FLASH 8

the ultimative accelerator for your C64

The hardware

Because we try to describe the **Flash 8** system as exact as possible, the following explanations are really technical, because other hard- and software developer will use the **Flash 8** in the best optimum conditions as possible.

Jumper settings

At the PCB are placed 3 lines of pairs of pin sticks, with short connectors (jumper) at that sticks are many different settings possible:

J1 An ABORT (a special Interrupt of the 65816-CPU) will be initiated with this jumper, if an access at the I/O 1 (connection 1-2) or I/O 2 (connection 2-3) take place. At this possibility programmer, they like to realize special applications (e.g. control programs) with the C64, a very simple form interrupt depending real-time control applications may be build up.

J2 To guarantee the highest possible compatibility of the **Flash 8** to the different C64, the timing of the accelerator will be still variable. At the default setting the pin 1 will be connected to pin2. In case of any disturbance, or the C64 will not start up, remove the jumper and close pin 2 to pin 3. In this case the clock of the **Flash 8** rises up 3 - 5 ns earlier.

With the potentiometer, at the left side of the DIP4 switch, also you will be manipulating the timing of phi 2. However we tested C64 Computer, at no case a changing would be necessary.

J3 If you use 256 Kbyte RAM memories (2x 514256 zip-rams; possible lower then 60 ns access time) you connect pin 1 to pin 2.

If you use 1 Mbyte (2x 514400-60 zip) RAM memories chips (possible lower then 60 ns access time) you connect pin 2 to pin 3.

You should insert the corresponding RAM chips in that way, that the letters of the chips are looking at the end of the **Flash 8** PCB.

Settings of the dip switches

A DIP-4 switch is located directly at the right side of the potentiometer at the PCB. The meaning of the 4 DIP switches is the following:

DIP1 If this switch will be closed, the speed of the **Flash 8** will be controlled by software. The working speed of 8 MHz or 1 MHz will set depending by the bit 7 of the byte at the address 1.

Bit 7 = "1" will be 1 MHz and bit 7 = "0" will be 8 MHz.

Switch to 1 MHz working speed:
from BASIC: POKE1,PEEK(1)OR128
from assembler: LDA $01;ORA #$80;STA $01

Switch to 8 MHz working speed:
from BASIC: POKE1,PEEK(1)AND127
from assembler: LDA $01;AND #$7F,STA $01

With open switch the speed will be "compulsorily" at 1 MHz.

DIP2 If you have problems with some programs you may close this switch. In this case the zero page and the page 1 (stack) **in the C64 by himself** will be activated but the **Flash 8** will be about 10% slower.

At this reason please don't close this switch, even if it will be still possible.

DIP3 The commitments of the vectors (IRQ, NMI, RESET etc.) of the 65816-CPU will be set with this switch.

Switch off: (default setting) reading the commitments out of the actually operating-system-kernel at the time(address $E000-$FFFF)

Switch on: reading this data out of the block 5 of the EPROM.

	EPROM address	**name**	**CPU-address**
block 0 – 3	$0000 - $7FFF	XBANK	$1F : 0000 - $1F : 7FFF
block 4	$8000 - $9FFF	BASIC	$00 : A000 - $00 : BFFF
block 5	$AFF4 - $AFFF	VECTOR	$00 : FFF4 - $00 : FFFF
	$B000 - BFFF	CHAROM	$00 : D000 - $00 : DFFF
block 6	$C000 - $DFFF	KERNAL1	$00 : E000 - $00 : FFFF
block 7	$E000 - $FFFF	KERNAL2	$00 : E000 - $00 : FFFF

The 65816 will be a 16-bit-CPU similar as the 68000-CPU with 16 Mbyte address space. In this case the 4 number addresses will be not enough to define the exact address in the memory.
A 2 numbered prefix are coming up that define one of the possible 256 memory segments of 64 Kbyte.
If you like to burn a new EPROM for the **Flash 8**, please use a 64k-EPROM 27C512 with an access time of 75 ns.

DIP4 With this switch, in the range of delivery, you decide for one of the 2 operating systems, located in the EPROM of the **Flash 8**.

At the switch will be:
open: the original operation system of the C64 for the highest compatibility will be provided, while only the I/O routines for the **Flash 8** will be adapted. In the description of the software, you will find a documentation of that changes that take place.

closed: the TurboTrans-operating system with the parallel speeder over the userport (compatible to TurboAccess and Speed-Dos) and useful utilities will be activated.

At the board of the **Flash 8** will be also a LED showing the status of the board speed. Bit 7 of address 1 will be set (1 MHz; LED off) or bit 7 will be still not set = “0” (8 MHz if DIP1 at ON ; LED on)
In the middle of the board you see a pushbutton to initiate an RESET. At the right side behind the board you have the possibility to connect an additional pushbottom to release an ABORT. For this reason, we will like to offer in the future an “ absolute freezer “.

For all the people, who would like to program our **Flash 8** in machine language, we recommend our **Flash 8** adapted assembler (49 DM) and the book **PROGRAMMING THE 65816** (Prentice Hall Press; c. 600 pages; ISBN 0-89303-789-3) from David Eyes and Ron Lichty. With own programs please don’t use the ram area under the I/O region $D000-$DFFF for the video controller (as colour or graphic ram) because the video controller in relation of the **Flash 8** cant access at this ram area.

If you have possible problems with programs, that include an own speeder, you may switch the **Flash 8** for the loading time to 1 MHz.

Flash 8 will not work with the first C64, because the VIC inside 6569R1 will produce a timing that will be faulty.

The operating system software

Inside the range of delivery of the **Flash 8** there will be 2 operating systems for the C64. In case the DIP-switch 4 is being open, the original kernel will be activated. In case the DIP-switch 4 is closed the TurboTrans operating system will be activated.

The C64-kernel

The serial IEC-bus, among others despite of 8 MHz clock, must function. Besides the changing of the initial screen report, the following changes in the operation system have taken:

In case **Flash 8** after a reset shall switch directly to 8 MHz:

```
FDD5  A9 37      LDA  #$37
FDD7  85 01      STA  $01
```

In case of switching back automatically to 1 MHz while using the IEC-bus routines, these routines must be change:

```
ED24  20 B7 E4   JSR  E4B7
ED3A  20 B7 E4   JSR  E4B7
ED41  20 B7 E4   JSR  E4B7
EE2A  20 B7 E4   JSR  E4B7

E4B7  48         PHA
E4B8  A5 01      LDA  $01
E4BA  05 80      ORA  #$80
E4BC  85 01      STA  $01
E4BE  68         PLA
E4BF  4C 97 EE   JMP  EE97
```

At the end of the data transfer the **Flash 8**, in fact of the IEC-bus UNLISTEN-routine, shall switch back to 8 MHz:

```
EE10  4C C2 E4   JMP  E4C2

E4C2  48         PHA
E4C3  A5 01      LDA  $01
E4C5  29 7F      AND  #$7F
E4C7  D0 F3      BNE  E4BC
```

The TurboTrans-operating system

If the DIP switch 4 is closed, the TurboTrans-operating system including the following features will be activated:

The disc I/O routines will test the parallel data transfer across the userport may be possible to load the data 10 times quickly. If there may be no special cable and disc operating system installed, the loading and saving of data realised like before across the serial IEC-bus. Even you use the parallel data transfer, the serial port of the C64 **must be** connected with the Floppy.

Further functions may be called and initiated together with the CTRL-key and a hotkey (pressed at the same time).

CTRL D	directory	the directory of the disc will be shown at the screen with out loosing the program
CTRL L	loading	the BASIC program in the actual cursor line will load absolutely at the address $0801. TurboTrans announces the start and the end address and display RUN: to start the program, so that you only press RETURN to start the program.
CTRL ,	loading	function like CTRL L, only the loading will be relative like (LOAD”name”,8,1)
CTRL O	open	produce an OPEN1,8,15,”S:name”, so that the program in the actual cursor line may be deleted while pressing RETURN. If you use the CTRL O not inside the directory Turbo-Trans close the open floppy channel and open again with OPEN1,8,15”, to send in this case commands in a simple case to the floppy.
CTRL /		reading the error channel of the Floppy and print this information at the screen
CTRL P	print	produces a low-res hardcopy of the screen at a connected printer

CTRL @	may switch the internal floppy addresses between 8, 9, 10 and 11 to handle also other drives comfortably with the shortcuts like CTRL and hotkey.
CTRL *	this BASIC-renew will generate the lost BASIC-pointer after a reset or NEW at the state before.
CTRL +	switch the Flash 8 in software mode between 8 MHz (FAST) or 1 MHz (SLOW) to the other state.
CTRL TAB	the cursor jumps 5 lines down
CTRL B bottom	the cursor jumps at the left end of the line 25
SHIFT RUN/STOP	loaded and started the first program from the disc

Extended RESET-routine of the TurboTrans-operation system

Pressing the CTRL-key while pushing the RESET the possible auto start-programs in the memory will be ignored (BYPASS).

Pressing the SHIFT-key while pushing the RESET you reach a monitor with following functions:

m	<address>	produce a hex dump
s	“name”,<start address>,<end address> +1	save the marked ram area
l	“name”,<address>	load the defined program at the declared address

If you program more often in BASIC you may appreciate the auto increment function in steps of 10 numbers.

If you like to leave this modus you press SHIFT RETURN.

The Software

Inside the range of delivery there are 2 double sided saved discs with the following listed programs:

CP/M-Emulator

At the emulation of the CP/M operating system, the **Flash 8** with the clock of 8 MHz, will speed up at that way it may be not slower then a hardware CP/M printed circuit board (pcb).

Turbo-Access 1541 II

This disc operating system (DOS) covers all necessary parallel transfer routines. If you burn this system in a 16 Kbyte EPROM and change it against the DOS chip of the 1541 II you may across a parallel cable, connected at the userport, increase your loading speed about 10 times. You may buy that cable incl. EPROM at Discount 2000 for a price of 39,00 DM.

Memtest.obj

This memory test program will be loaded with LOAD “MEMTEST.OBJ”,8,1 and started with SYS49152

Memtest.as

This is the source text of the memory test program in the AS64-format

Marcro65816

This is a total Overview of the macro library of the new commands and addressing possibilities in the NATIVE-mode of the CPU in AS64- format

ROSS-DOS – disc operating system

This operating system for the 1541 floppy will be provided with new commands:

NEW – format a disc; Syntax: N:name,ID,<tracks>

While indicating the tracks from 35 – 43 (664-800 blocks free) this command formatting the disc in 20 sec. You realize that the original 1541 may be always able to format the discs up to 41 tracks. The number of the tracks the DOS will be recognize automatically by him.

EXCHANGE – changing of the name/ID Syntax: E:name or E:name,ID

With this command it may be finally possible, also without a disc monitor program, to change the name and/or the ID. The allowance for the name may be up to 16 characters and the ID may be up to 5 characters.

LOCK – scratch protection of single files Syntax: L:filename

The lock command protected single files for unintentional deleting.
It's possible to use joker (*?). For example: OPEN1,8,15,"L:*"
Protected files will be marked in the directory as "<"

FREE – remove scratch protection Syntax: F:filename

Protected files will be released with the FREE command

HIDE – hide single files Syntax: H:filename

This command hides single files. You don't see that files in the directory, still you may load and starting that files.

APPEAR – cancel the hide function Syntax: A:filename

VERIFY – switch verify on or off Syntax: V+ or V- (V=validate)

Furthermore the moving of the read/write heads will be optimized and the start control while disc changing implemented. So called "killer tracks" will be recognized and quit with a "24 read error".

***GEOS* – PATCH** for *GEOS* up from version 2.0

To use *GEOS* with your **Flash 8** card, first you must reform one of your boot discs with this delivered program *GeoPatch.* To reform your disc you do the following steps:

1.) Start your *GEOS* normal, **the Flash 8** must set at 1 MHz (DIP 1 OFF)

2.) If you see the desktop, insert the disc with the program *GeoPatch* and start the *GeoPatch* program.

3.) Following the hints in the program and execute the commands exactly.

4.) If the program will be ended and the desktop coming again, switch the **Flash 8** card to 8 MHz (DIP 1 ON) and boot your *GEOS* once more.

5.) Now it's only necessary to decide the right input driver **COMM 1351(8)** as the standard driver, if you use a mouse, as well as to set new your individual drive-configuration.

6.) The tool ***calculator*** would also be changed for using with the **Flash 8** card. If you like to use that tool, you must replace all existing version of ***calculator*** with the delivered version.

If you created own boot discs with the program ***GeoMakeBoot*** you may start that discs not with 8 MHz but with 1 MHz (DIP 1 OFF). After the GEOS will be boot up its possible to switch back to 8 MHz.

With the program ***GeoUnpatch*** in step 1 to 6 written, patching may be reversed.

For sending a purchase receipt, you may also order at our company a JIFFY-DOS for your **Flash 8** System.

GEOS – Patch

1. Working with GEOS 64 V2.0/2.5

The Flash 8 works at 1 MHz with GEOS without any problems. But it's not possible to configure any ram, not a Commodore REU even GeoRam and also not the internal ram of the Flash 8 independent to 256 Kbyte or 1 Mbyte. Floppy 1581 and FD4000 will be accepted and are also possible to configure in Geos. At 8 MHz Geos will not boot and generate a reset. To operate Geos with 8 MHz it must be patched. The patch and the unpatch program (it will restore the original state) are part of the delivery. That programs work flawless at system discs (not at backup system discs that will be ignored at the patch program).

At the patch disc there is also a calculator for 8 MHz, the original calculator leads at 8 MHz to crash (hexcalc ect. running also at 8 MHz, but rather try it yourself). GeoRam system discs are also possible to patch, but not longer recognize the GeoRam. You can no longer put in the original condition; in this case take care. They have the behaviour like the 2.0 system discs. Creating bootable diskettes with GeoCopy or GeoMakeBoot is not very easy, but recommended urgently, to ensure that the original system disc can be restored (with GeoUnpatch) and backup of the boot disc can be created. Therefore, we highlight at it.

2. Build up a patchable system disc

Yes its possible, to copy a system disc. On the one hand there are the possibilities, using a parallel floppy connection to copy the system disc, on the other side there will be some programs, e.g. GeoMakeBoot, GeoCopy etc. The latter will be not patchable, because the length of the boot programs (GEOS, GEOBOOT and KERNAL) will be changed. We found only one possibility, but for that you need the 64er special issue 96 named your own. Who does not own, here is the address for ordering:

64er Magazin Leserservice D74710 Neckarsulm Tel.: 07132/969-185
1 booklet costs 16, 00 DM plus shipping costs (6, 00 DM) and you can pay on account.

So here are the instructions: (The Flash 8 has to stuck in the expansion port, but at 1 MHz.)

1. Format two floppies (or both sides of one disc) with the ID code LJ
2. Copy the system disc (with read-sticker) on both discs (with a copy program which doesn't format the disc again).
3. Start in Basic the program GEOSCONVERT 64 and follow the instructions. Then the GEOS program boot the new system disc (which was inserted as the first), the second renamed to backup system. The question of whether you already own an installed application must unconditionally be answered with JA. Then you put the application disc (backside of the system disc), and other program discs such as Geo-Publisher 64 in the drive and the new discs will have the same installation numbers of the original boot discs. The backup-system-disc should be renamed to system.
4. Place the patch diskette of Flash 8 in the drive and start the program GeoPatch.
5. Repeat the procedure of number 4 with second disc
6. Turn off the computer, set the Flash 8 to 8 MHz, and boot a trial basis with both new boot floppy.

3. Patching a system disc

It is possible to patch the original system discs as well as copies in parallel, also using the copies of the program GeoConvert 64. The Proceed as follows:

1. Start GEOS as usual with the Flash 8 card, the 1 MHz mode must be used (DIP 1 off).
2. After the Desktop has appeared, insert the diskette with the program GeoPatch and start it
3. Follow the instructions given in the program exactly; otherwise there is a danger that you destroy your Geos disc.

Figure 1

4. If the program has returned to the desktop, you still have to select the input driver COMM 1351 (8) as the default driver.
5. Now switch off your computer and if necessary revise the addresses of your drives. Then boot Geos back around to save your disc configuration to the boot disc.
6. Turn off the computer again, switch the Flash 8 to 1 MHz (DIP 1 on) and start Geos as usual. Replace the computer tools “calculator” on the discs with the supplied version you want to use with the Flash 8 card.

4. Boot discs with GeoCopy

Who doesn’t own or know this program, please note: It is available from each PD-dealer.

1. Boot Geos from the patched boot disc and then insert the GeoCopy floppy disc. Start the program GeoCopy 1.1 and follow the instructions of the program. After a few changes of the disc, the copy is ready.
   In different manuals, one must still use a basic program (in this case it would be G64.BAS). If you do that, the GeoCopy BootDisc for Flash 8 will not be bootable. So apply none of these basic programs!!!
   Now the desktop must be overwritten (possibly with TopDesk), as it is copied incorrectly. Then transfer all the other programs you need, to GeoCopy boot disc (KONFIGURIEREN, mouse drivers, and RBOOT) of the patched system disc. These discs will boot now properly, but the 3 boot files do not work properly. If you delete files and copy new files, the 3 boot files might be deleted. So copy only the needed programs on It, then just use only to boot (write protection label)! This disc may then look like in Figure 3.

Figure 2

2. Remove the floppy disc, turn off the computer and set the Flash 8 to 8 MHz (DIP 1 ON). Then turn on the C64 back and boot from the floppy disc GeoCopy. The Flash 8 with 1MB of RAM, will be configured to RAM 1541, when the shadow copy of the 1541 repeal of the KONFIGURIEREN Flash 8; a RAM 1571 may be configurable. It can now configure also 1581 or FD 4000 as in 1581 to do so. All applications can now run normally, but they work, of course, "slightly" faster.

   But an 8-fold acceleration can be difficult to achieve, as Floppy access is not accelerated. So they run off acceleration with the normal speed.

3. Enjoy the speed of the scroll GeoPaint images, long calculations GeoCalc or fastprinting with Geos LQ.

5. RAM 1581 together with Flash 8

Known, the KONFIGURIEREN 2.0 normally does not know a RAM 1581. The GeoPatch program for Flash 8 patch accordingly, it's not a RAM 1581 configurable. Since the Flash 8 needs a part of its RAM memory itself, a Flash 8 with 256 k RAM is not possible to configure a RAM 1541. Anyone with a Flash 8 of 1 MB can thus configure a RAM 1571.

Falk Rehwagen has arranged a disc that is offered under the name Flash 8 GEOS-PATCH-DISC. Here, the normal KONFIGURIEREN for Flash 8 is adjusted. The program can operate in the most recent version also a GeoRAM over a trick along with the Flash 8, while the Ram of the GeoRAM will be added just to the RAM of the Flash 8. With Flash 8 with 1 MB and a GeoRam 512 K is obtained as 1472 k RAM. So a configuration of a RAM 1581 and RAM 1571 simultaneously will be possible. The entire memory can also be used together with GATEWAY.

A non-buffered BBGRam works like a GeoRam and can configure this, a REBOOT after turned off C64 and buffered BBGRam will be not possible. A Commodore REU, however, you cant use it. Since the manual, the Commodore REU is written very comprehensive and user-friendly, I would say nothing more to it.

How the disc looks like, is shown in the following image (Flash RAM must in front of KONFIGURIEREN, set F8_RBOOT somewhere behind it).

Figure 3

This works well with a 1581 and GeoMakeBoot. However, first use the Flash 8 configuring for GeoMakeBoot disc and then 3 Files to be replaced.
The whole desktop looks like this:

Figure 4

The disc is available at a price of 15.00 DM at:
PERFORMANCE PERIPHERALS Europe
Michael Renz
Holzweg 12
D 53332 Bornheim
Tel.: /Fax: 02227/3221

6. Boot discs made with GeoMakeBoot

This program creates bootable floppy discs only in cooperation with the programs of Falk Rehwagen (see above). You must therefore have this disc first. Then proceed as follows:

1. Create a boot disc with GeoMakeBoot and plugged-in Flash 8 card at 1 MHz. This boot disc is still not bootable.
2. Copy the FlashRam program and an original KONFIGURIEREN on this disc (the patched KONFIGURIEREN must be overwritten).
3. Start the program Flash CONFIG of the disc Flash 8-GEOS-PATCH-DISKETTE of any drive. The KONFIGURIEREN is adapted to the Flash 8. The question of external ram driver you should answer JA, if the Flash 8 has to be operated in parallel mode with a GeoRam. This must be via an adapter #2 (30.00 DM) at PP Europe M. Renz also connected to the extension port.
4. Set the mouse driver COMM 1351 (8) as the starting driver and save your configuration to KONFIGURIEREN the boot disc.
5. Turn off the computer and set the Flash 8 to 8 MHz. Now you can boot from it at any time. The disc is also under the DESK TOP copied at any time and designed to create copies of the boot discs of toys.