

# DOCUMENTATION FOR CCS64 V1.09 SHAREWARE

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This version is shareware.

## **DISCLAIMER**

The installation and use of this product is done completely under your own responsibility. Under no circumstances should the producers of this product be held responsible for any damages or costs, that this product in any way could cause you or your equipment.

## **INTRODUCTION**

Welcome to the world of CCS64. This a software emulator for the Commodore 64 computer. You may say this is not the first program trying to emulate the C64. But this is planned to be the finale C64 emulator. I have worked in several years with this product, studying the C64 into its innermost secrets. This shareware version should run perfectly with all games or demos, even those using the 1541 disk drive.

## **REGISTRATION**

As this is SHAREWARE, if you like and use this program you are supposed to register it. Of course you then will get a registered version of this program with additional features and bonuses. At the moment the register fee is 30 USD, or equal amount in GBP, DEM or SEK. Credit cards or CHEQUES can NOT be used. Please consult your local post office or bank for proper ways of sending money to Sweden.

To register you send a international postal money order or cash money, together with your name, address and/or e-mail to:

Per Håkan Sundell  
Sundell Consulting  
Nygatan 5A IV  
S-231 43 TRELLEBORG  
SWEDEN

Or you can transfer the money directly to my bank account. Please pay via Eurogiro or SWIFT to our (Sundell Consulting) account number 607 85 52-4 with Postgirot Bank AB (publ) S-105 06 Stockholm, Sweden. SWIFT address: PGSI SESS

Note that registered users are entitled to unlimited number of updates of CCS64 without any further costs. The product will be continuously updated as long as there is any features or bugs to be fixed. This means that you could safely register now, even if some special feature is not ready yet, as you will not miss the update when that special feature is ready.

## SYSTEM REQUIREMENTS

Minimum requirements:

- Pentium processor or equal.
- 8 Mb of internal memory.
- VGA graphics.
  - DOS 5.0 or later.

Additional support:

- Soundblaster 8/16 or compatibles.
- Gravis Ultrasound.
  - Windows 95.

## INFORMATION

The emulation of the C64 computer supports:

- 99.9% 6510 CPU. All imaginable programs should work. The emulation of CPU is cycle exact and considers all strange side-effects.
- 99.9% 6567 VIC - PAL. All imaginable graphics modes and effect should work. The emulation of VIC is pixel exact and considers all strange effects, both known and unknown, as it emulates the inner workings of the VIC chip.
- 6581 SID. Nearly 100% except for filters. The emulation of SID is cycle exact and constructs fully synthetic samples in 8 or 16 bits resolution.
- 99.9% 6526 CIAS. All features of the I/O circuits. The emulation of CIA is cycle exact.
- 99% Commodore 1541 Diskdrive. The emulation of 1541 is cycle exact.
  - C64 Keyboard. All keys including Restore.

To make it easier to use the program supports:

- Graphics output for VGA in resolutions 384x282,384x246,368x240 and 320x200.
- Sound output for Soundblaster or Ultrasound in quality up to the maximum the soundcard manages (45454 Hz in 16 bit).
- 'Reset and Load' of one-parted programs in .PRG or .T64 file formats.
- Screen snap-shot, saves an image of the whole current C64 screen (504x312 pixels).
- Joystick emulation, both with keys and real PC joysticks.
- Options menu.
- True tape emulation including turbotape and tape images (use originals on tape). Sorry but for the true tape images, I am the only one able to create them, as I use special hardware and program on my AMIGA computer.
- Freeze function, to save or restore the status of the emulator. This feature is under development so use with care...
- Machine code monitor. This feature is under development so use with care...

The registered version of the program will in near future (or already does) support:

- Ability to actually save the currently used .D64 file that is used for 1541 emulation. This enables you to save hiscores etc. from games that saves data to the 1541 diskdrive. ***This feature is ready***
- Create empty .D64 files. ***This feature is ready***
- Better options menu.
- Making wave-files from C64 music. ***This feature is ready***
- Cartridge support.
- Speed control. ***This feature is ready***
- Support for different file formats like LYNX and extended 1541.
- Memory expansion unit REU 1750 (16Mb).
- Commodore 1351 Mouse emulation.

The registered version is on the working stage and will be ready as fast as users register. Thus, more support from you gives better program.

## INSTRUCTIONS

To start the program from Windows, just double-click the C64 (CCS64\_95.BAT) icon. If you want to run from DOS, change to correct directory and type CCS64. If you have any problems with running the program from Windows, then reboot and run the program from DOS instead.

To change the program preferences either use the program menu by pressing the key F9 from the program, or edit the C64.CFG file:

If you have any problems with the settings and want the factory default settings back, just delete C64.CFG file and it will be restored next time you run CCS64.

### SCREENMODE=

- 1 - 320 horizontal pixels and 200 vertical lines Chained mode in 70 Hz.
- 2 - 368 horizontal pixels and 240 vertical lines Planar mode in 60 Hz.
- 3 - 384 horizontal pixels and 246 vertical lines Planar mode in 60 Hz.
- 4 - 384 horizontal pixels and 282 vertical lines Planar mode in 50 Hz.
- 5 - 384 horizontal pixels and 282 vertical lines Planar mode with Scanlines in 60 Hz.

Note that the PAL Television standard is most like mode 4. If you change to a mode that doesn't work (or look nice) on your equipment, immediately (this is VERY important, or your equipment can be damaged) quit the CCS64 program by pressing PAUSE or shut of the computer.

### SOUNDENABLE=

- YES - On.
- NO - Off.

### SAMPLEFREQ=

- 11111,22222,45454 etc. recommended on Soundblaster.
- 11025,22050,44100 etc. recommended on Ultrasound.
- any other value (ex. 17923) if your soundcard can manage it.

SAMPLEBITS=

16 - Tries to use 16 bits samples, otherwise uses 8.

8 - 8 bits samples.

LOADPATH=

the path where you have your C64 games and demos.

RGBCOLOR0=

RGBCOLOR1=

...

RGBCOLOR15=

the RGB color values that should be used for emulating the C64 colors.

To use PC joysticks you don't have to calibrate, just plug it in anytime. If you still have problems you have the possibility to calibrate in the menu.

The keyboard is emulated almost like a real C64 keyboard except for these keys:

PAUSE	= Exit CCS64.
F9	= Options menu.
F10	= Captures the interlaced screen as an image in 256 colors (ccs??.bmp).
F11	= Restores a frozen emulator state.
F12	= Freezes (saves) the emulator state.
Print Screen	= Captures the screen as an image (ccs??.bmp).
Scroll Lock	= Reinitialize screen mode. Sometime Windows manages to distort colors when switching between programs.
Left CTRL	= Commodore.
Escape	= Run/Stop.
Delete	= Arrow Up.
Insert	= Pound.
Home	= Clr/Home.
Page Up	= RESTORE. Observe that you must HIT this key

like on a real C64! Hitting means holding down key for a very short moment.

The default joystick emulation in keys is as follows:

C64 Joystick Port 1 -

Fire - Right ALT (ALT GR)

Up - Keypad %

Down - Keypad 5

Left - Keypad 7

Right - Keypad 9

C64 Joystick Port 2 -

Fire - Right CTRL

Up - Keypad 8

Down - Keypad 2

Left - Keypad 4

Right - Keypad 6

To use the Options menu press F9 and then use the cursor keys to select. Use cursor right, space or enter to enter a choice. Use cursor left to go back to the previous menu from a submenu. Use cursor up or down to change selection. In a directory listing you could also use PageUp or PageDown to scroll faster through the selections.

The MENU is organized as follows:

CONTINUE - Go back to C64 mode.

LOAD PROGRAM - Load a C64 program file, select a .D64 disk image or start a Tape emulation session.

RESET C64 (HARD) - Reset the C64, as it would be turned off and on again.

RESET C64 (SOFT) - Reset the C64, as you would have a reset button.

CCSMON ON/OFF - Enable or disable the CCS-MON ROM cartridge emulation.

OPTIONS - A submenu of special options and features.

QUIT - Quits the CCS64 emulator.

The submenu OPTIONS is organized as follows:

SCREENMODE - A submenu where you could select a different resolution.

JOYSTICK - A submenu where you could select from different possible joystick emulation combinations (real joystick and/or keyboard).

JOYSTICK CALIBRATION - A submenu where you could calibrate your joystick for use with CCS64. Useful if you have problems with your PC joystick like not responding to movement or going in the wrong direction.

C1541 ON/OFF - Enable or disable the Commodore 1541 diskdrive emulation. Useful for some games that don't allow the C64 computer to be connected to a 1541 diskdrive.

SAVE CURRENT DISK - As the 1541 diskdrive emulation don't save directly to the PC filesystem when you save something to device 8 from the C64 mode, you have to force saving to PC with this selection. In this way you could decide not to save for example hiscores or a adventure game state which you don't like.

SPEED 100% - This selection will allow you to change the maximum speed which CCS64 will run in, compared to a real C64. To change the value, select this selection and then use cursor left or right to increase or decrease the value. When your satisfied, press cursor up or down.

CREATE EMPTY DISK - This will create a new .D64 fileimage in the current directory as the CCS64 package lies in. Nice if you're writing a program and want to save it. Just select this option, and go back to C64 mode and type SAVE "PROGRAMNAME",8 .

SOUND SAMPLING START/STOP - This will create a new .WAV file in the current directory as the CCS64 package lies in. After starting of this feature, all sound output from the C64 will be saved to this file continuously. Note that this file will increase in size very quickly, and should therefore be used with care so you won't run out of diskpace.

To actually start a program after 'Reset and Load' you have to type RUN and pressing Enter. This is because 'Reset and Load' only loads the program into C64's memory banks.

To change 1541 disk just select the .D64 file and enter its directory. Note that you should not select 'Reset and Load', just press Escape to exit the menu.

Note that when your sampling the C64's audio output to a .WAV file, the sample rate and bit resolution will be the same as selected in the C64.CFG file.

Note that on a German keyboard, the keys Y and Z will have changed place when using under CCS64.

## KNOWN PROBLEMS

Sometimes special games on .D64 images will behave badly when you use the 'Reset and Load' feature. To solve this problems do like this. 1). Reset the C64. 2). Enter menu and select the correct .D64 and enter its contents listing, but do not select a filename when the contents shows up, just go back to the main menu and select Continue. 3). From the BASIC type: LOAD"\*,8,1

If you do not have a CD-ROM in your CD drive or a disk in your diskdrive, the emulator will hang up if you select this device in the menu. So please, always be sure that you have a initialized (sometimes you have to wait some seconds after instering it) CD-ROM in your CD-drive before trying to use the CD device from the menu.

The option load as Turbo tape should only be used when you get a message like "PRESS PLAY ON TAPE" on your C64-screen, and you're shure about that the second part should be loaded as turbo tape. Otherwise nothing useful will happen.

Note that when you use 'Reset and Load' from the menu, the program will not be started directly, just loaded into memory. Please type RUN to actually start the program afterwards.

Some programs are made for the American version of C64 that supports the American TV system NTSC. As CCS64 only emulates the European C64 version that uses TV system PAL, those NTSC programs could behave badly with the emulator, just as they would on a real C64 PAL system.

Using the emulator under Windows with old and outdated sound drivers can sometimes cause the system to hang, or getting no sound at all. In these cases, run in DOS if possible.

## NOTES

The C64 roms is under copyright (C) by Commodore Business Machines. If you don't want these original roms you could replace the files KERNAL.ROM, BASIC.ROM and CHAR.ROM.

## CONTACT ADDRESS

If you have any emulation problems or suggestions, that don't concern SID filters or NTSC, please contact me. Note that I get a lot of e-mail, so perhaps don't count on that I will reply to it. But of course I will read it. I will not reply to questions where the answer can be found in this documentation.

E-mail: Hakan.Sundell@xpress.se

CCS64 homepage: <http://www.fatal-design.com/ccs64>

Newsgroup: comp.emulators.cbm

Note that these addresses can change within near future, and when so have happened you most certainly can find my new addresses by searching the Internet.

## CCS-MON

CCS-MON is a machine code monitor made for the C64 on a cartridge. CCS64 support emulation of this cartridge. You should mainly use this cartridge when you want to look or enter something in a c64 program. It also includes a disk turbo, turbo tape and some other utilities.

Here is a list of the commands used in CCS-MON. The <xxxx>, <yyyy> etceteras means a memory address location in hexadecimal notation. Things in [] are optional and do not have to be given.

A <xxxx> <mnemonic> - Assemble machine code at address xxxx.  
B <xxxx> - Set Breakpoint (see Q,W commands) at xxxx.  
C <xxxx> <yyyy> <zzzz> - Compare the memory contents between addresses  
xxxx to yyyy with the contents at zzzz

and on.

If there are any differences these will

be shown

D <xxxx> [<yyyy>] - Disassemble the machine code instruction at  
xxxx, and optional each succeeding

lines until

yyyy.

E - Installs extended interrupt handlers at RAM  
addresses FFE0-FFFF, so that tracing at

normally

hidden RAM is possible.

F <xxxx> <yyyy> <zz> - Fills the memory at xxxx to yyyy with the  
byte zz.

G [<xxxx>] - Executes the machine code at the current PC  
(see R command) or optional at adress

xxxx.

H <xxxx> <yyyy> <zz> ... - Hunts the memory at xxxx to yyyy for the  
occurrences of the byte sequence of one

or more

bytes.

I <xxxx> [<yyyy>] - Interpret the memory at xxxx to yyyy as  
ASCII text.

L "filename" <zz> [<xxxx>] - Loads a file from device zz into memory xxxx  
or default address.

M <xxxx> [<yyyy>] - Shows the memory contents at xxxx to yyyy.  
 O "command" - Output a command to the 1541 diskdrive.  
 Q [<xxxx>] - Quicktraces the machine code at the current  
 PC (see R command) or optional at  
 address xxxx.  
 R - Show the contents of the internal register  
 of the 6510 cpu.  
 S "filename" <zz> <xxxx> <yyyy>  
 - Saves a file from memory xxxx to  
 yyyy, to  
 device zz.  
 T <xxxx> <yyyy> <zzzz> - Copies the memory contents of xxxx to yyyy,  
 to zzzz and on.  
 W [<xxxx>] - Traces the machine code at the current  
 PC (see R command) or optional at  
 address xxxx.  
 X - Exit and enter BASIC.  
 XC - Exit and enter initialized BASIC.  
 XZ - Exit and enter initialized BASIC and screen.  
 @ - Shows the status of the 1541 diskdrive.  
 \* - Changes the contents of the 6510 memory bank  
 register to allow access to special RAM  
 areas.

The following keys have special meanings in CCS-MON.

F1 - Show the directory contents of the current  
 inserted 1541 disk.  
 F3 - Alternative color set.  
 F5 - Used with F1 to load the filename on the  
 current line.  
 F8 - Clears all RAM at adressen 0800-FFFF.

The following keys have special meanings in CCS-MON when you do RESET and are holding down these.

Space - Copies the memory at addresses at 0000-07FF  
 to the RAM at D000-D7FF.

The following keys have special meanings in CCS-MON when you do RESET or hitting RESTORE and are holding down these.

Commodore - The same as the XZ command.

## TURBO TAPE

Some programs in two or more parts in a .T64 archive uses Turbo Tape to load the second Part. When the C64 shows a message on the screen like 'Press play on tape' you should enter



the Menu and select the second (or another) filename in the archive and select 'Load as Turbo Tape'. Thereafter CCS64 will behave like you would have a cassette player connected to your C64.

## **TIPS AND TRICKS**

As the CCS-MON has built in 1541 disk-turbo, you could speed up the loading time on some games. Just enable CCS-MON and Reset the C64 while holding down the commodore key. Thereafter you select the correct .D64 images, and the load the correct files with the BASIC load command, just like on a real C64.

If you have some problems with the configuration of CCS64, and want to go back to the default settings, just delete the C64.CFG file.

## **FILENAMES**

When you use the Screen-Shot function, the image will be saved as CCS0.BMP or CCS1.BMP, CCS2.BMP and so on.

When you create a new empty .D64 file, the image will be saved as CCS0.D64 or CCS1.D64, CCS2.D64 and so on.

When you uses sound sampling the audio file will be saved as CCS0.WAV or CCS1.WAV, CCS2.WAV and so on.

## **OTHER OPERATING SYSTEMS**

I am currently working on a version of CCS64 for Windows95/NT with DirectX. Registered users of CCS64 can get the current BETA version from me by e-mail.

Marko Mäkelä has ported CCS64 to LINUX and some other UNIX systems. Look at <http://www.funet.fi/pub/cbm> for more information.