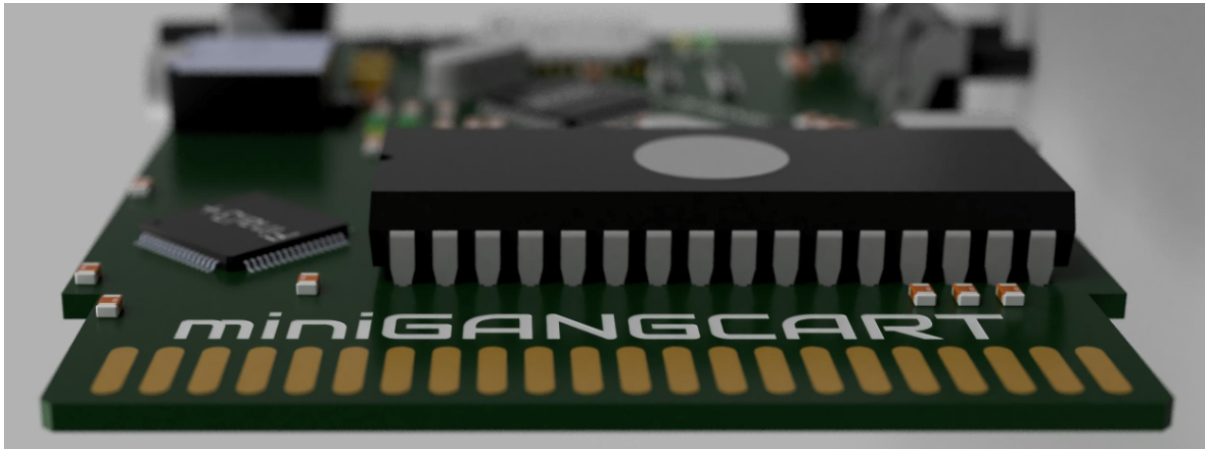# miniGANGCART



This miniGANGCART cartridge supports fast loading and writing procedures for stations 1541, 1541C, OCEANIC 9900, 1541II, 1570/1571 (in GCR1541 mode) and 1581, SD2IEC for the PAL / NTSC Commodore 64 version. The area that can be uploaded and burned using quick procedures is included in almost the entire C64 memory, that is from $ 0400 to $ FFFF.



# USER MANUAL

## Table of contents

mGC – miniGANGCART

## *1. Introduction*

Probably an important feature for players is the fact that
FINAL III +, and thus miniGANGCART, in which it was embedded
has the FREEEZE function, you can save the state of the frozen
game (of course concerns the real drive). To switch to FINAL
III + mode, hold down the reset button and press and release
the freeze button. The LED will turn blue. The same can be
returned to the default mode (blue LED will turn off).
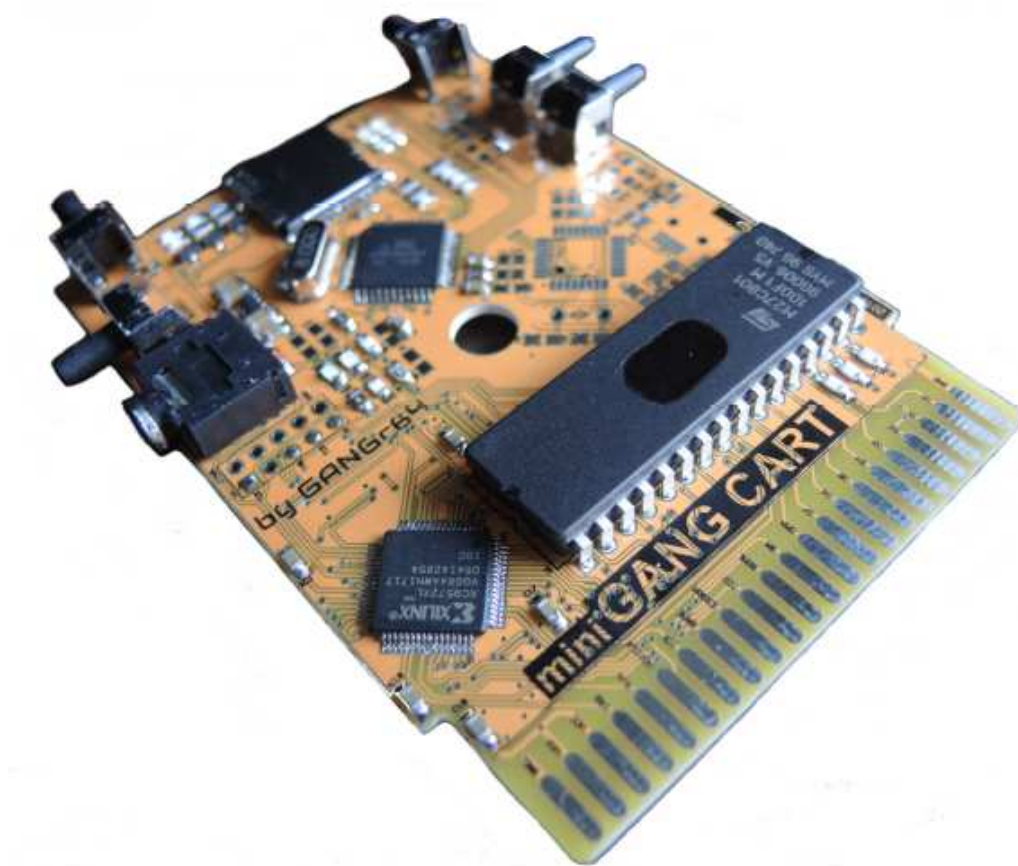


An overview view of the miniGANGCART cartridge without
housing.

3

## *2. How to connect the  miniGANGCART to C64 (SX64)*

Before connecting any device to your Commodore C64 (SX64) computer, remember to switch off the power supply, similarly when disconnecting cartridges first turn off the power supply. Connecting or disconnecting additional devices when the Commodore C64 (SX64) is turned on (powered up) can damage the computer itself or the attached / detachable device.
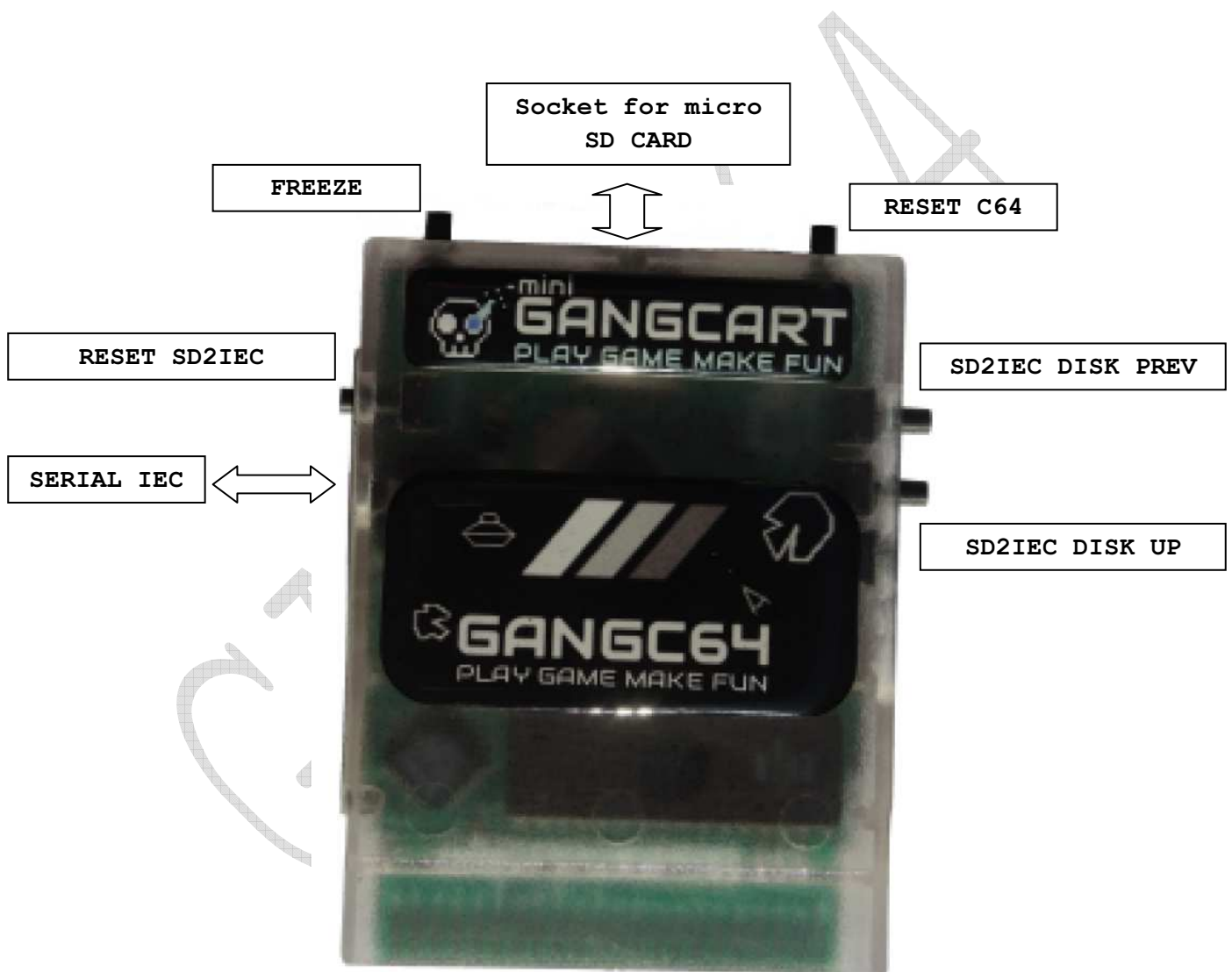


An overview view of the miniGANGCART cartridge with a description of ports and buttons.

Connecting miniGANGCART to Commodore C64 (the arrow marked IEC
cable - serial).



The miniGANGCART set includes a cartridge along with the
original packaging and the IEC serial cable and T-shirt.

> **Warning:**
>
> **After reset / enable the default mode is:**
>
> **CRUEL SD2IEC CORE**

Diagram of the IEC (serial) cable <-> miniGANGCART is shown below (it can be useful as a dog or other animal will eat cables).



**DIN6 pin numbering view**

**Mini jack plug stereo pin numbering for DIN6**
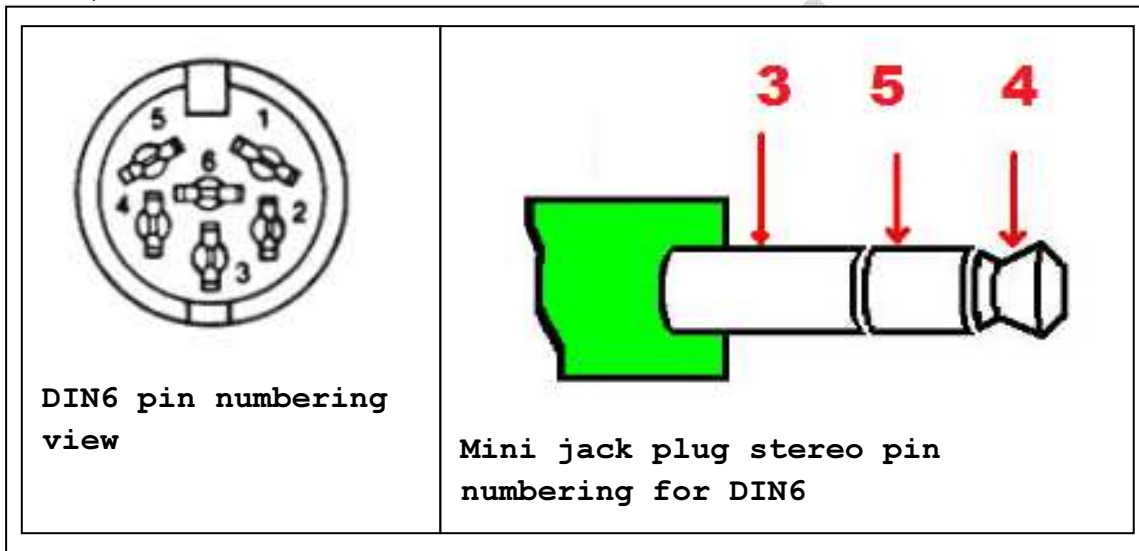
## 3. Connection of miniGANGCART simultaneously to C64 (SX64) and real disk drive

It is necessary to turn off all devices from the power network (computer and disk drives that we will be connecting) before starting the connection. Cartridge miniGANGCART cooperates with the following drives: 1541, 1541C, OCEANIC 9900, 1541II, 1570/1571 and 1581. We connect the hard drives with the IEC cable to the C64 (or SX64), insert the carrGAN miniGANGCART into the computer expansion port and connect it to the computer a previously connected drive for the next serial port. Only after checking the correctness of connection and verification of the Device ID address, we give power to the disk drives and the C64 computer (SX64).

**WARNING:**

If you do not use the SD2IEC interface at the same time as a real drive, you do not need to connect the miniGANGCART cartridge with the cable to the drive.

Drive station view from the
side of IEC ports (serial)
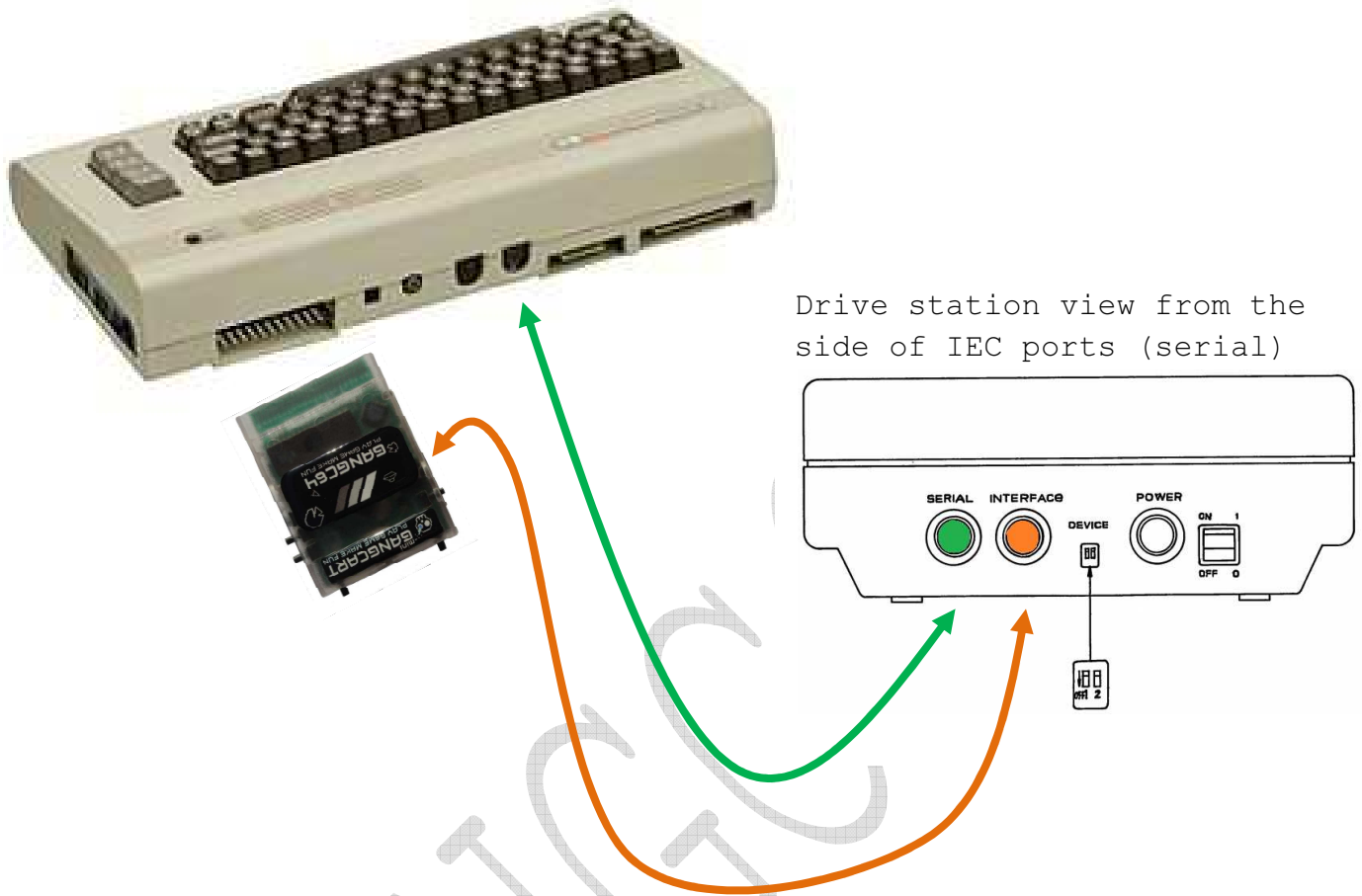
Simultaneous connection of the disk drive and miniGANGCART
together with built-in SD2IEC. If we use only a real disk
drive and we will not use SD2IEC, we can cancel the connection
marked in orange in the picture above.

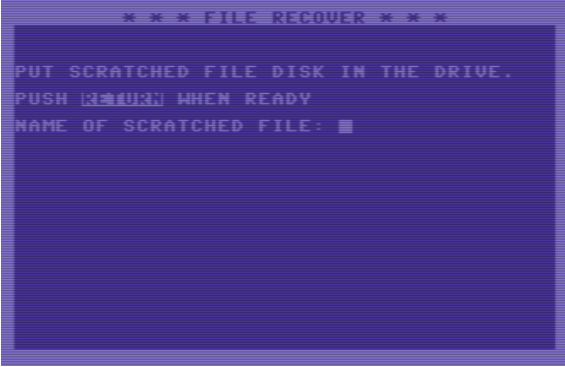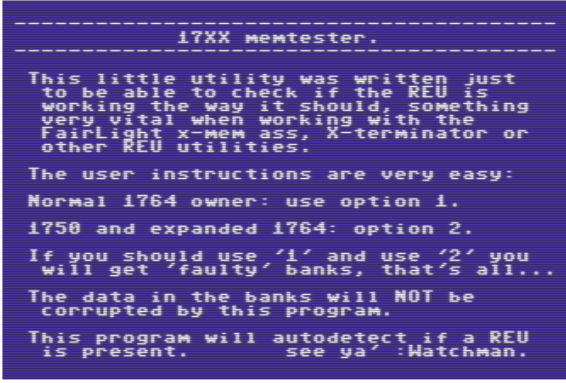## 4. *Content of miniGANGCART memory - that's what tigers like the most*
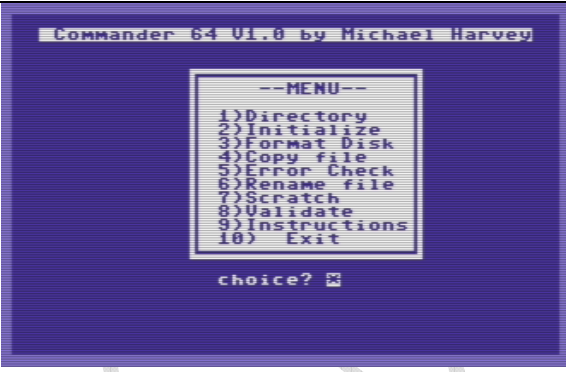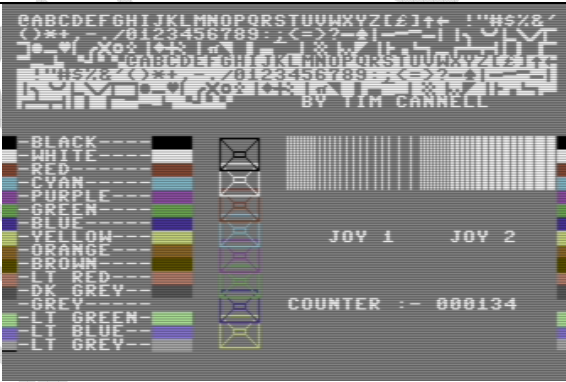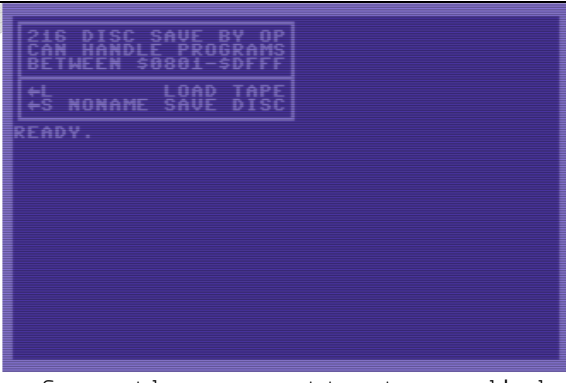
Cartridge miniGANGCART is equipped with a non-volatile EPROM
memory with a capacity of 8Mbit. To enter the contents of the
catalog of application programs and games (a set of 13 iconic
titles from the 90s is a Golden Cartridge 13 clone with
additional titles), enter the command <-F and confirm RETURN.

```
    **** COMMODORE 64 BASIC V2 ****

   64K RAM SYSTEM  38911 BASIC BYTES FREE

     CRUEL SD2IEC CORE FROM  GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST

F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD

←? - HELP

FIND EASTER EGG...


READY.
←F
```
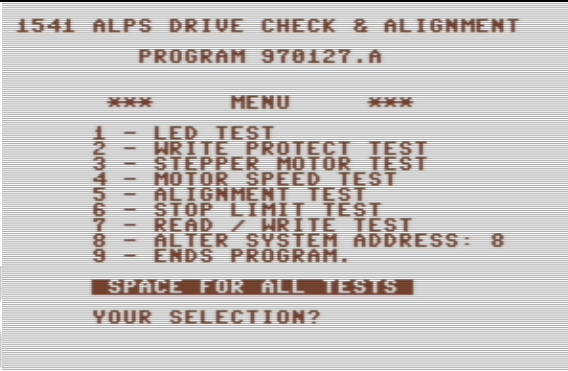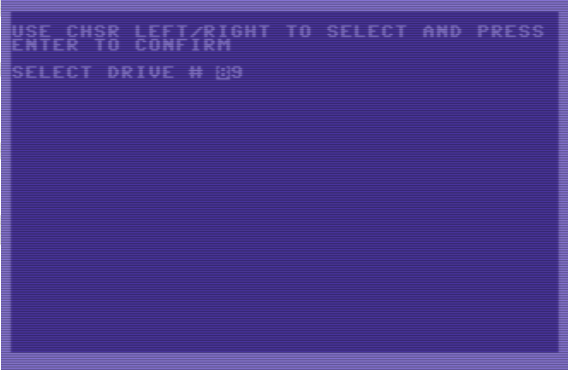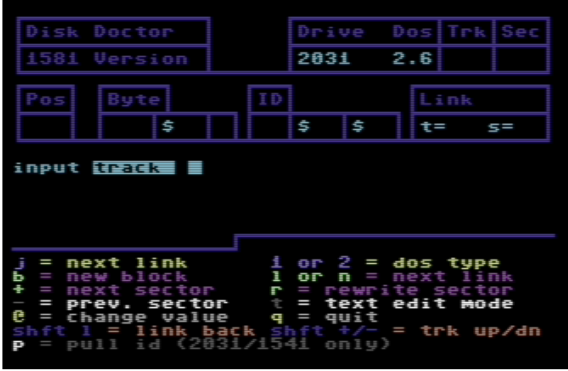
Enter the command <-F and confirm RETURN
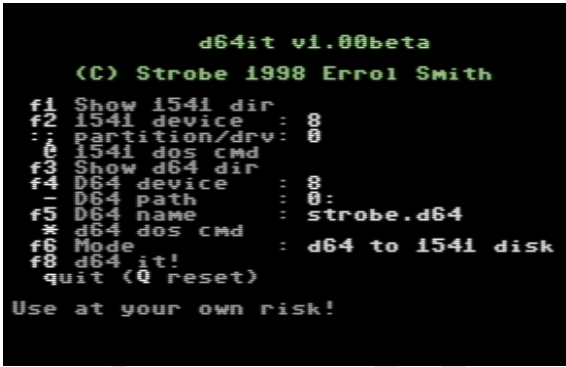
We will see a collection of programs and games, choose the title that interests us and confirm RETURN. When the title is loaded (which takes a few seconds), press the F3 button and start our adventure. All titles, including a view and a short description, are tabulated below.
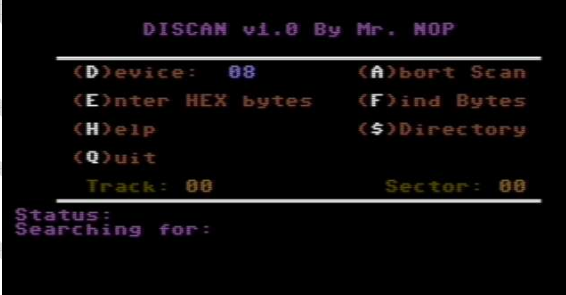
| Programs / games title | Screen program / description |
|---|---|
| FIBR |  File browser (SD2IEC or real station) |
| Rescratch |  Recovering deleted files from a floppy disk |
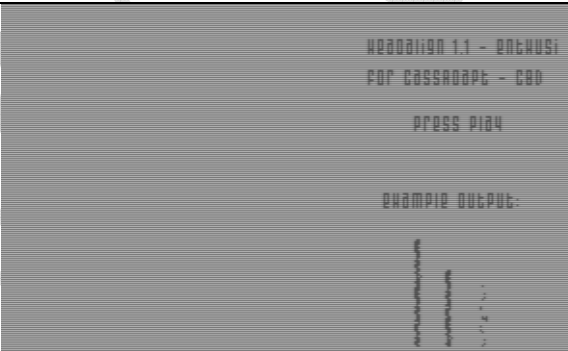
---

| | |
|---|---|
| REU17XX Tester |  Memory expansion tester REU for C64 / C128 |
| 64 Dos |  Utilities |
| 64 tester |  Test VIC/CPU/JOY |
| 216 Disc Save |  Copy from the cassette to a diskette |

| Programs / games title | Screen program / description |
|---|---|
| 1541 1571 Alignment | <br>Calibration of the head for station 1541/1571 |
| 1541 Alps Tester | <br>Station tester 1541 |
| 1541 Sectortester | <br>Floppy disk tester |
| 1581 Doctor | <br>Disk tester 1581 |

| | |
|---|---|
| Bear1541 |  Head correction 1541 |
| Blackbird |  Tracker |
| C64 Diagnostic |  C64 computer tester |
| CBMMARK C64 |  Provides basic information about the real disk drive |

| CIADIAG |  |
| --- | --- |
| | CIA tester for MOS 6526 systems |
| D64it v1 |  |
| | D64it is a simple program for the c64 to convert from .D64 files (emulator disk images) to a 1541 disk or vice-versa. It's slow but it works! Of course to use it you need a device on the c64 that can hold a ~170k D64 file (eg 1581, Ramdisk/REU, CMD hard drive etc).<br>Features:<br>Works with all storage devices, including REU's with ramdos<br>Supports paths/partitions on CMD devices<br>Supports CMD 1541 partitions as well as 'real' 1541 drives |
| Disc Kit |  |
| | A harvester for operations performed on floppy disks |

| Programs / games title | Screen program / description |
|---|---|
| Disk doctor 64.4 |  Floppy disk tester |
| Disk Tester |  Floppy disk tester |
| Discan v1.0 |  Data recovery from damaged floppy disks |
| Eksa disk test |  Floppy disk tester |

| Exos 14x turbo |   Turbo loader |
|---|---|
| Qload 1581 |   Turbo for station 1581 |
| Headalign |   Correction of the tape recorder head |
| Sidtest |   SID 6581 and 8580 system tester for C64 and C128 |

| Programs / games title | Screen program / description |
|---|---|
| SIDplay64 | SIDPLAY64-SD2IEC V1.21<br>BUILD 15.01.2018 18:01<br>PRESS #1/#2 TO SELECT DEVICE.<br>RETURN TO CONTINUE.<br>C8 :73,VICE FS DRIVER V2.0,00,00<br><br>Plays SID from SD2IEC |
| Stepper test 1541 | Drive stepper motor timing test.<br><br>Test blanks screen for around 11 minutes<br>(counts down to black 2.5 times)<br><br>PRESS SPACE TO TEST STEPPER MOTOR<br><br>(or any other key for other options)<br><br>Drive motor tester for 1541 |
| SX64 1541 Test | SX-64 DRIVE SYSTEM TEST   970126.J<br>PRESS 'RETURN' TO START FULL TEST.<br>PRESS 'W' TO CHECK WRITE PROTECT.<br>PRESS 'S' TO CHECK BELT & ADJUST SPEED<br>PRESS 'F' TO CHECK FORMAT.<br>PRESS 'A' TO CHECK STOP ADJUSTMENT.<br>PRESS 'R' TO CHECK READ/WRITE.<br>PRESS '↑' TO RETURN TO THE MAIN MENU.<br><br>Disk drive tester for SX64 |
| Sct2d v2.0 triad | SCT2D<br>TURBO TO DISK v2.0<br>Written By Sailor of Triad<br>Additional code by Wacek of Arise<br>HeadAlign by Enthusi of Onslaught<br><br>F1 – Destination Device#:08<br>F3 – Auto Transfer Mode : Y<br>F5 – Ignore Blocks Free : N<br>F7 – Fix tape filenames : Y<br>F8 – Fast I/O routine: SLOW<br><br>RETURN – Start Transfer<br><br>Press I For Instructions.<br>Press H For Head Align.<br><br>A professional combine from a cassette tape to a floppy disk |

| Mouse Test | <br>Mouse tester 1351 |
|---|---|
| Joystick Check | <br>Joystick tester |
| Quickformat 2.21 | <br>A simple tool for formatting floppy disks |
| 1942 | <br>Shooting game |

| Boulder Dash Crew |  Logic / adventure game |
|---|---|
| Bruce Lee |  Brawl game |
| C64anabalt |  Action game |
| Cauldron |  Adventure game |

| Commando |  |
| --- | --- |
| | Shooting game |
| Flappy Bird |  |
| | One button game |
| Great Giana |  |
| | Adventure game |
| International Karate |  |
| | Brawl game |

| | |
|---|---|
| International Soccer GS | <br>Sports game |
| Kick Off II | <br>Sports game |
| Lode Runner | <br>Logic / adventure game |
| Microprose Soccer | <br>Sports game |

| Pitfall |  Adventure game |
| River Raid |  Shooting game |
| Turrican 2 |  Shooting game |
| Yie ar kung-fu |  Brawl game |

| Zorro |  |
|---|---|
|  | Brawl / adventure game |

## 5. *Basic functions of miniGANGCART - description of commands*

```
F1 - go to the parent directory or "unmap the floppy disk" -
in the case of a disk drive it will only display the
directory.
F2 - input to the monitor
F3 - RUN
F4 - disabling the cart (in some cases, to start the program
you must first disable the cartridge)
F5 - MAGICAL 3-function KEY:
- if he recognizes the catalog, he performs browsing
- if it recognizes the disk image d64, d71, d81 maps the
floppy disk
- if it recognizes a file, it loads it
shift + run / stop instead of F5 = load & run

F6 - Goes to the root directory of the SD card, in the case of
the station will display the directory.
F7 - Reading the catalog of the current device

After using F1 / F5 / F6 / F7 / $ / @ $
While displaying the directory, you can pause the scroll and
resume with a space or end with the RUN / STOP key

F8 - Basic LIST command


<-? - help display - command list
<-H - starts the program to set the skew of the head in the
tape recorder
<-D - device selection, the menu is so smart that it
recognizes the device type on IEC
<-X - program change of the device number (applies to SD2IEC)
<-A - launching CBM ASTEROIDS
<-F - menu files (rom disk)
<-T - the choice of launching one of four cartridge's test
cartridges from the Worldofjani site - some require additional
```

hardware for the full test - loops on the ports, but some
tests will be performed correctly.

Below are the screens of the help command **<-?**

```
GANG C64 CRUEL SD2IEC CORE COMMANDS LIST

F - KEYS
--------
F1 - PARENT DIR
F2 - MONITOR
F3 - RUN
F4 - ZAP (DISABLE CART)
F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD
F6 - ROOT DIR
F7 - SIMPLE DIRECTORY
F8 - LIST

← - LEFT ARROW COMMANDS
-----------------------
←? - HELP
←H - HEAD FIT
←D - CHOOSE DEVICE
←X - FIX DEVICE NR
←A - CBM ASTEROIDS RUN
←F - SELECT FILE TO LOAD FROM ROM DISK
←T - RUN TEST IMAGES FROM WORLDOFJANI


... KEY FOR MORE ...
```

```
COMMANDS
--------
MON - MONITOR
LOAD"",7 - TAPE ABC TURBO LOAD
OLD - RESTORE BASIC PROGRAM
$ - DIRECTORY

/FNAME - EQUIVALENT TO LOAD"FNAME",8,1
↑FNAME - EQUIVALENT TO SAVE"FNAME"

@ - COMMANDS
------------
@ - READ ERROR CHANNEL
@V - VALIDATE DISK
@I - INIT DISK
@S:NAME - SCRATCH FILE
@8 - SELECT DEVICE #8
@9 - SELECT DEVICE #9
@10 - SELECT DEVICE #10
@11 - SELECT DEVICE #11
@N - FAST FORMAT DISK


... KEY FOR MORE ...
```

```
@COMMANDS FOR SD2IEC
--------------------
@CD←   - GO TO PARENT DIR
@CD// - GO TO ROOT DIR
@MD:DIRNAME - MAKE DIRECTORY
@RD:DIRNAME - REMOVE DIRECTORY
@XW - WRITE SD2IEC CONFIGURATION
@UI - WHOAMI
...


   SUPPORT
   -------
1541    - PAL/NTSC
1541 II - PAL/NTSC
1570    - PAL/NTSC (IN 1541 MODE)
1571    - PAL/NTSC (IN 1541 MODE)
1581    - PAL/NTSC (LOAD,SAVE)

SD2IEC  - PAL/NTSC


... KEY FOR MORE ...
```

```
MONITOR COMMANDS
----------------
X - EXIT TO BASIC
A - ASSEMBLE
D - DISASSEMBLE
M - DISPLAY MEMORY IN HEX
I - INTERPRET MEMORY AS CBM SCREEN CODES
* - TOGGLE RAM/ROM MODES
R - DISPLAY REGISTERS
F - FILL MEMORY
C - COMPARE MEMORY
T - TRANSFER MEMORY
G - EXECUTE PROGRAM AS PER REG. DISPLAY
N - NUMBER CONVERSION
L - LOAD
S - SAVE
@ - READ ERROR CHANNEL
$ - DISPLAY DIRECTORY
@*8 - OR @*9 ACCESS DRIVE MEMORY 8 OR 9
@* - RETURN ACCESS TO COMPUTER MEMORY
@8, @9, @10, @11 - SELECT DEVICE NR
@ME - EXECUTE MEMORY IN DISK DRIVE
@BR, @BW - READ/WRITE DISK SECTOR
@W - WARP TURBO MODE ON/OFF (DRIVE ONLY)
... KEY FOR MORE ...
```

The program screen for setting the skew of the tape recorder **<-H** is shown below

First the **<-H** and then RETURN commands
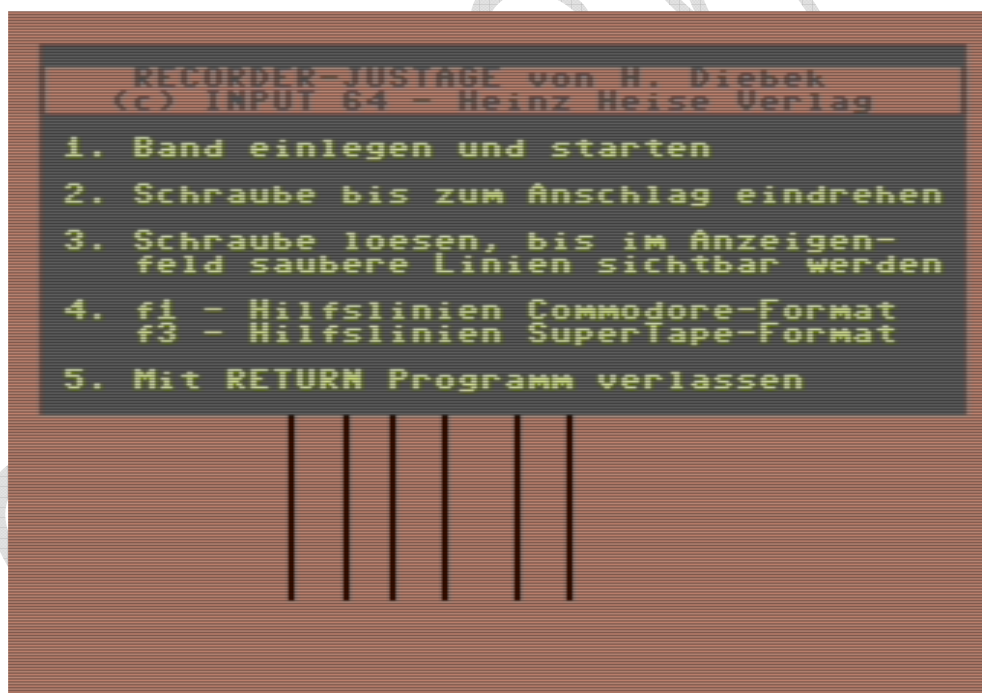


View from the operation of the recorder head correction
program.

The next page shows the changes of the device address which is
currently handled by miniGANGCART using the **<-D** command

```
      **** COMMODORE 64 BASIC V2 ****
   64K RAM SYSTEM  38911 BASIC BYTES FREE
      CRUEL SD2IEC CORE FROM  GANG C64
   F1 - PARENT DIR / F2 - MONITOR
   F3 - RUN  / F4 - ZAP
   F6 - ROOT DIR
   F7 - DIR  / F8 - LIST
   F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD
   ←? - HELP
   FIND EASTER EGG...

   READY.
   ←D█
```

First the **<-D** and then RETURN commands



```
            SELECT DEVICE




   #8          OTHER
   #9          NOT PRESENT
   #10         NOT PRESENT
   #11         NOT PRESENT
```
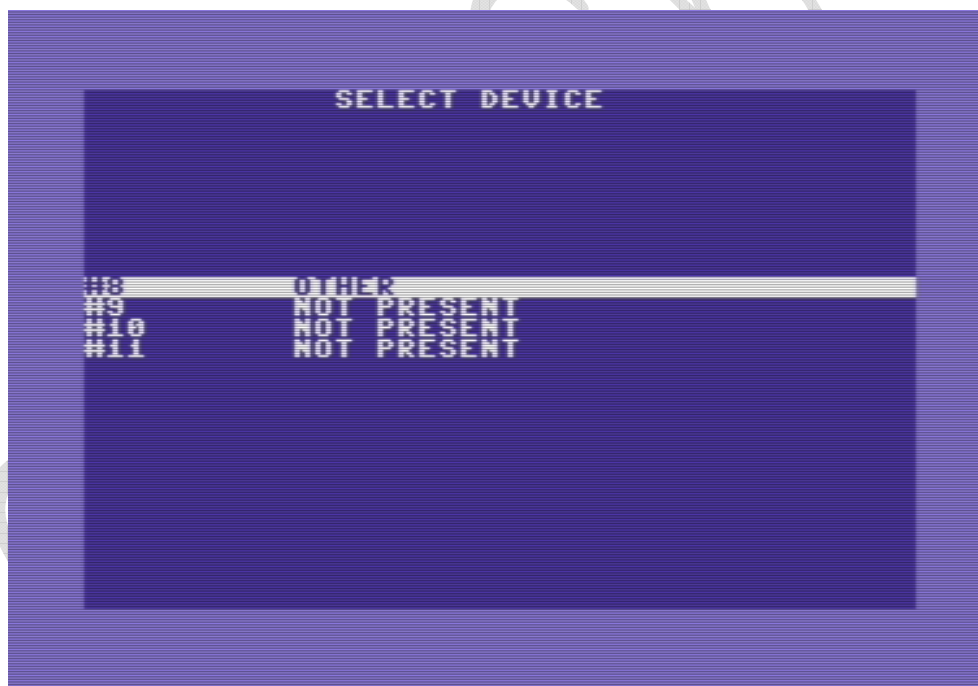
Here we choose the device (real station at a given address or
SD2IEC) which is to be served by the core miniGANGCART - by
default, the device is set to the address 8.Thus, we select
and confirm RETURN.

The next page presents the program change of address (applies
to SD2IEC) of the device which is currently supported by
miniGANGCART with the command **<-X**

First the **<-X** and then RETURN commands



We select the device and confirm RETURN

We can change the address of the drive from 8 to 11 (applies to SD2IEC)

Command **<-A** loading the cult Asteroid game saved in the EPROM memory



First the **<-A** and then RETURN commands

There was nothing left to do but to play ☺
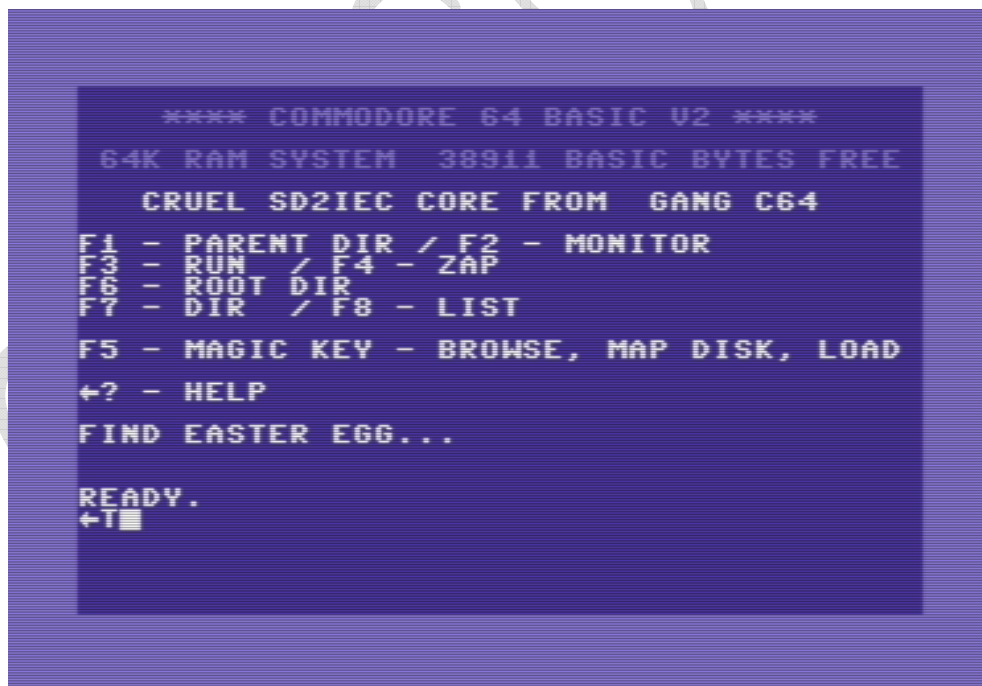


First the **<-T** and then RETURN command and ...
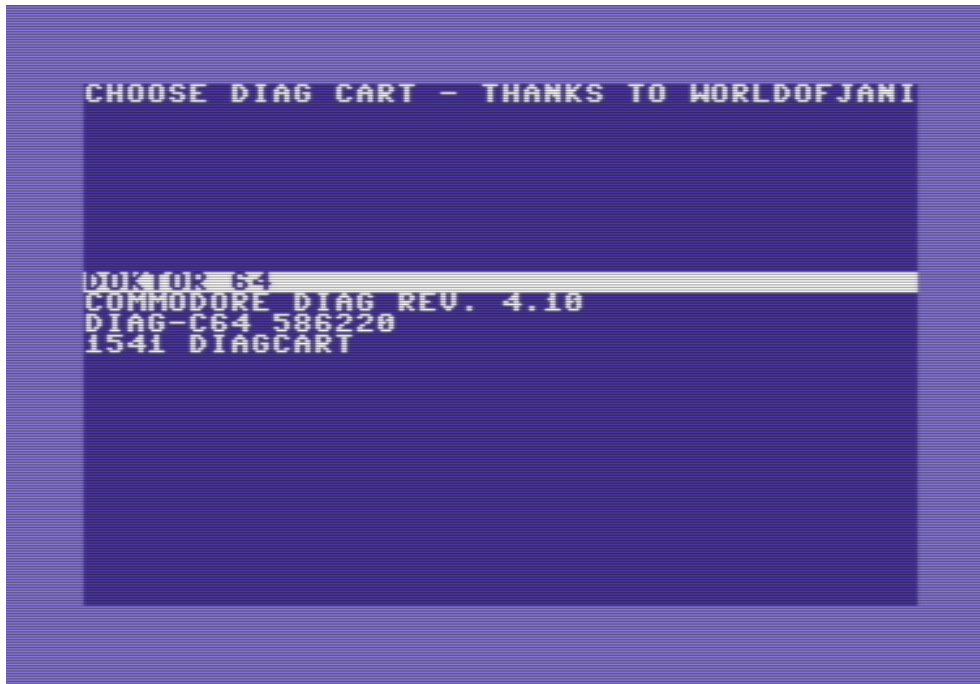
We are in diagnostic mode where we can choose the tool that interests us, we can choose:



Doctor 64

```
        C-64 DIAGNOSTIC REV 4.1.0

   RAM TEST1       OK
   PLA TEST        OK
   RAM TEST2




                        AM01:50:03
                        PM01:50:03

                        COUNT 0001
```

Commodore DIAG rev.4.10

```
        C-64 DIAGNOSTIC REV 586220

   ZERO PAGE     OK      CASSETTE        BAD
   STACK PAGE    OK      KEYBOARD        OPEN
   SCREEN RAM    OK      CONTROL PORT    BAD
   RAM TEST1     OK      SERIAL PORT     BAD
   RAM TEST2     OK      USER PORT       BAD
   PLA TEST      OK      TIMER1 A        OK
   COLOR RAM     OK             B        OK
   KERNAL ROM    OK      TIMER2 A        OK
   BASIC ROM     OK             B        OK
   CHARAC ROM    OK      INTERRUPT       BAD

   ┌─────────────────────────────────────────┐
   │ 6510 U7                    4164          │
   │ 6526 U1   BAD        U9            U21   │
   │ 6526 U2   BAD        U10           U22   │
   │ 6567 U19            U11           U23   │
   │ 6581 U18  BAD        U12           U24   │
   │ 82S1 U17                                 │
   └─────────────────────────────────────────┘

   COUNT 0000         00:00:33AM 00:00:33PM
```

Diagnostic Assembly Kit (CBM 326070-01)

1541 DIAGCART WORDOFJANI


MON - equivalent to F2, input to the monitor
LOAD "", 7 - loads the first recorded tape program stored in
ABC TURBO
OLD - restores the first Basic line of the program after the
NEW command or after the reset

$ - equivalent to F7 - directory
@ $ - equivalent to F7 - directory

/ "Filename"
^ "Filename"

LOAD and SAVE token - if there is a space in the name, enter
it in quotes.
With SAVE from the BASIC level you can enter the range of the
recording area, or accept the range proposed by the system.

```
     **** COMMODORE 64 BASIC V2 ****
  64K RAM SYSTEM  38911 BASIC BYTES FREE
    CRUEL SD2IEC CORE FROM  GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST
F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD
←? - HELP
FIND EASTER EGG...

READY.
@
00, OK,00,00
READY.
■
```

@ - reading device status (result of operation shown above)
@V - disk validation, counts the real number of free blocks on
the disk and removes unclosed files
@i - disk initialization
@S: name "- deletes the file
@N - formatting the disk, also virtual for sd2iec
        - enter the name of the disk in the dialog box
        - enter the disk ID to format
        - 2 characters for a full diskette format
        - 1 or 0 characters for erasing the diskette directory
        (faster but the format is not full)



```
    CRUEL SD2IEC CORE FROM  GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST
F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD
←? - HELP
FIND EASTER EGG...

READY.
@N
```

```
    CRUEL SD2IEC CORE FROM   GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST

F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD

←? - HELP

FIND EASTER EGG...


READY.
@N
ENTER DISK NAME:  [■                  ]
```

We will be asked to enter the disk name



```
    CRUEL SD2IEC CORE FROM   GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST

F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD

←? - HELP

FIND EASTER EGG...


READY.
@N
ENTER DISK NAME:  [GANGC64            ]


ENTER DISK ID : 1
```
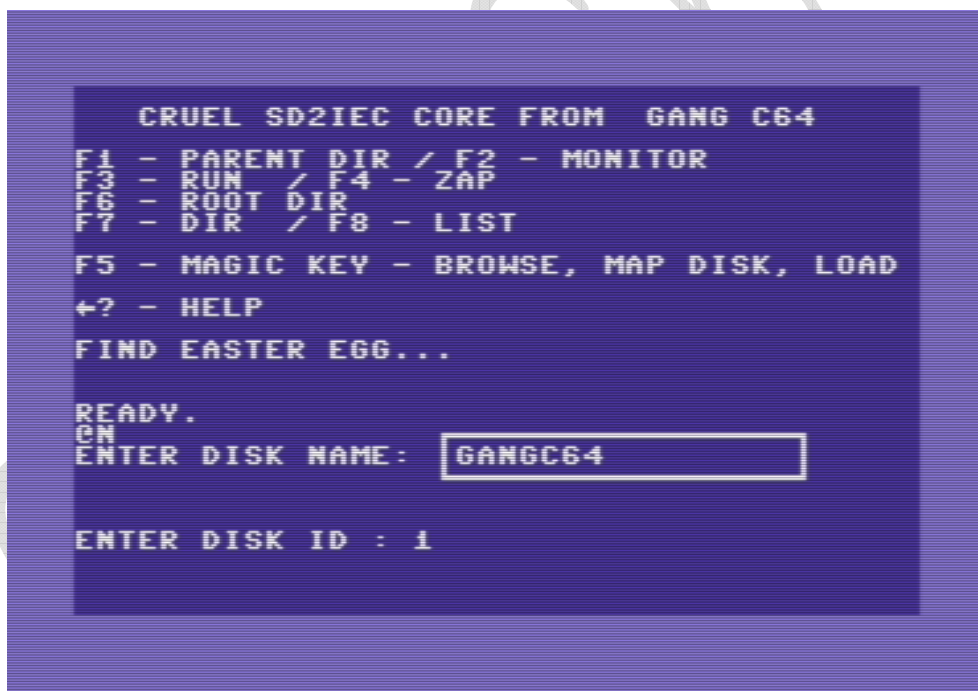
Now it's time for the disk ID

```
    CRUEL SD2IEC CORE FROM  GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST

F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD

←? - HELP

FIND EASTER EGG...


READY.
@N
ENTER DISK NAME:  GANGC64


ENTER DISK ID :

CHOICE DRIVE :  ▓08▓  09   10   11
```

Before formatting, we will ask you to indicate the device
number (disk drive).

```
   **** COMMODORE 64 BASIC V2 ****
 64K RAM SYSTEM  38911 BASIC BYTES FREE
    CRUEL SD2IEC CORE FROM  GANG C64
F1 - PARENT DIR / F2 - MONITOR
F3 - RUN  / F4 - ZAP
F6 - ROOT DIR
F7 - DIR  / F8 - LIST

F5 - MAGIC KEY - BROWSE, MAP DISK, LOAD

←? - HELP

FIND EASTER EGG...


READY.
@8▮
```

@ 8, @ 9, @ 10, @ 11 - selection of the currently used device
to which you want to refer

@XW - saving configuration SD2IEC - after changing the program
number of the device is saved as a permanent state
@UI - the device will give the message 73 in a status that
allows you to identify the device type and system version.
@MD: DIRNAME - create directory (for SD2IEC)
@RD: DIRNAME - removing the directory (for SD2IEC)

---

## 6.  *Monitor of the mGC machine language*

The monitor is modeled on the Action Replay monitor.

X - Exit to Basic.
A - Assemblacja.
D - Disassembling.
M - Memory monitoring in hexadecimal recording.
I * - Interpreting memory as screen codes.
And - the same as "I *".
* - Switching the monitor access to RAM / ROM.
R - Display of the state of registers.
F - Filling the memory.
C - Comparing memory.
T - Memory transfer.
G - Starting the program with registers set by the "R" command.
N - Number conversion.
L, S - Load, Save.
@ - Read device status on IEC.
$ - List display.
@ * 8 - Switching the monitor to device No. 8 - the commands refer to the DISK STATION.
@ * 9 - items for device no. 9. (@ * 8, @ * 9 only works for real disk drives)
@ * - Switch the monitor to C64 memory.
@ME - Execution of the Memory-Execute command in the disk drive.
@BR - Read sector of floppy disk for C64 memory. (works for stations and SD2IEC)
@BW - Saving the sector to a floppy disk from C64 memory (works for stations and SD2IEC)


Examples:

.D C000 D000 - disassembly of the area from $ C000 to $ D000.
.M C000 D000 - hexadecimal preview from $ C000 to $ D000.
.I C000 D000 - memory preview as screen codes from $ C000 to $ D000.
.D C000 - disassemble one instruction under $ C000.
.M C000- - hexadecimal monitoring from $ C000 "forward".

.D - unassemble the currently used address one time.
.I - single line preview as screen codes from the last used
address.

## 7. Scroll display control

a) With the F1 and F7 keys you can scroll and change the
direction of the scroll
While scrolling, you can stop it and resume it with any key
Or stop with the run / stop button.

b) If you are in the first or last line with the down / up
cursor keys, you can continue scrolling on one line.

1) BANKING. After entering the monitor, access to the entire
64KB RAM C64 is set. Using the "*" command allows access to
ROMs and I / O areas

2) ASSEMBLATION. :
.A C000 LDA # $ 01
It assembles one instruction at $ c000, calculates the address
of the next instruction and waits for input. Return without
assembling the assembly command ends assembling.

3) REGISTER DISPLAY.
.R
You can change the contents of registers and markers after
executing the "R" command, then after changing the contents of
registers, press return.

4) FILL MEMORY. :
.F C000 D000 AA
Fills the area from $ C000 to $ D000 byte with a value of $
AA.

5) HUNT MEMORY. :
.H C000 D000 01 02 03
Searches the area from $ C000 to $ D000 in case of a given
byte string and displays the address if a match has occurred.

6) COMPARE. :
.C C000 D000 E000
Compares an area from $ C000 to $ D000 with an area of $ E000.
If there are inconsistencies, their addresses are displayed on
the screen.

7) TRANSFER MEMORY. :
.T C000 D000 E000
Rewrites the area from $ C000 to $ D000 to $ E000.
8) GO. : .G C000

It runs the machine code at the address indicated, loading the initial values to the registers visible after the "R" command.
The code can be terminated with an RTS or BRK order.
The final values of the registers are saved and displayed.

9) CONVERSION OF FIGURES. :
.N $ C000. N 49152. N% 10101010
It can convert up to 32 bits
.N $ FFFFFFFF
Displays the value of a number in decimal, hexadecimal and binary form.


10) LOAD, SAVE:
.L

After entering the file name in the dialog
Choose the device
Enter the load address

NOTE: BUG SD2IEC - if the name is shorter than 16 characters, enter the entire file name and end it with an asterisk "*".
You do not need to do this for a disk drive.

.S

After entering the file name in the dialog
Choose the device
Enter the start and end address


## 8. Monitor mGC disk drive


@ * 8 - Switching the monitor to device No. 8 - the commands refer to the DISK STATION.
@ * 9 - items for device no. 9. (@ * 8, @ * 9 only works for real disk drives)

@W - WARP TURBO MONITOR MODE ON / OFF for the selected station via the command @ * 8 or @ * 9 (only for the disk drive)


@ * - Switch the monitor to C64 memory.


@ME (address) - Execution of the Memory-Execute command in the disk drive.

@BR - Read sector of floppy disk for C64 memory. (works for stations and SD2IEC)@BW  - Zapis sektora na dyskietkę z pamięci C64(działa dla stacji i SD2IEC)

@BR (TRACK) (SECTOR) (MEMORY PAGE - OLD BATT) - works for
stations and SD2IEC.
@BW (TRACK) (SECTOR) (MEMORY PAGE - OLD BATT) - works for
stations and SD2IEC.


@BR 12 01 40 - Read path 18, sector 1 to page $ 4000.
@BW 11 00 40 - Saving from page $ 40 to path 17, sector 0.

You can specify the decimal values of the sector path and
precede it with the "+" sign

@BR + 18, + 1.40 - It does the same as the previous command
given in hexadecimal format.


## 9. Final III + mode

**WARNING:**

**CENTRONICS printer link support via the interface, do not
connect this type of printer directly to the Commodore C64
bus**

The Final Cartridge III+ mode is equipped with two buttons:
RESET and FREEZE. The blue LED indicates device activity. One
of the unique features of this cartridge mode is the
appearance of the desktop and a windowed interface on which
you can move using the F1-F8 buttons, joystick or with the
help of a mouse if you have one. The version of Final III + is
equipped with Desktop 2.0 which in addition to the basic
functionality also has a number of programs (exactly 17
utility programs) accelerating work with Commodore C64 (SX64).
The list of programs and the menu view of tools are below.

View of the tools on the Final III + version Desktop 2.0.
Kolejno: 15 SEC FORMAT, 1541 ALPS TEST, 64 DOCTOR, CASETTE
AZIMUTH, COPY 190, COPY Q V2.0, DIR MASTER, DISK DOCTOR,DISK
 WIZARD, FAST FILE COPY, LOGO EDITOR,MENU MAKER, MONITOR
TEST, NO BLOCKS BOOT, SIMONS BASIC, SUER SPRITER, TURBO 250

The basic functionality of the Final III + mode is the
fastloader support for the SD2IEC interface and the most
important:

• 60 new commands and additional functions
• the ability to operate the universal printer connector
• BASIC extension with many new commands
• a great program that monitors memory
• the ability to break and copy each program
• TURBOto the disk drive (15 times faster loading of programs)
• TURBO for tape recorder (10 times faster charging)

## 10.    Activation and deactivation the Final III+ mode

After attaching the miniGANGCART cartridge to the C64 computer
(SX64) and any return of Final III + (to enter this command)
Stop and redo the Reset button) the power supply will take the
window with PULL-DOWN MENU, stating the options. In addition
to the possibility of removing it from the computer. This is
to signal the LED diode goes out. To do this, take a look at
KILL while working in BASIC, or choose the FALSE KILL option,
working under control or by using the Reset button and do not
release it by pressing the Lock button).
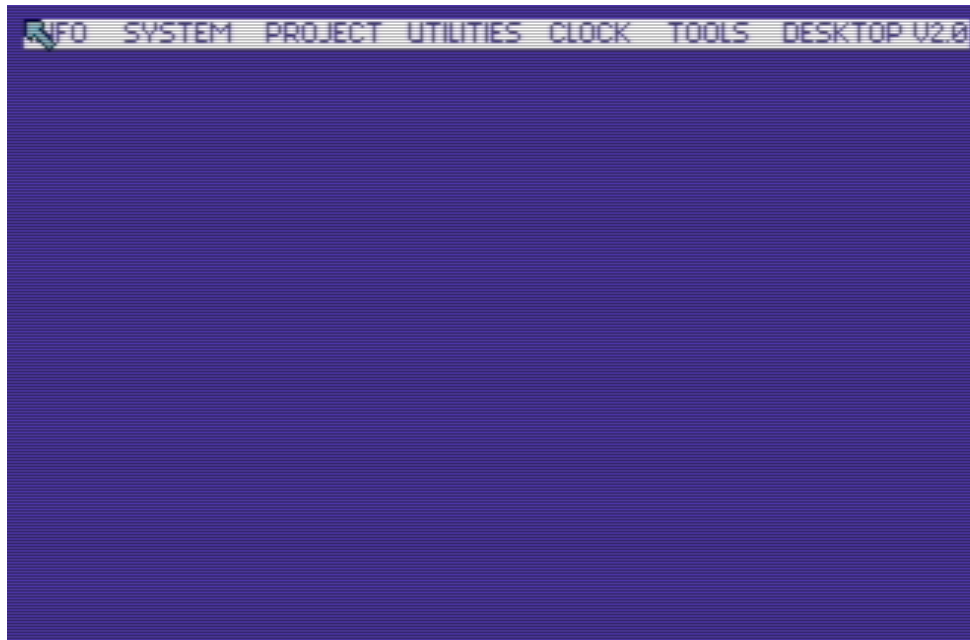
Windows and menu.

All FINAL III + options are available via the PULL-DOWN MENU.
Not everyone, however, is familiar with the use of such
symbols. So here is a short description in the windows, namely
after turning on the FINAL III + mode in the upper left corner
of the screen an arrow appears, which can be moved using the
joystick, mouse, or keys (F1 - up, F3 - down, F5 - left, F7 -
The FIRE button is simulated by the COMMODORE key Although
FINAL III + allows the use of both joystick ports, it is
recommended to use port 2.

The choice of the appropriate option from the menu is done by setting the arrow on the appropriate command field and pressing FIRE (or the button with the Commodore logo on the keyboard). A window opens with detailed options. It is possible to open several windows on the screen at the same time, but only one can be used at a given moment. The window closing symbol is placed in the upper left corner. The window will disappear from the screen when you move the arrow to the window close symbol and press FIRE (or the button with the Commodore logo on the keyboard). In the upper left corner there is a symbol of opening a new window, which reveals new possibilities of the selected option. The upper middle part of the window is used to move it on the screen. Setting the arrow in this field, pressing and holding FIRE (or the button with the Commodore logo on the keyboard), moves the window with the arrow. If any option requires entering text (eg entering the name of the diskette), enter it from the keyboard. There are three ways to end these operations:

   • by pressing RETURN
   • by pointing the arrow at the window close symbol and pressing FIRE
   • by selecting a new command, eg X

Communication window.
Such a window may open at every operation. His call must be served first. Here is the meaning of the following orders:


CANCEL - no acceptance of the order, return to the previous menu
DO or OK - confirm selected order
CONTINUE - continuation of work


## 11.      Desktop Final III+

This is the most important FINAL III + operating mode. With this operation you can activate FREEZER, MONITOR and many other functions. Several ways to activate DESKTOP:

After switching on the computer equipped with FINAL III +, it is reported in DESKTOP mode when working in BASIC, choosing the DESKTOP option from the BASIC system menu, writing DESKTOP and pressing RETURN (working in BASIC), while working in FREEZE mode, selecting options DESKTOP from the EXIT menu

The computer's RESET and the exit from work in DESKTOP is
carried out by pressing CTRL + SHIFT.

After activating DESKTOP, the following options will appear on
the screen:
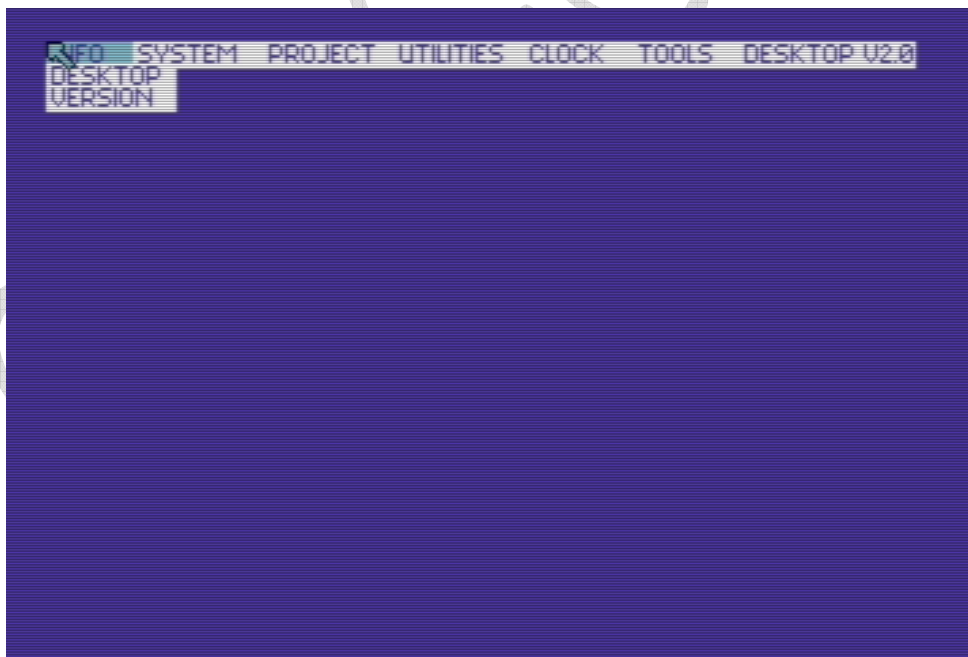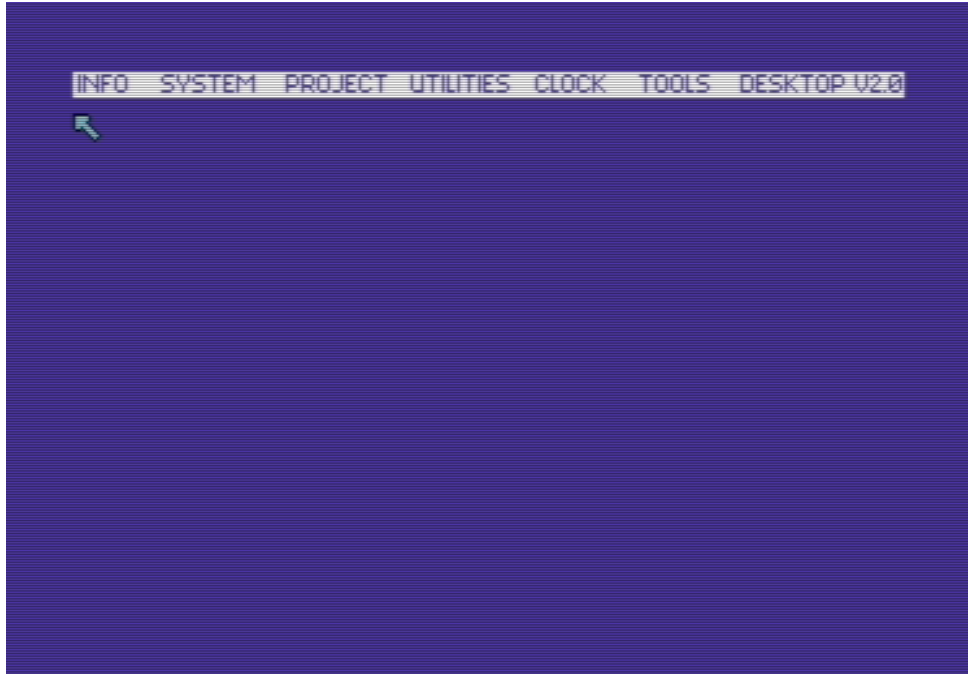




**DESKTOP** - information about the authors of the program.
**VERSION** - information about the program version.

---

INFO   SYSTEM   PROJECT   UTILITIES   CLOCK   TOOLS   DESKTOP V2.0

**THE FINAL CARTRIDGE III+**
**Software:**
Gerard van Assem        Marc Derksen
Wil Sparreboom          EDK  SAM
**Hardware:**
Ton Peters              Jacques van Schajik

Thanks: e5frog & Heather
Developed in 1987/2015      | **CONTINUE** |

INFO   SYSTEM   PROJECT   UTILITIES   CLOCK   TOOLS   DESKTOP V2.0

**DESKTOP          VERSION  2.0**
Calculator                    V1.2
Clock                         V1.0
Notepad                       V1.2
Preferences                   V1.2
Disk Operations               V1.1
Basic                         V1.2
**DATE: JAN 2015**      | **CONTINUE** |

**BASIC** - the end of work in DESKTOP and entering the extended
BASIC mode.

**FINAL KILL** - programmatically disconnects FINAL III.

**FREEZE** - go to the FREEZER menu.

**REDRAW** - with this option you can see all open windows.



**NOTEPAD** - cleans the notebook and lets you create a new
document.

**DLINK** - loading / saving a document from a disk. The window
should contain the name of the document.

**TLINK** - loading / saving a document from a tape. The window should contain the name of the document.

INFO   SYSTEM   PROJECT   UTILITIES   CLOCK   TOOLS   DESKTOP V2.0

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**TLINK**

Please, insert your PROJECT
TAPE in your datarecorder

CONTINUE            CANCEL

INFO   SYSTEM   PROJECT   UTILITIES   CLOCK   TOOLS   DESKTOP V2.0
                            PREFERENCES
                            BASIC PREFS
                            CALCULATOR
                            DISK
                            TAPE
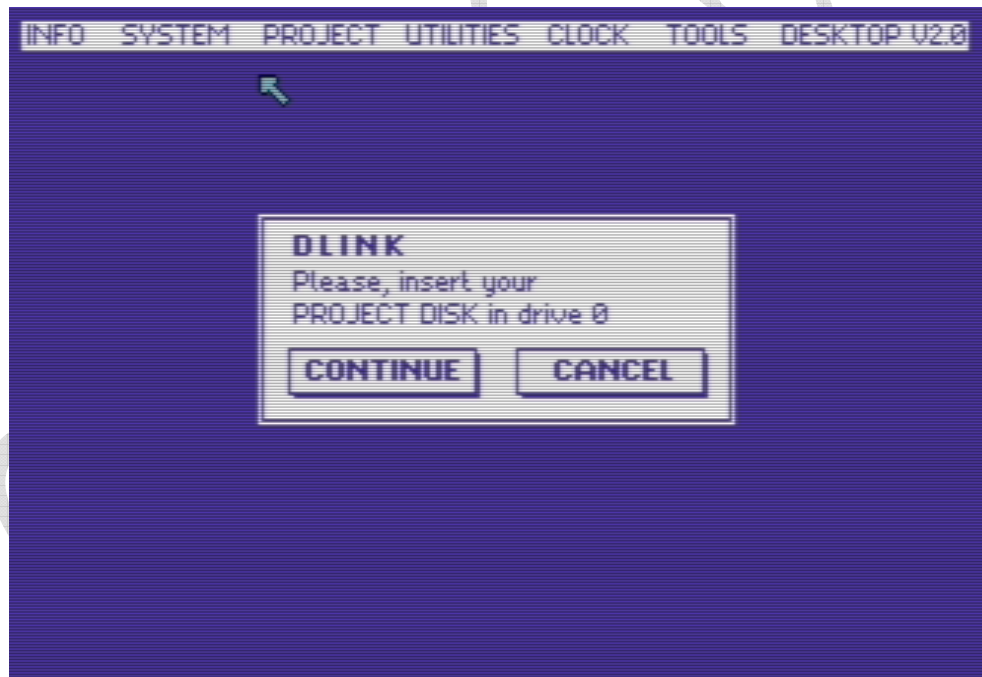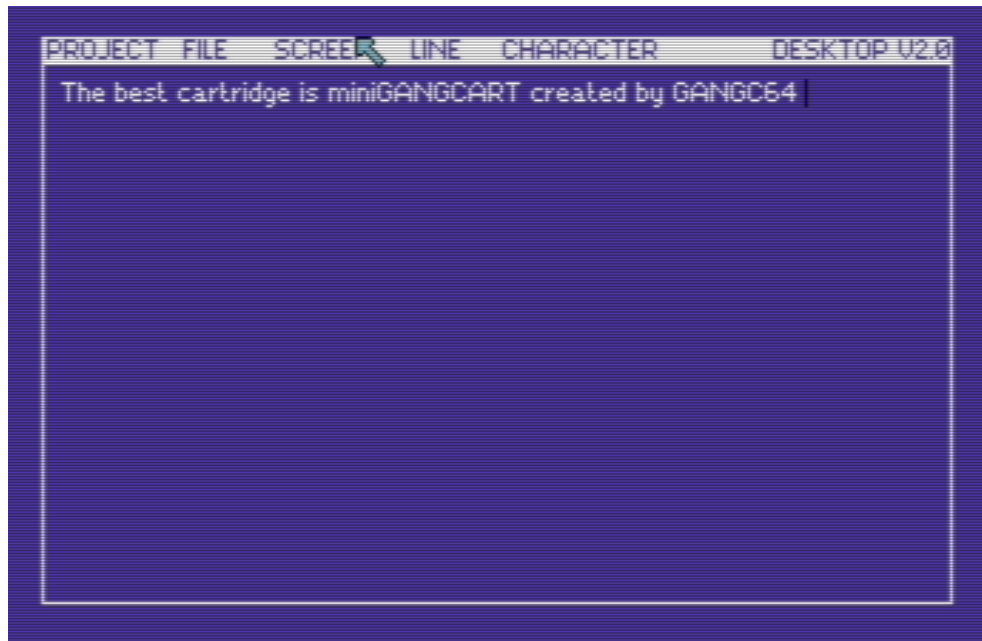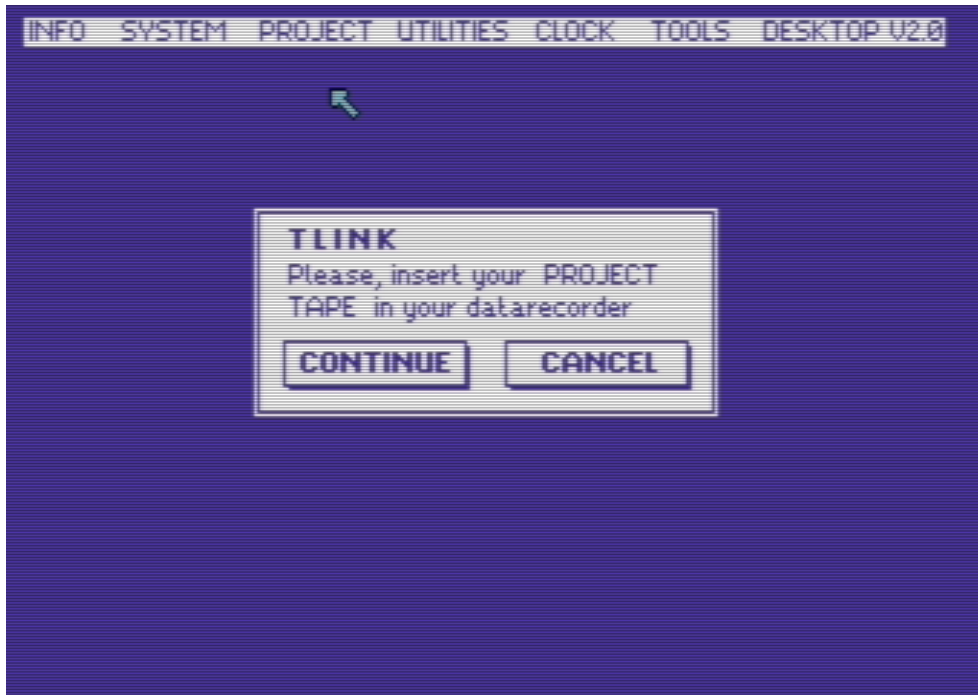
**PREFERENCES** – allows you to change a number of properties of FINAL III +:

COLOR – changing the color of the arrow and screen.

ACCELERATION – acceleration of the arrow.

VELOCITY – arrow speed.

POERT 1 (2) – number of the supported port.

JOYSTICK (MOUSE) – a type of communication device.

After setting all parameters, you can choose one of the four options:

OK – acceptance of the set parameters.

VIEW – preview of the set parameters on the screen.

DEFAULT – the adoption of parameters set permanently.

CANCEL – canceling the settings.
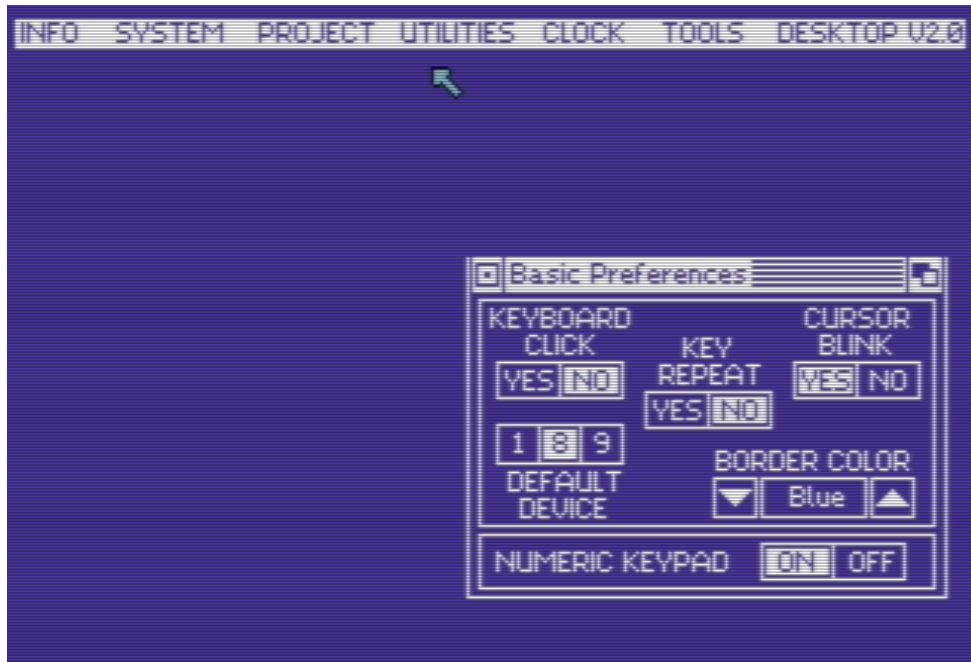
**BASIC PREFERENCES**

KEYBOARD CLICK - activates and deactivates the sound signal
when pressing the keys.

CURSOR BLINK - enables or disables the flashing of the cursor.

KEY REPEAT - enables or disables the repetition of the last
key pressed.

DEFAULT DEVICE - setting the address of an external device
intended for use:

1 - tape recorder
8 - the first disk drive
9 - the second disk drive

BORDER COLOR - setting the color of the screen frame.

NUMERIC KEYPAD - enables or disables the numeric keypad in
C128.
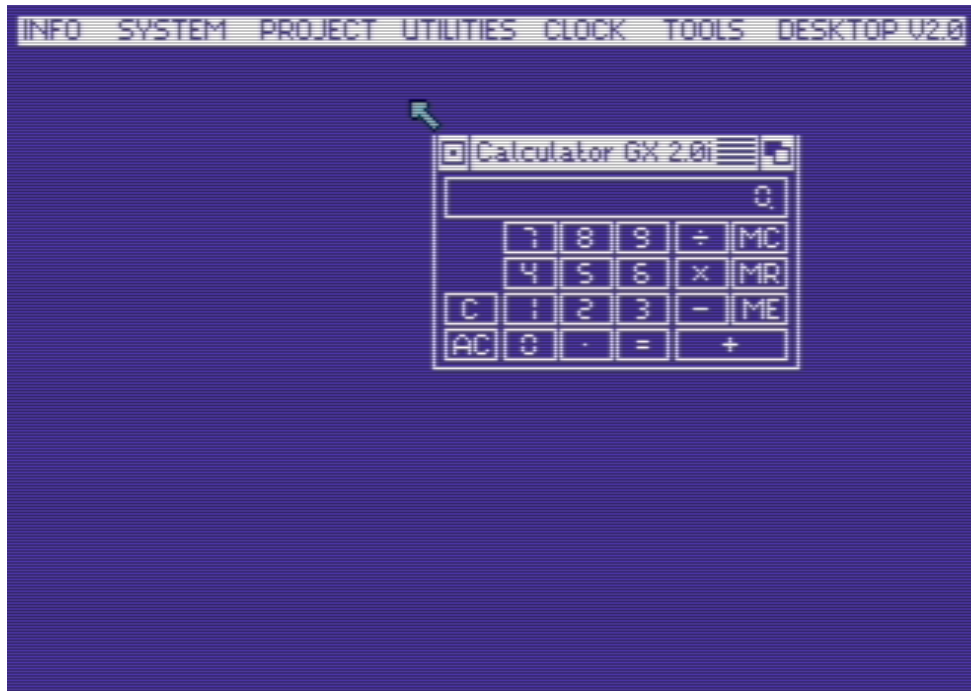
**CALCULATOR** - after activating this option, a calculator will
appear on the screen, in which any key is selected by pressing
FIRE.



**DISK** - operations available for a floppy disk

DIRECTIORY - allows you to open a window in which, after
inserting a floppy disk, the name of the floppy disk and the
list of programs on it will appear. This option allows you to
view up to three diskettes at the same time.

RUN - after selecting the selected program, use the DO option.
The selected program will be automatically loaded and started.
RENAME - this option is used to change the name of programs on
the floppy disk. After its launch, a window with two fields
will be created on the screen. In the FROM field, enter the

name to be changed and in the TO field the new name. The DO
option is for acceptance.

SCRATCH - is used to delete a selected program from a floppy
disk.

FAST FORMAT - quick formatting of a floppy disk with the
possibility of naming it.

EMPTY - quick erase the floppy without changing its name.

VALIDATE - the operation of "collecting" free blocks on a
floppy disk.

INITIALIZE - disk drive initialization.

CHANGE DISKNAME - changes the name of the diskette.

READ STATUS - it helps to determine the cause of error reading
from a floppy disk (if any).
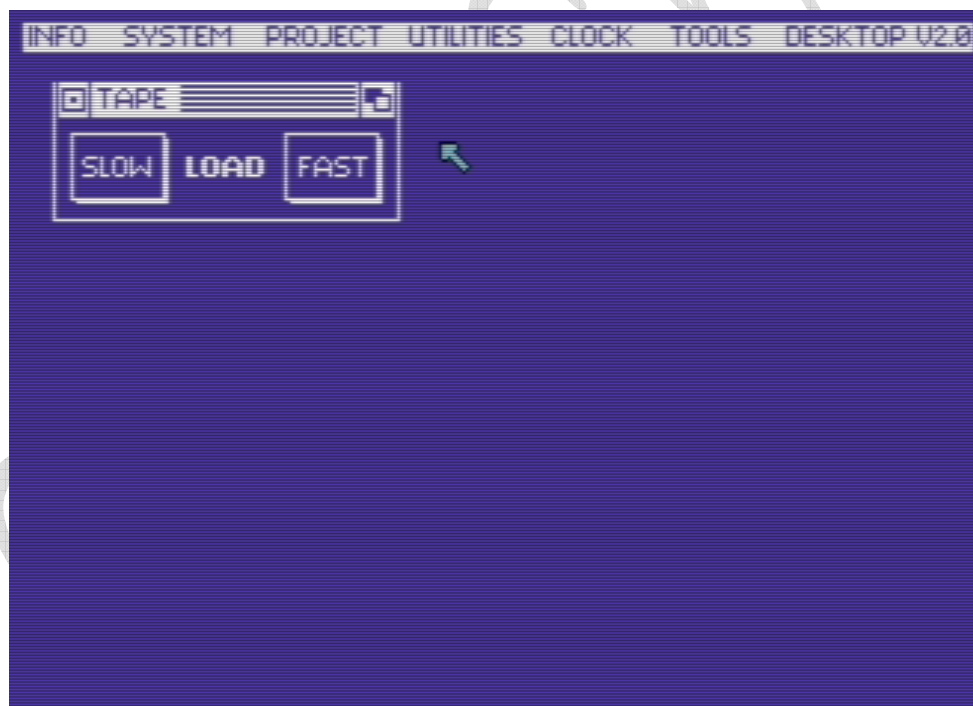


**TAPE** - work mode with a carrier on a magnetic tape

SLOW - charging in normal mode.

FAST - charging ten times faster. TURBO is compatible with all
previous turbo on C-64, C-128.

`TIME` - shows the current time on the screen.
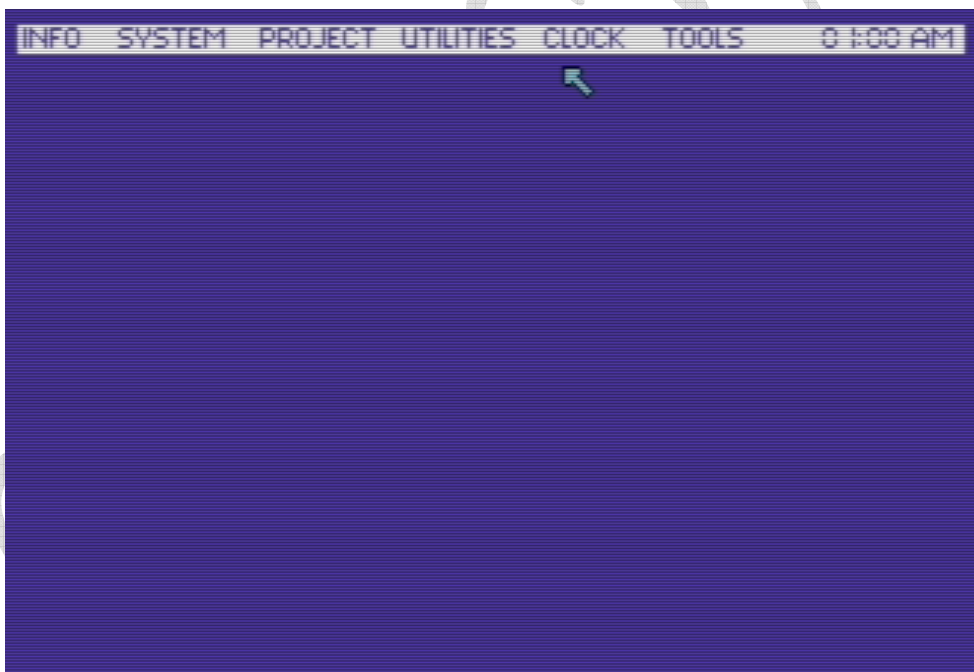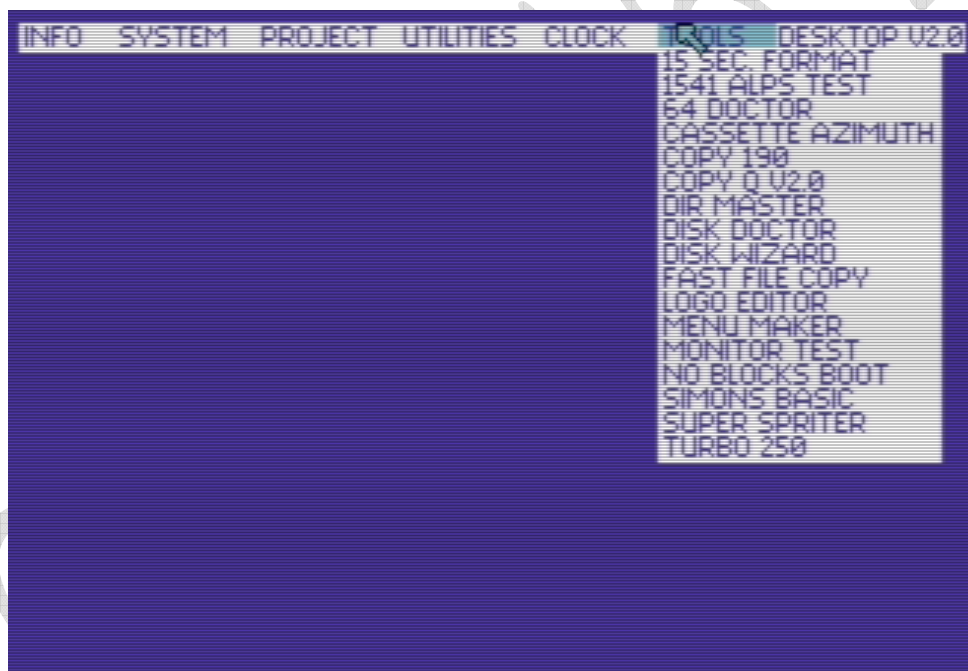
**TOOLS** - we have a choice of 17 programs that are diagnostic and service tools.
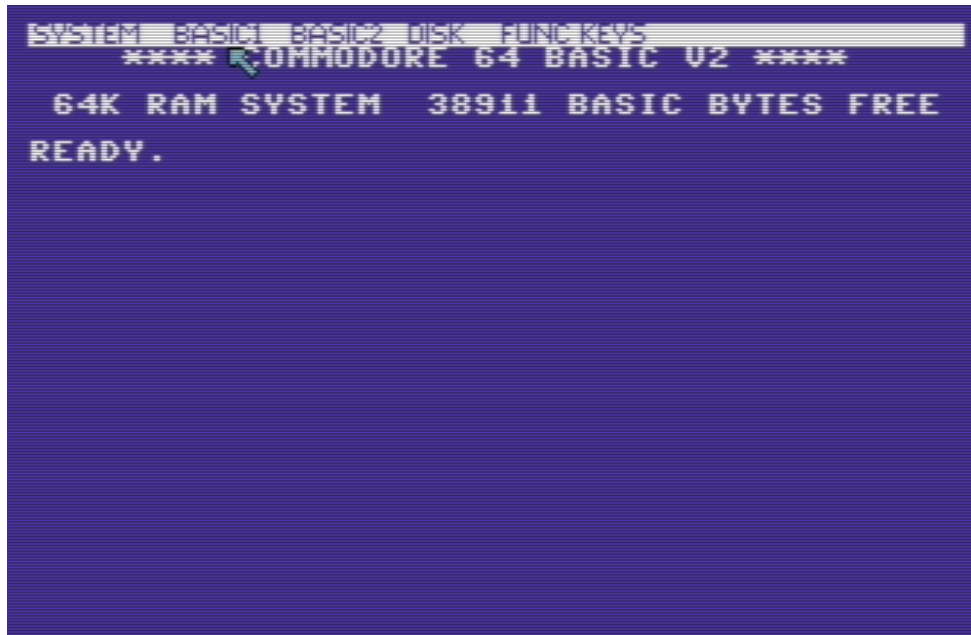
Going to the extended BASIC mode and pressing FIRE on Joysick
you get access to the menu shown above.

## 12.      *Extended BASIC's commands in Final III + mode*

Activation of the extended BASIC is possible by:


Pressing the COMMODORE key when the computer is turned on
choosing SYSTEM option from the main menu and then BASIC
option

Exit from extended BASIC is possible by:


- choosing the DESKTOP option from the SYSTEM menu
- writing DESKTOP and pressing RETURN
- writing FINAL KILL and pressing RETURN
- pressing the FREEZER button
- selecting FINAL KILL option from the SYSTEM menu


Listing programs and monitoring is possible up and down using
the cursor keys. By pressing CTRL and CLR / HOME
simultaneously, the cursor moves to the upper end of the text
on the screen.


In the extended BASIC you can work with the CENTRONICS
interface.


A copy of the current screen on the printer can be obtained by
simultaneously pressing the CTRL and RETURN keys.
After activating the BASIC option, it is possible to work with
the extended version of BASIC. Orders in this version can be
issued as follows:

write the whole word + RETURN
write the first letter, then the second letter with SHIFT +
RETURN

Thanks to the extension of BASIC's capabilities in this mode,
we can use the PULL-DOWN MENU, which greatly simplifies the
work of writing programs. PULL-DOWN MENU is called by pressing
FIRE.

In this mode the function keys have the following commands
assigned:

**F1** - program listing
**F2** - monitor
**F3** - starting the program
**F4** - restoring the program
**F5** - reading the first file from the floppy disk
**F6** - write the program to a floppy disk
**F7** - listing the floppy disk catalog
**F8** - drive station command

Description of the commands for this mode:

**APPEND** - allows you to combine programs. It makes it possible
to match an already existing program in the memory of another
program from the tape (append-cassette, dappend - diskette).

APPEND "program name", 7 or 8

**ARRAY** - issuing this command results in listing all array
variables present in a given program.

**AUTO** - automatic numbering of lines in the program. To end the
auto-numbering, press RETURN without writing the line content.

AUTO x, y
x - the starting number of the line
y - numbering step
In the absence of parameters x = 100, y = 10.

**BAR** - turns on or off [f3basic2]. If the BAR is off, there is
an additional 24KB available for your own program.

BAR - included
BAR OFF - turned off

**DEL** - deletes selected program lines.

DEL x, y - deletes lines from x to y
DEL - y - deletes the line to y
DEL x- - deletes all lines from x

**DESKTOP** - after you answer Y to Are you sure (Y / N), you return to work in the DESKTOP module.

**DLOAD** - loads the program from the disk drive.

DLOAD "program name"

**DOS** - system command for the disk drive. It can be obtained by pressing F8. For example, it replaces a sequence of commands:

OPEN 1,8,15, "NO: nme, id" and CLOSE in BASIC version 2.0 by the DOS command "NO: name, id"
DOS "order: specification1, specification2"

**DSAVE** - records the program to a floppy disk.

DSAVE "program name"

**DUMP** - allows to get to know all numerical variables in the program.

**DVERIFY** - performs program verification from a floppy disk - checks the program's compatibility with a program on a floppy disk.

DVERIFY "program name"

**FIND** - finds the sequence of symbols used in the program.

FIND "sequence" e.g. FIND "GOTO 423"

**HELP** - gives additional information about errors in the program.

**KILL** - disables FINAL III programmatically. When the cartridge is turned off, the LED is off.

**LIST** - causes listing of the program.

**MEM** - displays the contents of the memory divided into parts for the program, variables, tables, etc.

**MON** - transition to work with MONITOR (F2).

**MREAD** - causes 192 bytes of memory to be read from a specific place in the memory.

**MWRITE** - allows you to transfer a read block to any memory location, up to 24K bytes of RAM, which is usually "under" ROM.

MREAD location

Example:

```
FOR I = 0 TO 4
MREAD $0400 + I * 192
MWRITE $A000 + I * 192
NEXT I
```

This program copies the screen to the memory area under BASIC.
**OLD** - restores the program after the NEW command or after performing the RESET.

---

**Comments:**

**It is possible to transfer to all memory locations but the commands are intended to use 24k of RAM which are ordinary "under" ROM. This additional memory can be used as a place to store large amounts of information such as variables, text and graphics, reference tables, etc. 24k of additional RAM can be found at:**

**$ A000- $ BFFF = 8k BASIC interpreter**
**$ C000- $ CFFF = 4k of RAM**
**$ D000- $ DFFF = 4k VIC, SID and I / O**
**$ E000- $ FFFF = 8k kernel**

**To transfer 192 bytes, Final III uses a tape recorder cache.**

---

**OPEN** - this command opens the input / output channel for peripherals, and additionally, the Final Cartridge III expands it to CENTRONICS printers.

OPEN file number, device, address

Example:
OPEN 1,4,2 - allows you to use all normal ASCII characters.
OPEN 1,4,3 - allows you to use all ASCII codes and control codes used by printers.
OPEN 1,4,9 - allows printing of graphics and control codes.
OPEN 1,4,10 - works the same as OPEN 1,4,9, but prints from the back.

---

**Comments:**

**To view the program to the printer, you can use:**
**OPEN 1,4,9: CMD 1: LIST**
**After printing, close the printer channel**
**PRINT # 1: CLOSE 1**
**You can also use the PLIST command**

---

**ORDER** - restores order in connected programs after using command (D) APPEND.

**PACK** - after using this order, the program is packed. It allows you to save space on the media. The program starts from address 2049 (0801 HEX). To run the packed program, execute the UNPACK command.

**PDIR** - causes the file to be printed.

**PLIST** - prints the program listing.

**RENUM** - causes numbering of the program lines already written. Also reorders numbers in GOTO and GOSUB orders.

```
RENUM x, y
x - number 1 of the program line
y - numbering step
In the absence of parameters x = 100, y = 10.
```

**REPLACE** - this command allows you to replace the text or BASIC commands of the entire program.

```
REPLACE command1, command2 / "text1", "text2"
```

Example:
REPLACE PRINT # 1, PRINT - replaces the PRINT # 1 command with the PRINT command
REPLACE "FC3", "Final Cartridge III" - replaces FC3 with the text of Final Cartridge III.

**TRACE** - allows you to track the execution of the program in BASIC. Facilitates the search for errors.

```
TRACE - inclusion
TARCE OFF - switching off
```

**UNPACK** - restores the normal state of the program after the PACK command.

**$** - allows the use of hexadecimal numbers in programs, just like using decimal numbers. In order for the computer to know that we want to use the hexadecimal value, we must precede it with the $ symbol.

```
$ hexadecimal value
```

Example:
A = $ 0F - we assign a value of 15 to the variable
POKE $ D020, A - changes the color of the frame to gray
SYS $ FCE2 - resets the computer

---

## 13.    Monitor - list of orders of the Final III + mode



**MONITOR** - screen view after activating this mode

The option to learn about the interior of the computer, allows
you to write your own programs and allows you to watch games.
It consists of four parts: a machine language monitor, a disk
monitor, a character monitor and a sprite monitor. Ways to set
the MONITOR option:


writing the word MONITOR and pressing RETURN
pressing the F2 key
selecting the MONITOR option from the menu

The end of the MONITOR option is done by writing X and
pressing RETURN. After calling MONITOR, an information header
will appear on the screen with the following form:


C *
   PC IRQ BK AC XR YR SP NV # BDIZC
:; AB25 EA31 07 8D FF FF FF *. ** ... *


They are individual registers, along with their contents of
the processor flag.
Presentation of memory content:


: 2000 48 45 4C 4C 20 2A HELLO - hexadecimal recording
: 2000 HALLO *** FC-III QUALITY TEST ** - text entry
: 2000 *. *. * ... *. * .. ** .. - SPRITE MODE
: 2000 *. *. - CHARACTER MODE
.2000 48 PHA - mnemonic entry

SWITCHING MEMBERS OF MEMORY
C64 has the ability to address only 64 KB of memory. Because it must use 20 KB of ROM (KERNAL BASIC and CHARACTER ROM) and 64 KB of RAM at the same time, only the address areas are used twice. To create the user the ability to control access to the appropriate memory, FIANL III + can switch the appropriate memory banks so that they are visible or invisible from the MONITOR level.

In MONITOR mode, you can use the function keys:

**F3** - scroll the image up.
**F5** - scroll the image down.
**F7** - the equivalent of the DOS command "or @.

**LIST OF MONITOR MODE ORDERS**

**A** - assembling
- it is used to create your own programs.

A xxxx mnemonic
xxxx - is a 4-digit hexadecimal address
mnemonic - the symbol of the operation


A 0531 LDA # $ 09

**C** - comparison
- compares the set memory areas with each other, writing out all the cells in which there is a difference.

C xxxx yyyy zzzz
xxxx, yyyy - the beginning and end of the 1st area
zzzz - the beginning of the second area

**D** - disassembly
- gives a numerical value and mnemonic.

D xxxx yyyy xxxx, yyyy - the beginning and end of the area

or

D xxxx + scrolling with the cursor keys

**EC** - an overview of the memory content of the character area. It helps you define your own characters or change existing ones. The * character activates the character byte and the character. its deletion.

EC xxxx yyyy

gives a memory printout between xxxx and yyyy as a string.

**ES** - review of the memory content of the sprite area, shows the memory as characters for sprites.

ES xxxx yyyy

**F** - filling the memory with a specific code.

F xxxx yyyy zz
xxxx, yyyy - beginning and end of the filled area
zz - filling the code

**G** - start of the program from the cell with the given address. Useful for testing programs.

G xxxx
xxxx - indicates the start address

**H** - browsing memory for a given string of characters. The computer prints the addresses of all cells containing the search code.

H xxxx yyyy zz
xxxx, yyyy - the beginning and end of the searched area in search of the zz code

or

H xxxx yyyy "word" - search in a given area of the string, meaning the word in ASCII codize.

**I** - interpretation of characters as text. Great help in translating games into mother tongue, in finding key words in programs.

And xxxx yyyy

**L** - loading programs - you can load programs from disk and cassette to any memory areas. You can load other operating systems into the RAM under the ROM, which is to simulate cartridge operation.

L "name", xx, yyyy
xx - 1 cassette, 7 turbo cartridge, 8 or 9 disc drive
yyyy - starting load address (only for disks eg: L "name", 8,2000)

**M** - memory map. Viewing memory contents in the form of numeric content next to ASCII codes corresponding to this content. 8 bytes are in one line. To change the memory content, move the cursor over the given cell and enter the desired value there

M xxxx yyyy

**O** - choice between ROM and RAM. It allows the use of RAM
normally disconnected by the BASIC interpreter and the
operating system.

About x
x - value between 0 and 7
00 - disables all ROMs. then you can use the BASIC ROM
addresses (A000-BFFF), CHARACTER ROM (DOOO-DFFF) and the
KERNAL ROM operating system (E000-FFFF)

**OD** - after using this command the monitor supports the memory
of the disk drive.

**P** - printout of the screen on the printer.
**R** - assemblage - used to create your own programs.

**PC** - program register
**IRQ** - interrupt service address
**AC** - battery
**XR** - x register
**YR** - y register
**SP** - stack pointer
**N** - character flag
**V** - overflow bit
**#** - unused
**B** - interrupt flag
**D** - the decimal modulus flag
**And** - the break flag
**Z** - zero flag
**C** - transfer bit

**S** - ripping the memory for a cassette or disc.

S "name:, xx, yyyy, zzzz

**T** - transfer of memory contents from one area to another.

T xxxx yyyy zzzz - moving the area between xxxx and yyyy
addresses to the zzzz address

**X** - exit the MONITOR option.

**#** - decimal transformation into hexadecimal.

#x
x - decimal value

$ - hexadecimal transformation into decimal.

```
$x
```
x - wartość hexadecymalna

@ - the equivalent of the DOS command ".

* R - reading sectors from the disk.

* R xx yy zz
xx - track number
yy - sector number

* W - saving sectors on a floppy disk. It allows to make a copy of floppy disks, sectors, etc.



**BACKUP** - allows you to break virtually any program (even protected), and then rip it to a cassette or floppy disk. This program, uploaded to your computer, does not need the presence of FINAL III +. To make a copy of any program using FREEZER, do the following:


The transition to the FREEZER mode, reset the computer's memory using the ZERO FILL option, load and run the program intended for copying and then break it with the FREEZE button, modify the program to save a copy to the tape or floppy disk.

The BACKUP menu has the following options:

**DISK** - copying the copy to disk at normal speed.
**TAPE** - copying the tape to the tape at normal speed.
**FDISK** - copying to a disk at 15x speed.
**FTAPE** - copying the tape to a tape at 10x speed.

**GAME** - commands included in this option help to end the game, making it easier and often give so-called eternal life.

**SPRITE I** - disable sprite-sprite collision detection.
**SPRITE II** - disable sprite-picture collision detection.
**JOYSWAP** - allows you to change the port controlling the joystick.
**AUTOFIRE** - turns on FIRE permanently in the game.

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**COLORS** - allows you to change colors:

**BACKGND** - backgrounds.
**FOREGND** - subtitles.
**BORDER** - frames.



**SETTINGS**

**INTERFACE** - printer link selection
**PICTURE** - normal or rotated print
**COLORS** - print selection (color / monochrome)
**PRINTING** - an option for wide-angle printers
**PRINT** - runs the image printing process
**TYPE** - type of control codes:
**CBM** Compatibile - screen content is created and controlled using Commodore codes

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EPSON Compatibile - screen content is created and controlled
using EPSON codes
NEC P Series - screen content is created and controlled using
special NEC codes
HORIZONTAL VERTICAL SIZE - determination of print dimensions
GRAPHICS MODE - setting the working mode of the printer:

Graphic mode Characters per inch Printer type
Single density 60 8/24
Double density 120 8/24
Triple density 180 24
Quadruple density 240 8
High speed DD 120
CRT graphics 80 8
CRT graphics II 90 8/24

**ABORT** - interruption of printer operation (RUN / STOP)
**EXIT** - exit the SETTINGS option
**VIEW** - setting of different colors of the image with the
possibility of viewing on the screen.

**BORDER** - frame color
**FOREGND** - background color
**BCOLOR** 0 ... 3 - change in the color of images 0 ... 3
**EXIT** - exit from the VIEW option

**VIEW** - this command runs the CENTRONICS printer interface.
Resets the vectors when they are already set.



**RESET**
KILL - disabling FINAL III + without removing it from the
computer.
ZERO FILL - reset the computer's memory.

CBM64 - this command resets the computer displaying the
standard screen and starts FINAL III + if it was disconnected.
RESET



**EXIT**
RUN - runs the stopped program from the moment it was
interrupted.
MONITOR - go to MONITOR.
DESKTOP - transition to work in DESKTOP (window screen).


Authors of that user manual:
Wegi
RS2322


Sources for materials related to Final III +:
Instruction Final III issued by Atrax
https://www.c64-wiki.com/wiki/Final_Cartridge_3
http://www.c64scene.pl
http://c64.com.pl
https://csdb.dk/


Mouse: Attention - With the old Version of the "Final
Cartridge 3", only in joystick mode (press right mouse key on
the mouse 1351 during power on!).