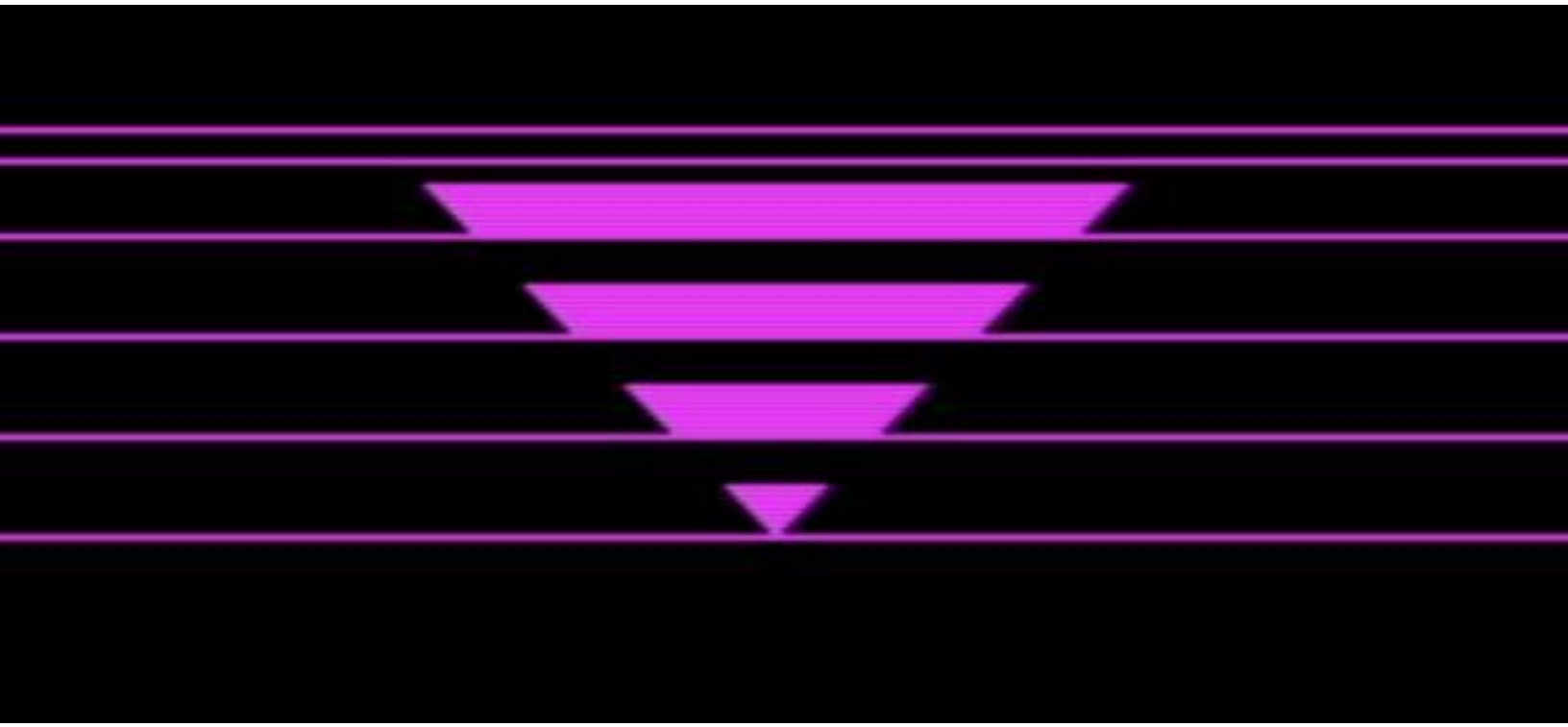

TRIANGULAR µOS 1.19

for

Commodore VIC 20

User's Manual

Contents:

PART A

PREPARATIONS

1. Introduction

TRIANGULAR μOS is GUI (graphic user interface) operating system for 8-bit Commodore computers. This User's Manual pertains to TRIANGULAR μOS 1.19 version for Commodore VIC-20 with 29KB of RAM (24KB Expansion).

Package contains files:

- *TRIANGULAR μOS 1.19 for Commodore VIC-20 Manual.pdf* – this manual
- *TRIANGULAR μOS 1.19.d64* – image of TRIANGULAR μOS System Disk containing 7 files, which takes 37.84 KB (156 disk blocs = 39.00 KB on disk)
- *TRIANGULAR uOS 1.19 Documents.d64* – empty formatted μOS Documents disk image for documents

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. Later it was expanded for Commodore VIC-20, Commodore 64 and Commodore 128.

This software was written in Commodore BASIC language (port of Microsoft BASIC) using CBM prg Studio 4.1.0, and is designed to run on at least Commodore VIC-20 with 24KB Expansion (total 29KB of RAM) and will run on any model with higher amount of memory expansion. TRIANGULAR μOS is designed to support BASIC 2.0 (V2) and works only in color text mode. Commodore BASIC (a runtime interpreted language similar in basic concept to JAVA RTM or C# CLI) is default language used in 8-bit Commodore computers and also functions as their OS and user interface. Similarly, to early Microsoft Windows (1.0 to 3.11), μOS sits atop of BASIC and KERNAL (Commodore's kernel) and Commodore DOS. It uses Commodore DOS implemented in Commodore disk drives or 3rd party solutions in order to load its parts, load/save settings and documents, perform operations on floppy disks and communicate with disk drive(s).

2. What's new

What's new in TRIANGULAR µOS 1.19 for Commodore VIC-20:

- Version of TRIANGULAR µOS 1.15 for Commodore VIC-20 with 24KB RAM extension with changed filenames convention, saving to .txt file, MONITOR improvement and other bugfixes added in version 1.11

3. What you need & Support

In order to run TRIANGULAR µOS, you need real Commodore VIC-20 computer with 29KB of RAM or more (24KB RAM Expansion) and disk drive and joystick to operate cursor.

You can also use freeware VICE emulator, which is available here:
https://vice-emu.sourceforge.io

VIC-20 emulator VICE must be configured with 24KB RAM Expansion or any higher memory configuration. Disk drive that can read 170KB 5.25¨ diskette (.d64 file) must be enabled: recommended CBM 1540 (default). Also, you should enable joystick. You can easily configure it as Numpad keys:

- Up (8), Down (2), Left (4), Right (6)
- You can move diagonally e.g., Up-Left (7)
- 0 or right Ctrl: Fire (click/select)

SUPPORT:

For more information, to report bug or to get help go to links listed below.

TRANGULAR µOS for Commodore VIC-20 on DENIAL forum:
https://sleepingelephant.com/ipw-web/bulletin/bb/viewtopic.php?t=10352

TRANGULAR µOS for Commodore VIC-20 on Lemon64 forum:
https://www.lemon64.com/forum/viewtopic.php?t=78834

TRIANGULAR YouTube channel:
https://www.youtube.com/channel/UCdnynTqbM8S6mc0EUXY58Gg/

SDK pack available here:
https://www.mediafire.com/file/94nxn5fu0ktoe36/TRIANGULAR_uOS_1.19_SDK.zip/file

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PART B

HOW TO USE TRIANGULAR μOS

4. How to use TRIANGULAR µOS 1.19

To start using TRIANGULAR µOS insert ***TRIANGULAR µOS 1.19.d64*** disk 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 µOS.

Now system starts. Program named UOS is first element of BIOS of this system. It checks if running machine is indeed Commodore VIC-20 computer, how much memory it has installed in and checks screen memory. Next BIOS checks if there are any disk drives, detects their 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 more than one System Disks are inserted in multi disk drive machine you can boot into higher device # drive by using F1 [#8] - F4 [#11] keys).

If any of above system checks weren't finished successfully, BIOS will display error message and return to default BASIC mode. If everything went OK, launching screen will appear. By pressing F1 key, you can enter BIOS SETUP menu, where system parameters and list of detected disk drives will be presented. To change Boot Drive or Work Drive hit highlighted key (F1 - F8) displayed after name of available disk drive*. You can also change system time by using T key and entering new time in format HH:MM:SS or reset system clock by hitting R key. To continue without saving changes (besides time clock which is changed dynamically) and go back to launch screen press E key. To save changes and restart µOS use S key. By pressing B key computer shuts down µOS completely and will go into its standard BASIC mode. When F1 key is not pressed when launching screen is present, BIOS continues to launching GUI.

*If you have other disk drive enabled, you can insert *TRIANGULAR uOS 1.19 Documents.d64* or any other disk into it and in BIOS Setup menu change Work Disk to that disk drive (most probably #9). By doing this you can easily load/save documents on separate disk than TRIANGULAR µOS System Disk (which is recommended setup). Otherwise, you will load/save documents from System Disk (unless you will change disk while working in WORDS word processor), which is default option (Work Disk set as #8 or device # of Boot Drive if #8 is not available).

GUI (graphic user interface) is central element of TRIANGULAR µOS. GUI's arrow-like cursor is joystick navigated:

– Up, Down, Right, Left
– You can move diagonally (e.g., Up-Left)
– Fire to select/click

On bottom of the screen there is task bar with black TRIANGULAR logo on center and digital clock on the right side with up arrow symbol to right of the clock. By clicking on this arrow, you will be able to go back directly to initial desktop screen from future windows (this is very useful when you want to skip closing previous windows and their inter-loading operations).

By clicking on TRIANGULAR logo, you will open start menu where you can select:

- SETTINGS – opens SETTINGS window
- RESTART – restarts TRIANGULAR µOS
- SHUT DOWN – exits to standard BASIC mode

On main screen desktop there are 4 icons:

- THIS VIC – open window similar to My Computer or This PC on Windows
- APPS – opens folder with selection of apps
- GAMES – opens folder with games
- SETTINGS – opens SETTINGS window

SETTINGS window allows you change system time (by clicking on + and – signs to change hours, minutes, seconds). Click on RESET CLOCK button to reset system clock. Below label WORD DISK there are buttons with device # (8> to 11>) on them. Red button color indicate that device is unavailable. Cyan color marks available drive and green show current selected work drive. Clicking on cyan button will change Work Drive to it. Below of PRINTER label there are buttons to select printer device # (NO, #4 - #7). If NO button is selected (default) no port is assigned and print functions are not available in TRIANGULAR µOS apps (e.g., WORDS). Most popular setup is to use printer as device #4. SAVE button saves selection into config file. As in most GUIs clicking on X button closes the window. By doing so without saving, any changes (besides time) are canceled. Rainbow colored COLORS button (to left of SAVE button) opens sub-window with GUI color management.

COLORS window enables color options. By clicking on one of eight tiles on right of BACKGR PATTERN label you can change desktop wallpaper pattern. COLOR offers selection of color for background wallpaper. REVERSED will reverse wallpaper patter (enabled with first pattern will change it to solid color). TITLE BAR will change color of title bar of windows. Don't forget to click on SAVE button to save color changes.

THIS VIC 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 a program for viewing disk content. Below title bar there are buttons with device # (8> to 11>). Red disk button indicate that device is unavailable. Cyan color marks available drive and green show current selected drive. Clicking on cyan/green button will start displaying disk content (on default program will display content of disk in Work Drive). Below buttons is field which displays disk name. When there no disk in disk drive or disk is empty (not formatted) program will display message: NO DISK! Further down there is field for disk content listing, which will display 10 items per page. In bottom corners of window there are 2 arrows: > (on right) will advance listing 1 page if additional programs are available and < arrow (on left) will get back to page 1. Clicking on any program will start it.

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 charters long):

- HELP – shows help
- CLR – clears screen
- EXIT – go back to desktop
- RESTART – restarts TRIANGULAR µOS
- BASIC – restarts computer to BASIC
- & – displays basic system info
- ! – displays current device info
- #[*devide number*] – changes disk drive: #1 for Datasette, disk drives 8-11 e.g.: #1, #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>[old name]=[new name] – renames file e.g.: R>OLD NAME=NEW NAME
- C>[original file]=[new file] – copies file e.g.: C>ORIGINAL FILE=NEW FILE
- N>[disk name<id] – formats disk (ID must be 2 charters long) e.g.: N>DISKNAME<ID
- D>[0]=[1] – make backup copy on double disk drives
- I> – initialize disk
- V> – validates disk

If any of above command will be entered erroneously or with improper parameter(s) error message INVALID COMMAND! or BAD PARAMETER! will be displayed. After operation user will be informed of its success (message: OK ✓) or descriptive error message will be displayed.

APPS folder contains 4 programs: WORDS, MATH, MONITOR and SYNTH.

WORDS is a word processor. Use Cursor Up or Cursor Down/Return to scroll page. Shift + Return to discard changes in current line and advance to next line (up or down). All operation evoked by function keys beside F5 (F1-F4 and F8) will pop up confirmation Yes/No prompt.

Press F1 to start new file. F2 prints document on printer. (You must assign printer to any port [#4 - #7] in SETTINGS, before printing otherwise F2 key won't enable printing function). Use F3 key to load document and F4 to save current document to file. F5 inserts tabulation of 5 spaces. Exit by pressing F8.

MATH – scientific calculator. To add 2 numbers, enter 1st number (by keyboard or by cursor by clicking on numbers in purple/blue field). Entered number will appear on right from B label. Use left arrow button or DEL key to delete 1 digit. Reset B register by clicking on C button or pressing C key. Click on = or + button or press = or Return key to store number from B register in A register. Next similarly add 2nd number and then click on any desired operation button or press +, -, *, /, % keys. Result is showed in A register (above B register). Other mathematical functions operate similarly: enter 1 or 2 numbers and press cyan button with given function. Pi button (with π symbol on it) stores π value in register B. Click ON or press O key to reset calculator state.

MONITOR is program that shows and edits 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 – goes back to APPS folder
- E>[address] – change memory from given memory address, one byte after one byte (in prompt type X to cancel, you can type R to repeat previous byte value)
- M>[address] – shows memory content starting from given memory address
- F>[1st address]-[2nd address]=[byte] – fills specified memory region with given byte value
- T>[1st address]-[2nd address]=[destination address] – copies specified memory region to another
- S>[1st address]-[2nd address]=[start address of other region] – swipes specified memory region with another
- G>[address] – executes machine language program starting at address

SYNTH – sound synthesizer. F1 and F2 keys will lower/rise volume (which is represented by green volumeter). Use keys listed in layout below to play on 4 sound voices simultaneously. Pressing those keys while holding Shift will play them in lower octave. Use F8 key to exit.

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

- SIMCITY – create and develop your city. Move cursor by joystick and 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 them can further develop into occupied one and bring revenue to the city
- STAR WARS X-Wing vs TIE Fighter – fabulous Star Wars themed space shooter. Score 500 points shooting down TIE Fighters to discover Darth Vader greatest secret. Move using keys A,W,S,D and shoot by pressing Spacebar.
- BREAKOUT – Superb edition of this famous game. Use Joy-right or Joy-left to move bar
- NEED4VIC – Great racing game. Press J or K to move your racing car

APPENDICES

A. Troubleshooting

Loading of next module of TRIANGULAR µOS can “freeze” in process of inter-loading next µOS module or disk program (very rare occurrence). This happens when loading screen not proceeds to next module for over 10 seconds for small µOS modules (it will take longer when much bigger 3rd party programs are loaded by user). When loading screen is not responsive for longer time, it means error in inter-loading procedure, most probably keyboard buffer was not filled with key properly. To see what really happened change color of cursor to blue (press Control + 7) and enter command POKE 36879,24 and hit Return key. This should change background color to white which will show underlying black text of loading sequence. If computer doesn’t change cursor or background color try again. If still there no effect it might be real freeze. If color change succeeds, try using RUN command to see if program will start or go to top of screen (Home key) and press Return in order try to reload program. If it will loads successfully enter RUN command. If that not work check if upper most load command is correct. It should have format: LOAD “[filename]”, [device # (8 - 11)] like in e.g.: LOAD “GUI”, 8. If none of it works then start system anew. To prevent this kind of freeze, try not to use keyboard when inter-loading procedure is performed (it can slip improper key into keyboard buffer, which most often leads to this error).

B. Changelog

Changelog for TRIANGULAR µOS 1.19 for Commodore VIC-20 [10-08-2023]:

- Version of TRIANGULAR µOS 1.15 for Commodore VIC-20 with 24KB RAM extension with changed filenames convention, saving to .txt file, MONITOR improvement and other bugfixes added in version 1.11

Changelog for TRIANGULAR µOS 1.18 for Commodore VIC-20 [09-08-2023]:

- Version of TRIANGULAR µOS 1.14 for Commodore VIC-20 with 16KB RAM extension with changed filenames convention, saving to .txt file, MONITOR improvement and other bugfixes added in version 1.11

Changelog for TRIANGULAR µOS 1.17 for Commodore VIC-20 [08-08-2023]:

- Version of TRIANGULAR µOS 1.13 for Commodore VIC-20 with 8KB RAM extension with changed filenames convention, saving to .txt file, MONITOR improvement and other bugfixes added in version 1.11

Changelog for TRIANGULAR µOS 1.16 for Commodore VIC-20 [07-08-2023]:

- Version of TRIANGULAR µOS 1.12 for Commodore VIC-20 with 3KB RAM extension with changed filenames convention, saving to .txt file, MONITOR improvement and other bugfixes added in version 1.11

Changelog for TRIANGULAR µOS 1.15/VIC for Commodore VIC-20 [19-08-2022]:

- TRIANGULAR µOS 1.15/VIC won't start on VIC-20 with less than 29 KB of RAM (24 KB RAM Expansion is needed or higher)
- GUI merged with MONITOR, WORDS and SYNTH
- MONITOR and WORDS errors messages accompanied by beep sound
- Besides LOADING screen there is added RESTARING (with yellow TRIANGULAR logo) and SHUT DOWN (with red logo)
- Bugfixes and improvements

Changelog for TRIANGULAR µOS 1.14/VIC for Commodore VIC-20 [14-08-2022]:

- TRIANGULAR µOS won't start on VIC-20 with less than 21 KB of RAM (16 KB RAM Expansion is needed or higher)
- GUI merged with MATH and CMD
- MATH keys assigned for basic functions (+, -, *, /, %) and ON
- CMD beep sound added while displaying error messages

Changelog for TRIANGULAR µOS 1.13/VIC for Commodore VIC-20 [12-08-2022]:

- TRIANGULAR µOS won't start on VIC-20 with less than 13 KB of RAM (8 KB RAM Expansion is needed or higher)
- GUI merged with COLORS & DISK
- GUI streamlined
- DISK received minor improvement of disk content handling mechanism

Changelog for TRIANGULAR µOS 1.12/VIC for Commodore VIC-20 [09-08-2022]:

- GUI merged with APPS, GAMES and SETTINGS
- COLORS can retrieve default color theme with DEAULT button
- DISK & CMD directory of disk content is retrieving file list at once
- CMD other updates, D> (duplicate) command added and other command syntax changes
- MATH improved, various functions added and few additional keys mapped
- MONITOR command syntax overhauled into 1-line commands
- Bugfixes and other minor improvements

Changelog for TRIANGULAR µOS 1.11/VIC for Commodore VIC-20 [31-07-2022]:

- TRIANGULAR µOS won't start on unexpanded VIC-20 5KB. VIC-20 with 8KB of RAM (3KB RAM Expansion) is needed (or higher)
- UOS and BIOS merged into single UOS program and improved error messages system
- CMD merged with its help file CMD>HLP and further improved
- CMD syntax of R> and C> operations changed to more intuitive [original file]=[new file]
- STAR WARS main menu merged with its game engine file STAR WARS>ENG

Changelog for TRIANGULAR µOS 1.11 for Commodore VIC-20 [05-08-2023]:

- Filenames convention changed from filename>ext[ension] to standard filename.ext[ension] e.g. uos>cfg to uos.cfg
- WORDS file extension changed to .txt
- MONITOR simplified running Machine Language programs
- Various other bugfixes and improvements

Changelog for TRIANGULAR µOS 1.10/VIC for Commodore VIC-20 [28-07-2022]:

- Supports Commodore VIC-20 with at least 5KB and it's 22 columns, 8 color text mode
- New colorful loader for inter-loading operations
- BIOS Setup menu offers option to enable/disable Datasette
- BIOS Setup supports separate Work disk drive for storing system apps documents
- BIOS improvements and bugfixes
- GUI cursor is joystick operated and can move diagonally
- GUI windowed environment uses custom color background and title bar
- Up arrow button added to task bar (placed right of clock) to go back to main desktop screen
- SETTINGS are split into two apps: SETTINGS which can change time, work disk and printer options and COLORS which can change colors of GUI elements
- DISK is now windowed and cursor operated. Changed disk content display mechanism.
- CMD introduced improved mechanism for displaying success or error of performed operation. Minor review of command syntax (I> and V> instead of I and V). Bugfixes.
- APPS folder in place of OFFICE contains WORDS, MATH, MONITOR, SYNTH
- MATH calculator revamped, simplified, windowed and cursor operated
- MONITOR have blue background. Command SHOW displays 2 hex digits instead of 4. Its HELP is consolidated. Minor bugfixes.
- 4 new games: SIMCITY, STAR WARS X-Wing vs TIE-Fighter (new version), BREAKOUT (new version), NEED4VIC
- Various other bugfixes and improvements
- Empty and formatted disk image called TRIANGULAR uOS 1.10-VIC Documents in .d64 and archived .zip file formats added for use as Work disk

Changelog for TRIANGULAR µOS 1.08 for Commodore PET [31-07-2023]:

- SETTINGS saving button name changed to APPLY
- Visual discrepancies corrected. µOS is geared more toward BASIC 2.0 and later versions
- Filenames convention changed from filename>ext[ension] to standard filename.ext[ension] e.g. uos>cfg to uos.cfg
- WORDS file extension changed to .txt
- Improved, bug fixed and cleaned code
- Code transferred to CBM prg Studio, code is more consolidated and over 3.5 KB smaller
- SDK package includes 20 source code .bas files, 1 Machine Language .prg file (BREAKOUT), 1 .cfg file, 1 empty disk .d64 file and two spreadsheet files .xlsx with system data

Changelog for TRIANGULAR µOS 1.05/PET for Commodore PET [29-06-2022]:

- Config file contains system key
- UOS/BIOS error messages system improved
- DISK text program is placed in THIS PET and it shows disk content and runs programs
- SETTINGS can properly cancel changes and other bugfixes
- Improvements, bugfixes and cleaned code from redundant parts in all programs produced very stable version

Changelog for TRIANGULAR µOS 1.04/PET for Commodore PET [21-06-2022]:

- Operating system name changed to TRIANGULAR µOS
- Launching program and config file names changed
- 8 KB version removed (since it is 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 is renamed to THIS PET and adds DISK icon which loads program form disk
- SETTINGS now have SAVE button for saving settings
- Some icons updated
- CMD is greatly overhauled with commands syntax similar to DOS Wedge/JiffyDOS and added function for listing directory of disk content
- MONITOR is 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 Commodore PET [27-02-2022]:

- System now have 4KB and 8KB modes – launcher will choose which one to boot into
- 8KB mode has consolidated code of GUI, STAR WARS into separate programs, as well as BIOS is combines with TRIANGULAR OS launcher, CMD with its HELP, MONITOR with its HELP
- Fixed bug in disk detection system
- Few minor bugfixes
- 2 new games (RATRUN & MAD BOMBER) only for 8KB mode (in replacement of SNAKES and LUNAR LAND)

Changelog for TRIANGULAR OS 1.02 for Commodore PET [06-02-2022]:

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

Changelog for TRIANGULAR OS 1.01 for Commodore PET [16-01-2022]:

- First version to have manual
- Various minor improvements done in launching TRIANGULAR program
- BIOS has fixed launching logo position
- GUI memorizes cursor position in-between of loading modules plus has minor bugfixes
- CMD has 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 has AI opponent fixed and minor esthetic changes
- LUNAR LAND received minor esthetic changes

Changelog for TRIANGULAR OS 1.00 for Commodore PET [24-12-2021]:

- Starting procedure changed: TRIANGULAR disk detecting program -> BIOS (Launching screen combined with BIOS Setup Menu) -> DESKTOP (GUI)
- System utilizes Datasette buffer memory to store status of TRIANGULAR OS
- BIOS detects if there are disk drives #8 - #11, detecting mechanism is improved and functioning drive type detection is added
- BIOS Setup Menu displays drives and can change BOOT drive and restart system
- DESKTOP is streamlined and icons redesigned
- START Menu is placed on center of task bar and is displayed just as TRIANGULAR logo and have SETTINGS, RESTART and SHUT DOWN options
- SETTINGS (renamed CONTROL PANEL) can change desktop wallpaper from 5 patterns
- MY COMPUTER is renamed THIS PC and its disk icon now open CMD program
- CMD (renamed DOS) can now change operating disk (#8 - #11) plus some improvements
- OFFICE apps have minor improvements
- MONITOR is heavily reworked and improved, operates on HEX values
- GAMES icon in place of STAR WARS icon opens folder with 4 games: STAR WARS X-Wing vs TIE Fighter, SNAKES, LUNAR LAND and BREAKOUT

Changelog for TRIANGULAR OS 1.00 BETA for Commodore PET [2016 to 24-10-2021]:

- System supports 1 cassette recorder: device #1 and only 1 disk drive: device #8
- BIOS have implemented simple PET type detection and it detects if there is disk drive #8
- BIOS Setup Menu is accessed with DEL key where you can change or reset system time
- Starting procedure: BIOS -> TRIANGULAR DOS -> Launch screen -> DESKTOP (GUI)
- DESKTOP (GUI) contains wallpaper, task bar on which are located: clock (right bottom), START Menu with TRIANGULAR logo (left bottom) and 4 icons: MY COMPUTER, OFFICE, STAR WARS and MONITOR
- START Menu has CONTROL PANEL, RESTART, EXIT TO DOS and QUIT TO BASIC options
- CONTROL PANEL can change time and reset system clock
- MY COMPUTER contains cassette and disk icon which can load first encountered program (equivalent of LOAD for cassette icon and LOAD “*”,8 for disk icon)
- OFFICE contains 4 office suite programs: WORD a word processor, CALC spreadsheet, CONTACTS contact manager and MATH calculator
- STAR WARS brings fabulous STAR WARS X-Wing vs TIE Fighter game
- MONITOR is a very simple memory monitor program, operates on decimal numbers