



TRIANGULAR  $\mu$ OS 1.05/PET

for



Manual

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# PART A

## PREPARATIONS

# 1. Introduction

TRIANGULAR  $\mu$ OS is GUI (graphic user interface) operating system for 8-bit Commodore computers. This Manual pertains to TRIANGULAR  $\mu$ OS 1.05/PET version for Commodore PET equipped with 40 column display.

## Package contains files:

- *TRIANGULAR  $\mu$ OS 1.05-PET for Commodore PET Manual.pdf* – this manual
- *TRIANGULAR  $\mu$ OS 1.05-PET.d64* – image of TRIANGULAR  $\mu$ OS System Disk, which consists of 22 files, which all take 43.78 KB on System Disk (188 disk blocs = 47 KB)
- *purple.vpl* – custom purple color palette for VICE emulator

Goal of creating this system was to develop GUI for 8-bit Commodore computers with lowest amount of memory: that is Commodore PET with at least 4KB of memory.

This software is written in Commodore BASIC language using WinVICE PET emulator, and is designed to run on less than 3KB available for BASIC programs available in lowest 4KB model of Commodore PET and will run on any 40 column PET model with bigger amount of memory. Commodore BASIC (an interpreted language similar to JAVA or C# CLI) is default language used in 8-bit Commodore computers and also functions as OS for them. So  $\mu$ OS sits top of BASIC and KERNAL (Commodore's kernel). It is designed to support Basic 1.0 (V1 / Original ROM - this version supports disk drive only in VICE emulator) or 2.0 (V2) and higher editions of Commodore BASIC.  $\mu$ OS works only in text mode, since PET has not any graphic mode.

TRIANGULAR  $\mu$ OS for Commodore PET on Lemon64 forum:

<https://www.lemon64.com/forum/viewtopic.php?t=78834>

TRIANGULAR YouTube channel:

<https://www.youtube.com/channel/UCdnynTqbM8S6mc0EUXY58Gg/>

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## 2. Changelog

### What's new in TRIANGULAR $\mu$ OS 1.05/PET for Commodore PET:

- Config file contains system key
- UOS/BIOS error messages system improved
- DISK text program added to show disk content and run programs
- SETTINGS can properly cancel changes and other bugfixes
- Improvements, bugfixes and cleaned code from redundant parts of all programs produced very stable version

### Changelog for TRIANGULAR $\mu$ OS 1.04/PET for Commodore PET:

- OS name changed to TRIANGULAR  $\mu$ OS
- Launching and config filenames changed
- 8 KB version removed (since it is actually slower than 4 KB version)
- GUI: windows have black close buttons
- Taskbar window name moved to left side of TRIANGULAR logo orb
- Click/select key changed to 0 (zero)
- DESKTOP renamed to GUI
- THIS PC window renamed to THIS PET
- SETTINGS now have button SAVE for saving settings
- Some icons updated
- CMD is greatly overhauled with commands syntax similar to DOS Wedge/JiffyDOS and added listing directory/disk content function
- MONITOR improved
- WORDS instead of WORD – this is completely new word processor
- SIMCITY game added in place of LUNAR LAND
- Other games have slightly different menu keys
- Games from 8 KB version removed
- Improvements and bugfixes

### **Changelog for TRIANGULAR OS 1.03 for PET:**

- System now have 4KB and 8KB modes – launcher choose which one to boot
- 8KB mode has consolidated code into 1 program of GUI, STAR WARS, BIOS and TRIANGULAR OS launcher, CMD and its HELP, Monitor and its HELP
- Fixed bug in disk detection system
- Few minor bugfixes
- 2 new games (RATRUN & MAD BOMBER) in 8KB mode (instead of SNAKES and LUNAR LAND)

### **Changelog for TRIANGULAR OS 1.02 for PET:**

- Minor visual changes across the board (mostly highlighted key letters)
- Launch program renamed to TRIANGULAR OS
- TRIANGULARS OS/BIOS – has improved disk drive detection system. Drive database expanded (include SD2PET (*experimental*)). Loads OS>CFG file with wallpaper settings. From BIOS Setup Menu option is added to exit to BASIC
- GUI OS – SETTINGS saves wallpaper settings in file OS>CFG
- CMD – fixed drive # change mechanism. Minor bugfixes.
- OFFICE apps visual revision and many bugfixes
- GAMES minor visual changes and bugfixes

### **Changelog for TRIANGULAR OS 1.01 for PET:**

- First version to have manual
- Various minor improvements done in launching TRIANGULAR program
- BIOS – fixed launching logo position
- GUI OS – memorize cursor position in-between loading modules plus minor bugfixes
- CMD – many bugfixes
- MONITOR – fixed serious bug preventing user from running machine language programs
- OFFICE – apps can now properly load and save data on disk
- STAR WARS – added music in intro and outro. Game engine now don't reset system clock
- SNAKES – AI opponent fixed and minor esthetic changes
- LUNAR LAND – received minor esthetic changes

### 3. What you need

In order to run TRIANGULAR  $\mu$ OS, you will need either real 40 column Commodore PET computer with 4 KB of RAM (or more) and disk drive or freeware VICE emulator, which is available here:

<https://vice-emu.sourceforge.io>

VICE emulator should be configured as 40 column model (model 2001, 3000 or 4000 series). Disk drive that can read 170KB 5.25" diskette (\*.d64 file) must be enabled: recommended CBM 2031 (default). Any KERNAL ROM/BASIC version supporting disk drive or memory size configuration is supported by this  $\mu$ OS.

For special purple color in VICE emulator use custom pallet *purple.vpl* file included in this package, as external pallet. This custom pallet was created in PaletteEditor .11, program available here:

<https://www.lemon64.com/forum/viewtopic.php?t=53176>

(Download, only if you want create your own custom color for PET)

## PART B

# HOW TO USE TRIANGULAR $\mu$ OS

## 4. How to use TRIANGULAR $\mu$ OS 1.05/PET

To start using TRIANGULAR  $\mu$ OS insert *TRIANGULAR uOS 1.05 PET.d64* into disk drive and type command: **LOAD "\*" ,8** or **LOAD "UOS" ,8** in BASIC and press Return key (or Enter on PC keyboard in case of emulators). System launcher named UOS will check your system. If you are using your drive as device #8, use one of above commands. If you are using different device # then change last number (8) to it (e.g.: **LOAD "\*" ,9** if you want to use disk drive #9). After successfully loading startup program type **RUN** (and press Return/Enter) to start  $\mu$ OS.

By doing so whole system starts. Program named UOS is first element of BIOS of this system. It checks if running machine is indeed Commodore PET computer, which BASIC version it is running (V1 or V2 and higher), if this is 40 column version. Next BIOS will check if there are disk drives, detects disks hardware IDs, and if system disk is present, automatically sets boot drive to lowest disk drive # containing matching system disk and load configuration file.

If any of above activities were not finished successfully, BIOS will display error message and return to default BASIC mode. If everything went OK, launching screen will appear. By pressing DEL key, you can enter into BIOS SETUP menu, where system parameters and list of detected disk drives will be presented. To change boot device hit highlighted key (A-D) after name of available disk drive. you can also change system time by using T key and entering new time in format HHMMSS or reset system clock by hitting R key. To restart whole system press E key. To quit this menu use X key to go back to launch screen. By pressing S key computer exits  $\mu$ OS completely and will go into its standard BASIC mode. When DEL key is not pressed, BIOS continues to launching GUI.

GUI (graphic user interface) is central element of TRIANGULAR  $\mu$ OS. GUI is navigated by pressing number pad keys, which moves arrow-like cursor:

- 2 – down
- 4 – left
- 6 – right
- 8 – up
- 0 – select/click

On bottom of the screen there is task bar with TRIANGULAR logo on center and digital clock on the right. Clicking this logo will open menu where you can select:

- SETTINGS – opens SETTINGS window
- RESTART – restarts TRIANGULAR  $\mu$ OS
- SHUT DOWN – exits to BASIC

In SETTINGS window you can change system time (by clicking on + and – signs to change hours, minutes, seconds). Click on RESET CLOCK button resets system clock. By clicking on one of five tiles on right of PATTERN label you can change system wallpaper pattern. Button SAVE saves wallpaper selection into config file. As in most GUI clicking on X button will close the windows. By doing so without saving, any wallpaper changes are canceled.

On main screen desktop there are 4 icons:

- THIS PET – open window similar to My Computer or This PC on Windows
- OFFICE – opens folder with selection of office suite applications
- GAMES – opens folder with games
- MONITOR – starts memory monitor

THIS PET window contains 2 icons:

- DISK – open program which shows content of disk and starts stored on it programs
- CMD – starts a command prompt program

DISK is program that show disk content and can start programs store on disk. On start it checks disk (it can take a while) and displays System Disk content: disk name and list of files stored on it. By using Cursor up and Cursor down keys you can scroll the disk programs list. you can run selected program by hitting Return/Enter key. In upper area there are labels with disk drives available (8> to 11>) with letters under them (A-D). (Only available disk drives will be displayed here and there should be at least one drive available). By pressing key of available disk drive (A-D) you can display content of that disk. When there no disk in that drive or disk is empty program will display messages: NO DISK! or EMPTY DISK! Use Shift + Delete keys to exit.

CMD is a DOS-like command prompt program that allows you to manage disk content. It accepts one of following commands (disk and file names cannot be longer than 16 characters, ID must be exactly 2 characters long):

- HELP – shows help
- CLR – clears screen
- EXIT – go back to desktop
- RESTART – restarts TRIANGULAR  $\mu$ OS
- BASIC – restarts computer to BASIC
- & – displays basic system info
- @ – displays current device info
- #[*device number*] – changes disk drive (8-11 e.g.: #8, #11)
- \$ – show directory (content) of disk
- ↑[*filename*] – load program (e.g.: ↑SIMCITY)
- ↑ – load first encountered program (similar to LOAD “\*”,8 in BASIC)
- S>[*filename*] – deletes file (e.g.: S>SIMCITY)
- R>[*new name=old name*] – renames file (e.g.: R>NEW NAME=OLD NAME)
- C>[*new file=original file*] – copies file (e.g.: C>NEW FILE=ORIGINAL FILE)
- N>[*disk name<id*] – formats disk (ID parameter is optional) (e.g.: N>DISKNAME<ID)
- I – initialize disk
- V – validates disk
- #1 – load program from cassette tape #1
- #2 – load program from cassette tape #2

MONITOR is program that shows and edit computer memory. Memory cells values are displayed in hexadecimal number system (0-F). Possible commands below (type X in any further prompts to cancel operation):

- HELP – shows help
- CLR – clears screen
- EXIT – go back to desktop
- ENTRY – change memory from given memory address, one byte after one byte (additionally, besides X, you can type R to fast repeat previous byte value)
- SHOW – shows memory content starting from given memory address
- FILL – fills specified memory region with given byte value
- COPY – copies specified memory region to another
- GO – executes machine language program

OFFICE folder contains 4 office suite programs:

- WORDS is a word processor. Use Cursor Up or Cursor Down/Return to scroll page. Shift + Return to discard changes in current line. Press Shift + Home to start new file. Home key prints document on printer #4. Use C= key to load document and Shift + C= to save current document to file. Exit by pressing Shift + Delete keys.
- CALC – very simple spreadsheet program. Press number 1 to 7 to enter/change values in that spreadsheet row. Press N to start new file, S to save file, L to load file and P to print. Use X key to exit.
- CONTACTS – create and manage contacts information. Press N to enter new contact information, S to save it, L to load contact and P to print. Use X key to exit.
- MATH – scientific calculator. To add 2 numbers, enter 1<sup>st</sup> number (by pressing Return/Enter key and then entering it). Press + key. Next similarly add 2<sup>nd</sup> number and then again press +. Result is showed on right from RESULT label (near top of screen). Other mathematical functions operate similarly: enter 1 or 2 numbers and press highlighted key in the name of operation listed on screen. Use Shift + Delete keys to exit.

GAMES folder offers 4 game titles (instructions inside every game):

- STAR WARS X-Wing vs TIE Fighter – fabulous Star Wars themed space shooter. Shoot down 100 TIE Fighter to discover Darth Vader greatest secret. Move by using keys 2,4,6,8. Shoot by pressing Spacebar.
- SIMCITY – create and develop your city. Press R, C or I key to place Residential, Commercial or Industrial zones. Use Space to build a road. Roads are essential since only zone segments with road adjacent to it can develop into used one and bring revenue to city
- SNAKES – play game of snakes with second human player or computer opponent
- BREAKOUT – superb PET edition of this famous game. Press 4 or 6 to move bar