optional values
Assembly number	optional values
Specification for frequency	You can see whether the SDRAM is PC100 or PC66 compatible

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Update Rate

You can switch the update rate to the following values:
1 sec
2 sec
5 sec
10 sec (default)
20 sec
30 sec
There are 581 values displayed in a line. So at the update rate of 10 sec you could see the past 5810 sec (about 1 1/2 hour).

Shareware

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Wolfram Podien
Rohöfe 3
28832 Achim
Germany.

When payment is received you will be sent a registration key for the last version of this program.

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Settings

- Mainboard Choice
- Temperature Senosor Choice (not always displayed)
- Temperature Offset
- Celisus - Fahrenheit
- Measurement Sources configuration
- Language
- Startup of CPUCooL
- Configure Tray game item
- Change names of temperature, voltage, and fans
- Priority of CPUCooL

Startup

You can choose between several startup modes. They configure whether CPUCooL should go to the tray or make up a dialog.
In the autostart folder CPUCooL has the parameter 1. That parameter tells CPUCooL that it is called from the autostart folder. If the autostartup option is on it will go to the tray. Otherwise it will start up a dialog.

Celsius - Fahrenheit

This button switches the temperature display form Celsius to Fahrenheit or vice versa. The temperature offsets are not recalculated. They are interpreted as Fahrenheit values. The limits are recalculated. This switch is system wide. Every temperature will be interpreted that way.

Help

This Help system
There is an <u>About</u> Box to show the version number and other information

About

There is an about screen which gives the version number and there is a screen for this help menu. There are some additional outputs which show the I2C Bus and the CPU Version. With the button „write info to file" all these information is written to a file called **CPUCooL.Info**. Then you can fax or mail me the information.

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Registration

Payment : 30 DM or 15 EUR or US$13
to
Wolfram Podien
Rohöfe 3
28832 Achim
Germany
Kto 1368364 at Bank 24 BLZ 38070724

You can get the current version at http://www.podien.de
Support at support@podien.de .
For the registration conditions have a look at the <u>Shareware</u>
section.

Please send this form per e-mail or letter:

Operating system :

Mainboard manufacturer and type

Graphic card manufacturer and type

Please insert the Info you get from HELP ->CPUCooL Info and the button Write to File

How did you become acquainted with CPUCooL:

Anything ideas for improvement:

Any suggestions:

Put a personal check or a note into an envelope or send/wire the money directly to my bank. Every payment is welcomed and will help me to continue with this project.

Set Limits

You can change the limits which the program should check while it is running. For every motherboard value (temperature, fan and voltages) there maybe a defined limit. If the value is above the limits there is an alarm message issued. Under this menu item are two displays. The first one asks for the value to check, the next menu item asks for the upper and lower limit for that item. You can assign a value to every menu item that is read /write.
If that special value should be checked it must be activated by the active button in the second menu. If the program should not care about the limit do not check the active button.

Priority

You can change the priority of the program with this menu. The priority tells the operating system which jobs are urgent. The highest priority is real-time The program itself has a normal priority class. You can lower the value in that class by taking a value that is above the normal check button (above idle). It is advisable to do it as the program will give more process time to the job in the foreground.

Normally the program takes under 3 per cent time. All ic's that are only connected via smbus (GL518, GL520, Win83783, LM80,..) are a little bit more complicated to access, which take about 0.5 per cent.

If you take the first priority value it would not cost you anything as the time is taken form the idle time. This time is not needed by other processes.

For SIS5595 (old version) and VIA Chip (you can see that by menu Help->CPUCooL Info) sets it is advisable to take the option to raise the priority only while accessing the I2C bus.   Then the timing of the I2C bus is not disturbed by task switching.

Functions

Here you could configure every function in CPUCooL. A detailed description is at the functions itself. Click on the item to get the specific function description.

Cooling Mode / Temperature dependant switchin
Windows shutdown by keyboard / Eject all removable media
Change FrontSideBus / Change CPU Speed option.

Dependig on your CPU you could see one of the following items for CPU Optimization:
Cyrix   Processors
Intel   Processors.
AMD   Processor(processor defendant)

Windows Memory Periodical Cleanup   start here
Limits of temperature voltage fanspeed
SD-RAM RAM EPROM contents

Optimizations for Cyrix CPU's

Write Allocation	To optimize the cache strategy of L2 cache.
Write Back Cache	Set strategy for second level cache
IO Recovery Time	Set IO recovery time to 0 or to max.
Linear Burst	chip set must support it. Be careful
Cached Directory	for old Cyrix processors only
CPU ID	CPU ID switch on
Negate Lock	Do not wait for floating point unit
Suspend on Halt	To enable power saving switch it on. This item is necessary for CPUCooL to enable cooling function.
Framebuffer	Sets the CPU cache buffer to the framebuffer of graphics card

Optimizations for Intel CPU's

For Intel CPU's

Low Power	For Intel Pentium processor to enable low power mode (default off)
Low Power MMX	For Intel Pentium II processors to enable low power mode (default)
L2 Cache Latency	Number of clock cycles between two accesses to the L2 cache. Could be 0 to 15. Dangerous. Your hardware could freeze. Unplug AC and try to restart your computer

Optimizations for AMD CPU's

For AMD K6 2/3 CPU's

Write Allocation	To optimize the cache strategy of L2 cache.
Data Prefetch	If enabled, cache misses initiated by a memory read within a 32 byte cache line are conditionally followed by cache-line fetches of the other line in the 64 byte sector
Write Combining	To enable to combine up to four byte accesses to a long word access. There are two possibilities: Global: It enables the CPU to write to any memory without write ordering. Speculative: is an restriction of global. Write ordering is done in any memory except the memory of the frame buffers and an external EWBE signal
EWBE Enhance	Out of order writing to the L1 Cache.
Frame Buffer	To optimize the access of the frame buffer in the graphics card. There are two frame buffers which could be optimized separately

Optimizations for Athlon look here

Memoryoptimizations for Windows

Windows especially Windows 95/98 does not give allocated memory back to the user. So memory decreases till nothing is left. If more memory is needed then the operating system frees memory. The disadvantage is that if you start an application, most times there is no more memory left at the beginning. Then Windows starts his deallocation algorithm taking the time needed to start the application. With this menu you could choose a strategy to free the memory before starting the application at a time windows has to do nothing else.

Good values are for 64 M Byte to free 16 M Byte if there are only 2 M Byte left after a time of 10 sec. It is not useful to free more than half of memory.

You can do it periodically every e.g. 30 minutes as well.

Initially this option is switched off because CPUCooL could not detect, whether there is a CD-ROM is working or not. If a CD ROM burner is working in 486 systems you should switch off this option because it might delay the data output from the CPU a little bit on slow systems.
Before starting a game it is a good thing to tell CPUCooL with the right mouse button in the tray menu that a game is going to start. Then CPUCooL frees the memory, suspends cooling, and cancels all his own periodical tasks. So you will get a higher frame rate than ever.

Display Options

You can choose with value you want to see in

Tray Value
This display (Main display)
Small Display
Limits of graphic display
Colours of the lower and small display

Beside the normal temperature voltage and fan values there are several normal monitor values to display. These values are as follows:

% CPU Time	is the working time of the CPU. If this value is 0 the CPU has nothing to do.
Dial rec	is the value in kB/s received by a dial up network. Not included are the K Bytes, which are directly read from a COM Port
Dial trans	is the value in kB/s transmitted by a dial up modem in a second. Not included are the K Bytes, which are directly send to a COM Port
Dial crc	are the CRC Errors of the dial up modem. In Windows NT it is for a session, in Windows 95/98 it is for all sessions since the power is switched on. If this value raises you must check the connection to the modem
Dial tot rec	are the number of bytes received from the remote host. In Windows NT it is for a session, in Windows 95/98 it is for all sessions since the power is switched on.
Dial tot trans	are the number of bytes transmitted to the remote host. In Windows NT it is for a session, in Windows 95/98 it is for all sessions since the power is switched on.
Mem avail	displays the physical memory available in the system for jobs not yet running
Mem page	displays the number of bytes in a page file
Disk read	the total number of bytes read from the local file system / sec. There are some problems to detect that value in NT. So it is the system i/o read access on NT based systems.
Disk write	the total number of bytes written to the local file system / sec. There are some problems to detect that value in NT.
Server total	number of bytes received and transmitted by the local CPU via network in server mode / sec. There bytes are ordered from another compter.
Client total	number of bytes received and transmitted by the local CPU via network as a client computer / sec. These bytes are used in the local computer
Pager page	number of pages send by the CPU to a page file.

Tray Value

If there is more than one temperature value you can select the values that should go to the tray. Only five values could be displayed in the tray. It could be a temperature or the CPU Load time or the free memory or the dial up receive/transmit values if they are available.

Keep in mind that it costs time to display the values in tray

Windows NT There is no colored display from bar graphs.

Celsius Fahrenheit

You can select whether you want to see the Celsius values or the Fahrenheit values. It is for both the tray and the display at the same time. It is for the temperature offset as well.

Temperature Offset

There is an offset between the correct temperature of the CPU and the displayed temperature. To minimize this offset you can put in a value to be added to the temperature. Only the sum will be displayed.

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Display

You can hide some options that are supported by the chip set manufacturer but are not connected on the main board. The result are silly values. If you do not want to see them you can hide these values by un checking the button.

Besides fan speeds and voltages there are temperatures to be seen. If these temperatures are from the main monitoring IC they are called Temp. If these temperatures are generated by an additional monitoring IC on the motherboard, they are called Temp Sens. You can see the main monitoring IC under Help ->CPUCooL Info. The main monitoring IC comes second (First is the chip set). The additonal temperature only detecting device come third, called sensor.
On some motherboards the voltage readout is not correct. Then the motherboard manufacturer has not taken the pinning of the IC manufacturer.

% CPU Time	is the working time of the CPU. If this value is 0 the CPU has nothing to do.
Dial rec	is the value in kB/s received by a dial up network. Not included are the K Bytes, which are directly read from a COM Port
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Client total	number of bytes received and transmitted by the local CPU via network as a client computer / sec. These bytes are used in the local computer
Pager page	number of pages send by the CPU to a page file.

General Display Options

In this menu you can select the actions of the timer routine. This routine is called periodically with the <u>Updaterate</u> . There are four options:

Nothing	Nothing is done. No timer routine is set up.
Tray Only	Only the values that are needed to display the tray value are gathered from the system. No check is done. No alarm is checked. No forced cooling.
Motherboard and tray values	All values except those from the operating system are gathered. Alarm function is enabled together with the cooling options.
Full Display	All values are gathered. All alarms could happen, forced cooling enabled.

Right mouse button display

You can select between these options (some of them are displayed only if necessary):

Exit CPUCooL   Exit CPUCooL. The exit display is popped up

Open main display   The main display is opened

Free memory   The memory is freed with the amount of memory configure in the <u>Free Memory Display</u> is configured

Cooling on/off   Windows 95/98 only. Switches on / off cooling directely.

Alarm on/off   If an alarm from temperatures, voltages or fans is active you can switch it off by clicking this item.

Forced cooling off   You can switch off the forced cooling if it is enabled in the <u>Cooling</u>   Display

Start/Stop game   Start game is free memory and switch off any collection of data (neither from the motherboard nor from the operating system). The Tray value stays as it is. It is the same as the Nothing option in <u>Display Options</u> Stop game frees the memory again. It restores the <u>Display Options</u> . Cooling is switched on.

Close tray menu   Closes the right button display

Small Displays

Small display are used to observe the computer continuously. They could be configured via a menu. There are four options:
- Options
- Numeric display
- Graphical display
- Bargraph display

The options part of the menu is generally used for configuring the display. You can choose the position of the display. What is most common, is to put it in the lower right corner as there is often free space available. The size of the display could be changed in the next box. Values between 0.4 and 3.0 are available. You should check the next box if you like the display so that it should always be displayed. As time goes on you will see every value you have chosen displayed in real time quotes. Also you clear the names by unchecking the next checkbox. You can choose a black and white display or a colored display with the last checkbox.

Choose the options 2 to 4 to configure the values you want to see.

With item 2 you can get a numeric display of the values you want to see.

Item 3 gives you a graphical curve. These are only relative values that you will be viewing,   you can see small differences exactly. But you will not see an absolute value.

The last option you can see barographs. The length of the graph changes with the value it should display.

Language Choice

You can choose the language in which the messages and the menu system will be displayed. Today you can only choose between German, English and French. But I hope to present you other languages as soon as possible.

SDRam 2. Display

The second half of the values stored in the SDRam could be read out here. The most interesting point is the Specification for frequency. It shows whether the SDRam is PC 100 compliant or not.

Set Limits

Here you can enter the limits you want to have. Please use the arrows. There is no possibility to enter the values directly.
Values to be checked must be activated by the active button. Otherwise they will not make any alarm

Left Button double click

This menu is a combination of the exit menu and the configuration menu. The configuration menu is described here .

Register

Hints to register CPUCooL are <u>here</u> .

Small Displays Options

The options for small displays are described <u>here</u> .

Front Side Bus

If you would like to set the Front Side Bus, have a look at the following links:
Exlaination of the Buttons and Fields
Working with CPUFSB
Trouble Shooting
Frequently Asked Questions

What is the FrontSideBus?
The FrontSideBus is the main CPU bus. All data to and from the memory and the input/output devices is transferred by this bus. To speed up your system you must only increase the frequency of this bus. But there are limits set by the CPU manufacturer. If you come near that limit your system crashes.

Windows Shutdown

You can choose the keystroke combination to shutdown windows. You always have to take the Control and Alt keys. These keystrokes prevent you from shutting down windows occasionally The additional keystroke is chosen between the letters, numbers and function keys.
There are five ways to shutdown windows:
- shutdown windows normally with power switch off
- shutdown windows forced with power switch off
- shutdown windows normally with reboot
- shutdown windows forced with reboot
- Log off the current user

When you take the forced option not all programs wire asked to shutdown. So you can loose data if it is not saved before. But if windows hangs it is sometimes the only way to shutdown windows if you take the forced option.

Log File

You can create a log file with all the data output of CPUCooL. Here are the following options in the menu log file configuration:

Start logging at the start of CPUCooL

Start the logging at the beginning of CPUCooL. Then every time you start CPUCooL the log file would be written to

Append data to log file

Append the new data to an existing log file. If there is no log file a new log file will be created without an error message. But the log file will grow. If that box is not checked, a new file will be created and the old one will be destroyed.

Text of data is written to log file

If you check the third box every values will be written with its name in front of its value.

Mainboard values only

In the last check box you can choose whether you only want to log the mainboard values or all values CPUCooL gathers.

If you choose a filename then logging will start immediately. If you do not choose a name, the name you took the last time will be taken again. If there is no last name, CPUCooL will take the name "CPUCooLLOG.LOG". You can stop logging at any time you want.

Configure Graphics Display

You can set the limits for the graphics. This menu item is for all four graphics:

- the graphics of the big display
- the graphics of the small displays
- the bar graph of the small displays
- the bar graph of the tray icon

You can choose the maximum value the display should display correctly. If for example you configure the maximum of the dial rec limit to 13 K byte every value from 0 to 13 K byte will be displayed correctly. 13 K is the top of the display. If you choose 130K byte Limit 10 K byte   will be on the line 1. If you choose 13K byte limit the 10 K byte will be on the line 10.
You could set the limits for

- Dial rec - dial receive
- Dial trans - dial transmit
- Mem avail - memory available
- Mem page - memory paging
- Disk read - disk read
- Disk write - disk write
- Server total - transferred via network in server mode
- Client total - transferred via network in client mode
- Pager page - pages the pager transfers to disk.

In addition you can leave the horizontal and vertical lines from the big display. So you can see the graph a little bit better.
The next thing CPUCooL has to solve is the problem of displaying temperatures in graphs. The main problem is that 130F is equal to 54,4 ° Celsius. That is a normal operating temperature for a processor. But that is the limit for the graphics. So now you can decide if you want to see a good graphic curves only the curves are displayed in ° Celsius but the numerical display is still in Fahrenheit. You get a good graphic curve. On the other hand you can choose to display all graphics in Fahrenheit and the maximum value is 1300 F. So you get the correct values but the scale is very rough.

SDRAM Overview

With the SDRAM display you get a quick overview of the technical data from the SDRAM's in your system. You can get an extended overview if you press the extended output button. The output of <u>these displays</u> is for experts only.

Signal name	Meaning
checksum	Checksum calculated by the addition of the first 64 bytes in EEPROM
number of bytes in EEPROM	number of bytes in EEPROM
CAS Latency	Number of clock cycles before to wait until the data is accessible
RAS to CAS Delay	delay time between RAS and CAS signal. 15ns = 66 MHz 10 ns = 100MHz 7,5 ns = 133 MHz
RAS precharge time	Wait time until the next data could be accessed
SDRAM cycle time	Cycle time for a complete data access
SDRAM access time	Time from setting the RAM address to data output
SDRAM 2nd cycle time	If you are in the second best CAS latency mode this is the time for a complete data access
SDRAM 2nd access time	If you are in the second best CAS latency mode this is the time from all addresses correct until data is present
PC 100 spec	Shows whether the module is PC66 or PC100/133 compatible

Display Configuration Menu

This is the display configuration menu. You can choose the other menus.

Mainboard Choice

The mainboards listed in this menu have problems with reading the Front Side Bus and the EEPROMs on the SDRAM. It is necessary to switch the SMBus, as there are additional bus drivers in the SMBus. These bus drivers have to be switched in every read cycle.

Reading the temperature, the voltages and the fan speeds is independent of this feature.

Additionally there is a list of known mainboards put into CPUCooL. So you can easily choose the mainboard and you get the PLL.

Please give me an e-mail if you have a mainboard not listed here with the mainboard manufacturer, mainboard type and PLL.

Configure tray game item

With this button you could change several options of CPUCooL in one go. Simply by clicking the right mouse button on the tray icon. This is normally done for getting the best performance out of your hardware. Normally you only need it for games. You could

- Switch off cooling. Normally the CPU usage if you play games is 100%. Then there is no time for cooling anyway.
- You could switch off periodical activities. So there will be no values taken form the mainboard (temperature, fan speed and voltages) and from the system.
- The output window of CPUCooL will be minimized. If you play games you do not want to see anything but the game
- The frond side bus is set to a higher speed.

Everything could be taken back with a single click with the right mouse button on the tray icon of CPUCooL.

Athlon Optimizations

In this menu there are the optimizations known for K6 AMD processors. They are checked for the Athlon system.

Additionally the cache divisor is made switchable. The Cache divisor is the ratio between the system clock and the clock of the L2 Processor.

With this option you can change the caches speed independent of the system speed. There is a detection for Motorola and NEC caches. Normally up to 700 MHz use ½ from 750 to 850 use 2/5 and from 900 to 1000MHz use 1/3.

Colours of the Display

With this item you could change the colours to be displayed. There is exactely one colour for each mainboard / system value. The temp1 has excately one colour, and it is displayed in this colour in the big and small display. You can choose your personal favorite colours as you like. These colours will be saved so with every CPUCooL call you get the same colours.

In the first display you must choose the value to which the colour should be set. In the next display you can choose your favourite colour.

The lower display ist the lower part of the big display.

Change Names of Temperature, voltage, and fans

In this display you could set the name of temperatures, voltage and fans to your personal favourites. You can give the value, normally displayed as temp 2 the value CPU Temp. All occurrence of that temp 2 value would be changed to CPU Temp.
You should give expressive and not too long names the the values as the display size is restricted.

Winbond Temperature Dialog

This display is only seen on computers with Winbond monitoring chips. In these chips there is a option which optimizes the display of the temperatures. If you are directly connected to a PII compatible temerature measuring diode, you should take that option for this sensor. You can see that especially it you look at the temperatures. If they change quickly with the load of the CPU you might have a direct connection to the silicon die (quickly is about 10 ° C difference in 10 sec).   Then you should take that option

Fan Speed Control

In this menu there are two temperatures defined with their fan values. If the temperature is below the first value, the fan speed of the first value is taken. If the temperature is above the second value, the fan speed of the second value is taken. Between these two temperatures the is a linear function in between. So if the temperature increases the fan speed increases also.
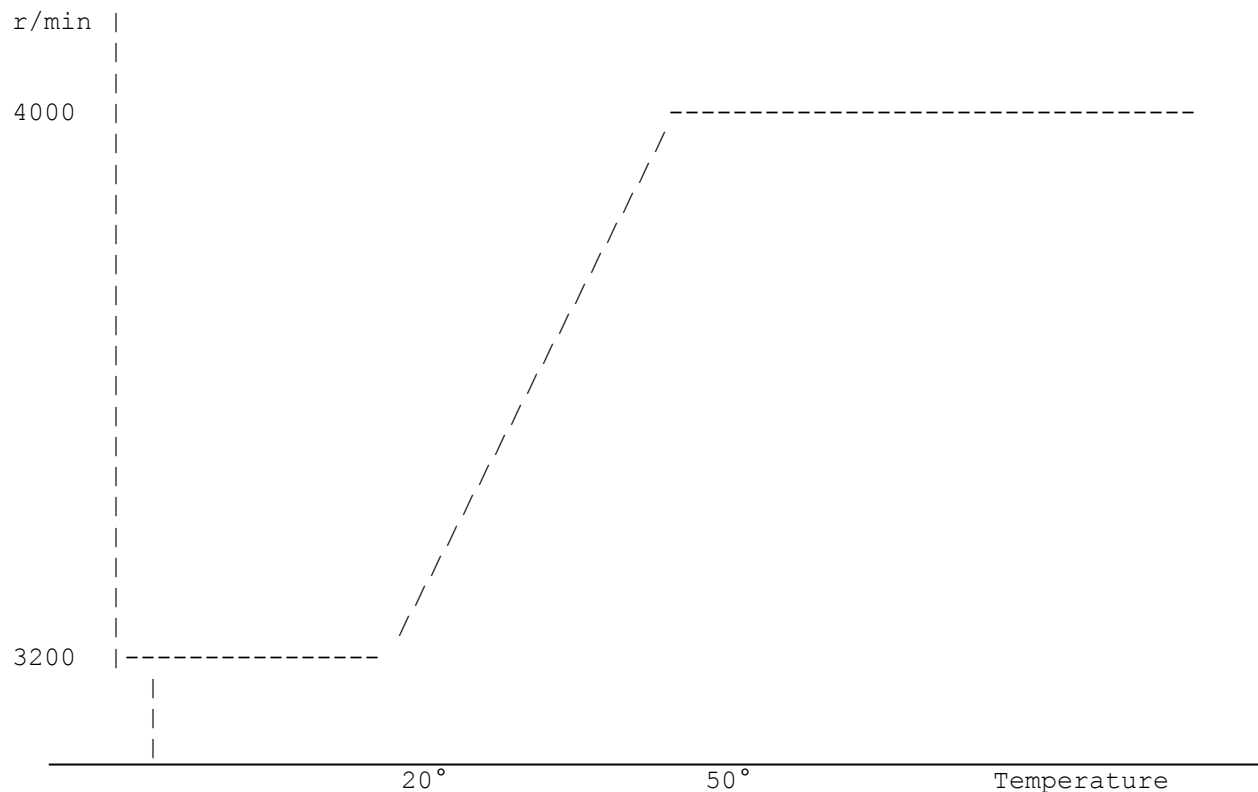
The fan speed is defined relatively. 100 means the fan is at full speed. At 0 there is no fan rotation. At 80 there is 80 % of the nominal speed reached.

Example:

Normal fan speed 4000 rotations/ min

80 % is   3200 rotations/min

There is a diagram for that example

```
r/min |
      |
      |
4000  |                                    --------------------------------
      |                                  /
      |                                 /
      |                                /
      |                               /
      |                              /
      |                             /
      |                            /
      |                           /
      |                          /
      |                         /
      |                        /
      |                       /
      |                      /
      |                     /
      |                    /
      |                   /
3200  |-----------------/
      |    |
      |    |
      |    |
      |_____
                   20°                  50°                    Temperature
```

This is the diagram for the fan speed over the temperature with the following values:

lower limit 20° and 3200 rotations / minute

upper limit 50° and 4000 rotations /minute.

If you have chosen Fahrenheit as measuring unit than 20 means 20 Fahrenheit and 50 means 50 Fahrenheit. The values are calculated to Celsius internally.

Temperature controlled program start

Cooling Mode

You can switch the cooling on and off with this display

Additionally you can do forced cooling when one of the sensors is above a certain level. It will raise the priority of the cooling task and will slow down the systems performance dramatically. So choose a high level which is slightly below the limits of the CPU. It is wise to let CPUCooL alert you by sound so you know the situation. You will hear three sounds out of the main computer speaker. Forced cooling will be switched on till the temperature is 2° Celsius or 4 Fahrenheit below the switch on temperature.
Alternatively you can shutdown Windows. A message box is displayed before the actual shutdown takes place.
Alternatively you can reduce the speed of the FrontSideBus. So the CPU will reduce the clock frequency and produce less heat. It will than be cooler.

You can also switch off the cooling function while playing a game. If the load is above a certain level for a longer time, CPUCooL can switch off the cooling function. It will be switched on immediately after the load goes below this level.

CPUCooL Cooling Mode

Under many operating systems like Windows NT and Linux the CPU issues a HALT operation when there is nothing to do. That enables the built-in CPU function to reduce the power consumption, which keeps the CPU cool and saves money. If you overclock the CPU it is advisable to use a cooling program because the   CPU gets hotter then specified.
Unfortunately there is no HALT operation under Windows 95 / 98. The CPU permanently checks whether there is something to do or not. Many other programs like CPUCooL put in a task at low priority which issues a HALT instruction. But it costs time to make the new program run. You can see these programs work with the Microsoft WinTop Monitor. It shows 100 % activity although there is nothing to be done by the CPU.
CPUCooL has an other technique to solve this problem. Look at WinTop and you will see the difference. Wintop shows the normal idle time as before. CPUCooL integrates the HALT operation directly into Windows 95 / 98.
The other advantage is that you can only **switch off**   this cooling function by CPUCooL. There is no other way. Even if CPUCooL is terminated the cooling function is still active!
For Windows NT/2000 systems the cooling is implemented as well. In several systems you can reduce the CPU temperature also, especially if there are   huge amounts of background activity.

Temperature controlled FSB setting

Temperature controlled forced cooling

Temperature controlled Cooling

Configurable Options

Configure Main Display

Configuration Functions

Configuration of Display

Temperature Choise

Here you could choose the temperature sensor.

Buttons and Fields

The main menu of CPUCooL is divided into two parts, the right and the left part. The left part is for testing the PLL's and the right part is for setting up the frequencies CPUCooL could set.

Left Part

Mainboard Manufacturer / Mainboard type
This selection is for a quick access to the PLL's. If there is a user of that mainboard, who has mailed the mainboard / PLL combination to me before, the mainboard is added to a list. So the next user with the same mainboard must not have a look at the mainboard to find the PLL. It is only a **preselection**. If there is another PLL on your mainboard, please select the PLL found. This would overwrite any mainboard selection.
To change the mainboard manufacturer click on the right field with the arrow. Then more mainboard manufactures are visable.

PLL manufacturer / Mainboard type
Here you could select the PLL of your mainboard. This is done by the arrows at the left side. If your PLL manufacturer is ICWorks have a look at the cypress menu item, as cypress has bought ICWorks. For details how to find the PLL have a look at the <u>PLL section</u>.

Frequency to set
Here you could select the desired frequency. Only the frequencies shown are available.

Get frequency
With this button you could read out the PLL (if it is a read/write PLL). If not a message is displayed. This is normal for write only PLL's. Mostly the answer is wrong in the frist time, because the PLL must be set once to answer correctely.

Set frequency
You could set the new frequency with this button. **It is on your own risk!** Have a look at the <u>Trouble Shooting</u> section to see what you could do if it fails. And have a look at the <u>Working with CPUCooL</u> section to see the preparations and hints.

Actual frequency
Here is the actual frequency displayed. It has a tolerance of 0.5 %. It is only updated it you press the get / set frequeny or the Get PLL button. It is not updated periodically.

Multiplier
The multiplier is displayed correctly only for the AMD processors, as the multiplier id for intel processors is not implemented yet. The multiplier is set for intel processors when you have set one frequency. I will try to implement the intel multiplier soon.

PLL output string
Here you could see the current PLL settings. Only for read / write PLL's. You must press the Get PLL button to get the results. On some write only PLL's the computer might crash. Have a look at the <u>trouble shooting</u> section for help

Right Part

Tray frequencies

Here you could select the frequencies to be displayed when you click on the tray symbol with the right mouse button. Up to four different frequencies could be selected. Please use one frequency for the standard frequency to have a reference if there is an error condition.

Set FSB on next CPUCooL start

Here you could select the frequency that is selected after CPUCooL is started. It is for both, start in the autostart foulder and start via start menu. Please do not select the highest frequency possible in this item. The CPU may alter...

Set frequency at shutdown

If windows is shut down this frequency is set. It is for both shutdown to DOS mode and complete shutdown.

FAQ /FSB related

My computer has a Winbond W83977 EF PLL. Is this supported?

No, this IC would never be supported as it is not a PLL but a floppy / peripherials controller. Have a look at <u>PLL</u> section to find the correct PLL

CPUCooL has detected the 9148-04 PLL. This is not going.

There is not build in PLL detection in CPUFSB. The PLL above is the first PLL I have added to the list. There is no way to detect PLL's but having a look at the <u>PLL</u> page.

CPUCooL only gives the error message "Your PLL is a write only PLL ...".

This is a normal message, no error. There are some PLL's you could only write to. The PLL manufacturer does not implement the read back functionality to save money. But what do you want? Mainly you want to set the new frequency and that should go without any further error, as this is a write operation to the PLL.

I only find the W211*H* PLL on my mainboard. It is supported?

Yes, I drop the last letter, as this is only tha packaging info. So W211 would be the   PLL you desire. **That is not only for the W211 but for all PLL's!**

But there is only a W211 A and W211 B in your list?

The W211 is a write only PLL. So I could not detect the state of one output. That may vary from mainboard to mainboard. So I implemented two PLL's for one device. You have to check out, which PLL is going. Mostly that output is not used. So both PLL's are working.

My PLL is from IC Works. Is it not listed?

IC Works was bought by cypress. I have put all PLL's into the cypress section.

PLL's

PLL's are the devices that create the CPU frequeny. PLL stands for Phase Locked Loop.
Here is an example:

Where do I find these PLL's??

Mostly it is near by a crystal which has the frequency of 14.3... MHz. Look at you mainboard and you will find a silver part that is about 1 cm long (it looks like a metal stick) and has the numbers 14.318 on top of the case. Nearby this crystal there is the PLL (Phase Locked Loop) that generates all frequencies of the mainboard. There are only six manufacturers of PLL IC's:

CMedia

Cypress

IC Works

ICS

IMI

Pericom

PLL

Winbond

If you have found the IC you may see some parts of the graphics above on the top of the IC. Then you coose the manufacturer, and all PLL's of that manufacturer are displayed here. If your numbers match this means you have chosen the correct PLL.

It is dangerous to change this frequency. It will be done at your own risk!

You can choose that PLL. Then it is advisable to take the frontbusspeed you have switched with jumpers and set this frequency first. If you succeed, you can try other frequencies as well. If you fail, you computer has to be powered off to recover. After some tries you will find the frequencies your hardware will work with.

Sometimes there are two or more versions of the same PLL listed with the same name but with   an ' A' or ' B' next to it. This is for write only PLL's. They could not be read out before setting the frequency. So since it was necessary to suggest the contents of the PLL I switched on every output. Also on some PLL's I was not sure whether the frequency was 24 MHz or 48 MHz. or if the spectrum of the PLL was switched on or not, so I had to program different versions to choose from.

You can easily switch the frequencies by clicking on the tray symbol. If you have defined some values for the tray it is easy to switch the frequencies without entering the main dialog. It is better to take only tested frequencies for the

tray display

The actual frequency is shown in a small box. It is not very accurate (about .5%). But it will change if you are successful with changing the frequency.

You can read out the parameters of some read/write PLL's. That is good for finding the values programmed in that PLL. Send me these values and you will get a version of CPUCooL in return that has the unknown PLL. If you have a write only PLL on the mainboard, your computer could crash.

There is a list of implemented PLL's in the internet. And there is a table with mainboards and PLL's as well. Check if you find your mainboard there. If will speed up the process of finding the correct PLL.
Please give me an e-mail with your mainboard and your PLL and I will add it as soon as possible.

SMBUS

The SMBUS is a system bus, developed by intel. It connects with a speed of up to 100 KBit/sec all devices that are connected to this bus. It is a two (three) wire connection, mostly compatible to the i2c bus.
Devices that are connected are mostly
- SPD of SDRAM
- PLL
- Hardware monitors for temperature, voltage and fan speed
- LCD Displays
- Akku voltage monitors
- Notebook control

Trouble shooting

PLEASE READ IT BEFORE STATING!!!

If Windows starts it executes CPUCooL, and it hangs.
 Please boot Windows in the secure mode. Run RESET.EXE once, that comes with the package, and then you could boot it in the normal way again. RESET.EXE clears all entries of CPUCooL out of the registry. So the startup frequency and the other settings are lost. You can now adjust it as you like.

My computer hangs?!?
Please unplug the computer. Mostly the frequency was too high. If you press the reset button, mostly the frequency stays as it is, too high for the CPU. In most cases the frequency is not set by BIOS. If you unplug it, there is a total reset and the PLL is initialized by the power on signal.

Working with CPUCooL /FSB Menu

The most difficult and first thing is to find out the <u>PLL</u>. There are some details for finding it in the link.

Alternatively you can use the mainboard selection for finding out the PLL. The problem is that the mainboard manufactures sometimes change the PLL while producing the mainboards without notice. So it is the best to have a look at the mainboard.

Any PLL selection will overwrite the mainboard preselection!!!

If you have found the PLL, please make a backup of your system. Norton Ghost and Drive Image are good tools for that. Or use an extra small partition of your harddisk and install another version of Windows.

It is dangerous to change this frequency. It will be done at your own risk!

After selecting the PLL either via mainboard preselection or direct input please first try to set the current system <u>Front Side Bus</u>speed. If the system crashes, the might be a bug or a wrong PLL definition in CPUFSB. If you succeed you can increase the FSB speed, till the computer crashes. **Keep a watching eye on the CPU temperature.**

If the computer has crashed, please switch off the power supply. Nothing else would help. On ATX systems you could not use the normal power switch as it is only a switch to the mainboard. Please use the switch in the power supply or unplug   the computer.

If you have problems, please read the <u>FAQ</u> section first.

After all you should select some frequencies for the<u>RightDisplay</u>. You could activate it by clicking with the right mouse button on the tray icon of CPUFSB.

If you have found a new mainboard / pll combination please give me an e-mail so I can add that combination for other users.