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Instruction Manual
C64 TUTOR

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C64 TUTOR
TABLE OF CONTENTS

INTRODUCTION

C64 TUTOR was designed to help you discover the capabilities of your Commodore 64. C64 TUTOR consists of two programs, TUTOR and UTILITIES. TUTOR is an interactive tutorial that introduces you to the C64. UTILITIES creates a learning environment in which you can explore the 64's calculating, text processing, graphic, and music capabilities. You can use UTILITIES for a quick sprite or music demonstration. With a little more experience you can use the letter writer to create letters, pictures, or even a slide show presentation. Students can use the calculator to learn how computers represent and process numbers. You are shown the settings you need to know to add what you have created with UTILITIES to your own programs.

GETTING STARTED

First time Commodore users will benefit most if they use TUTOR before using UTILITIES. TUTOR teaches you about the keyboard and provides an introduction to the C64 as a thinking tool. UTILITIES was written for those who have learned the information taught in TUTOR. You can easily play music, draw pictures, and create sprites using UTILITIES.

TUTOR and UTILITIES are computer programs. A computer program consists of instructions that tell the Commodore 64 what to do. To use a computer program you must first bring the instructions inside the computer. This is called loading a program. Once you have loaded a program, all you have to do is type **RUN** and press the key labelled Return. This tells the C64 that you want it to follow the program instructions.

C64 TUTOR comes packaged with a diskette and a cassette. If you have a floppy disk drive, you must follow the directions labelled LOADING DISKETTE which follow. If you have a cassette tape drive then follow the LOADING CASSETTE instructions.

LOADING DISKETTE

Insert the C64 TUTOR diskette in the disk drive with the label up and closest to you. Gently push the diskette all the way in and close the protective latch by pushing it down. Then type:

LOAD "TUTOR", 8

and press the Return key if you want to use the TUTOR program.

To use the UTILITIES program, type:

LOAD "UTILITIES", 8

and press the Return key.

The red light on the disk drive will light up and the program you selected will be loaded. Both programs are very large and will take several minutes to load. When the program is completely loaded, you will see:

READY

displayed on the screen and the red light on the disk drive will go out. Just type:

RUN

and press the Return key and you are ready to put TUTOR or UTILITIES to work.

LOADING CASSETTE

If you want to use TUTOR, place the cassette tape in the cassette drive with the side labelled TUTOR up. To use UTILITIES, place the cassette tape in the cassette drive with the side labelled UTILITIES up. Make sure the tape is rewound completely. Type:

LOAD

and press the Return key. The C64 will tell you to:

PRESS PLAY ON TAPE

Press play on your cassette drive. The screen will go blank until the program is found. The computer will then tell you it has found the program. Press the Commodore key and the program will be loaded into memory. The screen will go completely blank again and will remain blank until the program is completely loaded. TUTOR and UTILITIES are both very long programs and will take approximately 15 minutes to load.

When the program has been loaded you will see:

READY

displayed on the screen. Type:

RUN

and press the Return key and you are ready to use TUTOR or UTILITIES.

C64 TUTOR CAPABILITIES: TUTOR

TUTOR is designed to introduce a novice user to the Commodore 64. It teaches you how to talk to the C64 and how to use the keyboard. TUTOR shows some of the uses of the C64 and discusses computer memory.

TALKING TO THE C64

TALKING TO THE C64 explains what it means to talk to a computer. It demonstrates how to type colors, graphic characters, upper case letters, function keys, and control characters. You learn how to change colors, reverse character display, and use the Basic editor.

USES OF THE C64

USES OF THE C64 explains why the C64 is so powerful. The number, text, picture, and sound capabilities of the C64 are introduced. This section prepares you to use the C64 UTILITIES program.

EXPLORING THE C64

EXPLORING THE C64 teaches you about computer memory. Many of the more powerful features of the C64 cannot be used effectively without an understanding of memory and addresses. This section provides information that will make PEEK's and POKE's understandable.

C64 TUTOR CAPABILITIES: UTILITIES

UTILITIES is a program that lets you learn about the C64 and try it out without any programming knowledge. With UTILITIES, you can use the C64 as a calculator, text processor, sprite creator, or to play music.

Once you have loaded the UTILITIES program and typed RUN, you are ready to select a utility. A list of the utilities is displayed. You tell the UTILITIES program which of these utilities you want to use and it will start the selected utility for you. When you are finished using that utility, press **STOP** and you will be able to select another utility.

11

PROGRAMMER'S CALCULATOR

PROGRAMMER'S CALCULATOR is a utility that helps you calculate the numbers you need to write or understand a computer program. You can use it to learn about different number bases and how the C64 processes numbers. This calculator has many options, but beginners can ignore all the commands and just type in numbers. Whatever number is entered will be displayed in binary and hexadecimal representation. This is an easy way to learn about number bases. As greater computer insight is desired you can experiment with the commands to see how the numbers are changed.

Calculator Display

The PROGRAMMER'S CALCULATOR screen has three sections. The upper left side of the screen is the display section. The right half of the screen is the command section. The lower left side is the user entry section.

The display section shows you the last number entered or calculated in binary, hexadecimal, and decimal representation. The current base for number entry is highlighted using reverse video characters. The current base is the base used for any numbers you type in. If the current base was decimal and you entered the number 10, then you entered a decimal ten. If the current base was hexadecimal, then you entered a hexadecimal 10 which is a decimal 16. The current number is shown in both a signed decimal and unsigned decimal representation. This helps you see how negative numbers are stored in the computer. At the bottom of the display sec-

12

tion are three flags. A flag is a yes or no answer to a question. The **NEGATIVE?** flag shows the answer to the question: "Is the current number negative?". The **CARRY?** flag tells you that the last command created a number which was too large for our calculator. The **ZERO?** flag tells us that the current number equals zero. The Commodore has flags like this that programmers use to decide what to have the computer do next.

The entry section is where any number you're typing is displayed. That's why you'll find the cursor in this section. Any messages to you are also displayed in this section.

The command section lists all commands that the calculator has. The last command that you gave is highlighted unless you typed something that was not a valid command.

Using the Calculator

When you see the message telling you to:

PRESS COMMAND KEY OR ENTER A NUMBER

you can give the calculator a command or enter a number in the current base. If the base is decimal, you can enter negative numbers by starting off with a minus sign. You cannot enter a number with decimal places. Any number you enter will replace the current number. If you type a command, then the command will be executed.

Most of the commands just change the value of the current number or current base. ADD, SUBTRACT, TIMES, DIVIDE, MODULO, AND, OR, and XOR require a second number. When you type one of

13

these commands, you cannot specify another command until you have entered the second number. The current number will then be changed to the result of the operation performed on these two numbers.

To stop using the calculator, just press the **STOP** key.

Commands Requiring a Second Number

ADD . . . . The current number and a second number that you enter are added and replace the current number.

SUBTRACT . . . . The second number you enter is subtracted from the current number and the result replaces the current number.

TIMES . . . . The current number and a second number that you enter are multiplied and replace the current number.

DIVIDE . . . . The current number is divided by the second number you enter and the quotient replaces the current number.

MODULO . . . . The current number is divided by the second number you enter and the remainder replaces the current number.

AND. . . . . The current number is ANDed with the second number you enter and the result replaces the current number. AND takes every binary digit of the current number and compares it to the corresponding binary digit in the second number. If both digits are 1 then that digit is set to 1 in the result number. If both digits are not 1 then the result digit is 0.

OR . . . . The current number is ORed with the second number you enter and the result replaces the current number. OR takes every binary digit of the current number and compares it to the corresponding binary digit in the second number. If either digit is 1 then the corresponding bit in the result is set to 1. Only if both digits are 0 is the result bit set to 0.

XOR. . . . . The current number is XORed with the second number you enter and the result replaces the current number. XOR takes every binary digit of the current

15

number and compares it to
the corresponding binary
digit in the second number.
If one digit is 1 and the other
is 0, then the corresponding
bit in the result is set to 1.
If both bits are equal then the
result bit is set to 0.

Commands That Do Not Need a Second Number

NEGATE . . . . The current number is
multiplied by minus one and
the current number is
replaced with the result.

1'S COMPLEMENT . . Every binary digit in the
current number that is 1 is set
to 0 in the result. All 0's in the
current number are changed
to 1 in the result. The result
replaces the current number.

SHIFT LEFT . . . . The current number is
multiplied by two and the
result is the new current
number. The carry flag is set
to the leftmost binary digit in
the original number.

SHIFT RIGHT . . . . . . The current number is
divided by two and the result
is the new current number.
The carry flag is set to the
rightmost binary digit in the
original number.

ROTATE LEFT . . . . . . The current number is
multiplied by two, the
rightmost bit is replaced with
the carry flag, and the result
replaces the current number.
The carry flag is then set to
the leftmost binary digit in the
original number.

ROTATE RIGHT . . . . The current number is
divided by two, the leftmost
bit is replaced with the carry
flag and the result replaces
the current number. The carry
flag is then set to the
rightmost binary digit in the
original number.

ZERO . . . . The current number is set
to 0.

KILOBYTE . . . . The current number is set to
one kilobyte.

BINARY . . . . The current base is changed
to two.

HEXADECIMAL . . . . . The current base is changed
to sixteen.

DECIMAL . . . . The current base is changed
to ten.

LETTER WRITER

LETTER WRITER is a simple word processor. With the color, reverse video, graphics characters, and text characters, you can make pictures, color slides, graphs, or letters. LETTER WRITER lets you draw or write anything you want on the display screen. You just change the screen and LETTER WRITER will keep track of it all. When you have finished you can tell LETTER WRITER to save your finished screen to a diskette or cassette file. LETTER WRITER lets you load a saved screen so you can edit it later. Screens are saved as Basic programs so you can print the screen or add it to your own program.

Using the LETTER WRITER

The LETTER WRITER utility lets you create or edit as many letters as you like. At the start of each letter, you are asked:

PRESS BACKGROUND COLOR KEY DESIRED OR PRESS STOP TO QUIT:

If you press **STOP,** you will leave the LETTER WRITER and can select another utility. Type a Commodore color to set the letter screen color and to write a letter. You'll then be asked if you want to load an already saved letter. If you type yes, you will be asked for the name of the file to be loaded. This file will then be displayed for editing. If you type no, you will be given a blank screen for editing. Don't worry if you don't see anything on the screen. It has been erased so you can use the entire screen. To change the screen, just type as in Basic. You may also give a special command if you like. When you

have finished editing just press the **STOP** key. You then follow the displayed instructions to save your letter. If you want to throw away your letter, simply answer no when asked if you want to save the letter.

Special Letter Writer Commands

The following key combinations do extra work for you when typed:

Key Combination	Action
Control-Color or Cmd-Color	Change Color Characters typed will be displayed in the new color.
Control-RvsOn	Start Reversed Video Characters typed will be displayed reversed.
Control-RvsOff	End Reversed Video Characters typed will not be displayed reversed, but will display normally.
Control-L	Lower Case Letters The Commodore lower case character set will be used to display all characters.
Control-U	Upper Case Letters The Commodore upper case character set will be used to display all characters.
Crsr Keys or Shift-Crsr Keys	Move the Cursor The cursor will move in the direction indicated by the arrow on the key.

Key Combination	Action
Shift-Clear	Erase Line The line the cursor is on will be erased.
F1	Repeat The last character you typed is repeated.
F2	Enter Character by Number This lets you enter the number to use as a character code. Type in a number and press return and the character corresponding to that number will be displayed.
Control-D	Delete Line The line the cursor is on is deleted and all lines below are moved up one line.
Control-I	Insert Line The line the cursor is on and all lines below are moved down one line. The bottom line on the screen before the insert is lost.
Shift-Delete	Delete Character All characters on the current line from the cursor position on are moved left one space. The character to the left of the cursor is deleted.

Key Combination	**Action**
Insert	Insert Character
	All characters on the current line from the cursor position on are moved right one space. The rightmost character is lost.

SPRITE EDITOR

SPRITE EDITOR takes the drudgery out of sprite creation. A sprite is a displayable object that can be made into almost any figure or shape and moved around the display. Determining the numbers for a sprite definition by hand is very tedious. Using SPRITE EDITOR you draw the sprite you want and the numbers are calculated for you. You can instantly see what effect your changes will have on all sprite sizes. You can also change the sprite colors. You can load and save sprites to diskette or cassette to edit later or include in one of your own Basic programs. By loading a sprite from one file and changing it and saving it to a different file you can create animated sequences.

Using the SPRITE EDITOR

With the SPRITE EDITOR you edit one sprite at a time. After you have completed one sprite you can start on another. When editing a sprite, you must first specify what kind of sprite you want. You can select a high resolution or multicolor sprite. High resolution sprites can only have two colors. Multicolor sprites can have four colors. High resolution sprites can have more detail than multicolor sprites. If you press **STOP** when asked to select the sprite type, you will leave the SPRITE EDITOR.

After you have selected the sprite type you will be allowed to load a saved sprite. The numbers that make up a saved sprite (or 63 zeros if no sprite was loaded) will then be displayed. Then you can use the cursor keys to move to any of the numbers you wish to change. The Commodore manuals have

22

sprites that you can type in. When you are done changing these numbers, press **STOP**. You will then enter sprite draw mode. In draw mode you edit the large copy of the sprite on the screen until the sprites displayed beside it look the way you want. Press **STOP** to exit draw mode. The edited sprite definition is displayed. You can copy down the sprite definition by hand or save it to a file. This completes the editing of one sprite and you are ready to edit the next.

Draw Mode Commands

Key Combination	Action
1	Background Color Pixel The sprite pixel at the cursor position is changed to the background color.
2	Sprite Color Pixel The sprite pixel at the cursor position is changed to the sprite color.
3	Sprite Multicolor 1 The sprite pixel at the cursor position is changed to the sprite multicolor 1. This command only works with multicolor sprites.
4	Sprite Multicolor 2 The sprite pixel at the cursor position is changed to the sprite multicolor 2. This command only works with multicolor sprites.

Key Combination   Action

F1 .... Change Background Color
                    The background color is
                    changed to a color you type
                    in when asked.

F2 .... Change Sprite Color
                    The sprite color is changed
                    to a color you type in when
                    asked.

F3 .... Change Multicolor 1
                    The multicolor 1 is changed
                    to a color you type in when
                    asked.

F4 .... Change Multicolor 2
                    The multicolor 2 is changed
                    to a color you type in when
                    asked.

F7 .... Pen Off
                    Turns pen mode off. In pen
                    mode all pixels you move
                    over with the cursor are
                    changed to the last pixel
                    color you typed.

F8 .... Pen On
                    Turns the pen mode on.

Crsr Keys or .... Move the cursor
Shift-Crsr Keys   The cursor will move in the
                      direction indicated by the
                      arrow on the key.

Key Combination	**Action**
Q	Cursor Up and Left
	The cursor is moved up one row and left one column.
E	Cursor Up and Right
	The cursor is moved up one row and right one column.
D	Cursor Down and Right
	The cursor is moved down one row and right one column.
A	Cursor Down and Left
	The cursor is moved down one row and left one column.
Shift-Clear	Erase Line
	All pixels on the line the cursor is on are set to the background color.
Control-D	Delete Line
	The line the cursor is on is deleted and all lines below are moved up one line.
Control-I	Insert Line
	The line the cursor is on and all lines below are moved down one line. The bottom line on the screen before the insert is lost.

Key Combination	Action
Shift-Delete	Delete Pixel
	All pixels on the current line from the cursor on are moved left one pixel. The pixel to the left of the cursor is deleted.
Insert	Insert Pixel
	All pixels on the current line from the cursor on are moved right one pixel. The rightmost pixel is lost.

MUSIC MAKER

MUSIC MAKER lets you play music or make sound effects with your Commodore 64. You can change most of the C64 sound parameters and learn what they do. The sound parameters are very well described in the Commodore 64 Programmer's Reference Guide, but is hard to fully appreciate them until you have heard the effects of changing the parameters. Use MUSIC MAKER to play music or explore the C64 sound capabilities in an enjoyable way.

Using MUSIC MAKER

There are three screen pages for the MUSIC MAKER. The first screen page shows you how the notes will be played when you play the keyboard. The second page shows you what your current instrument is. The third display shows you the sound filter settings and special effect settings. The parameters on the first page can be changed at any time. The parameters on the second and third page can only be changed when the page they are on is displayed. You can play notes when any page is displayed. This lets you try changes out immediately.

With some sound parameter settings you will not hear anything when you play a note. If you change a sound parameter and cannot hear anything, just change the parameter again. When you have finished using MUSIC MAKER press **STOP**. You can then select another utility.

The Music Keyboard

You can play any of the notes in the current octave displayed on page one or in the lower half of the next higher octave. The notes are arranged like the keys on a piano. The Q key is the first note of the octave. The W is the next note. The rest of the notes use the remaining keys in this row over to the up arrow key. The sharps and flats use the corresponding key in the upper keyboard row. When you are on the first page any note you type will be displayed on a musical scale, along with the name of the note and its frequency. The frequency is displayed broken down into a high and low portion. Frequency low and frequency high are used when you want to use the note in a program.

When all the frequency information is being calculated you cannot play very fast. If you press the F4 key, the frequency calculations will be turned off and you can play faster. Just press the F4 key again when you want the frequency information displayed.

The current octave, number of voices, and note duration are also displayed on page one. You can change these parameters when you are on another page even though you can't see them. Just listen for the difference.

The parameters on the second and third page are changed using the cursor keys. When on the second or third page you will see the cursor positioned over one of the parameters. To change this parameter, type cursor up or cursor down. When you want to change another parameter, just type cursor right or cursor left to move the cursor to that parameter.

Special Music Commands

Key Combination	Action
F1	Display Page One The first music page is displayed.
F2	Display Page Two The second music page is displayed.
F3	Display Page Three The third music page is displayed.
F4	Show Frequency On/Off If the frequency display is on then turn it off. If it is off then turn it on.
F5	Increase Note Duration Increase the length of each note. You can also select a duration of HOLD or SUSTAIN. With a duration of HOLD a note will play as long as you hold the key. HOLD works best with a large sustain value. SUSTAIN causes any note you play to stay on until a new note is pressed. It also works best with large sustain values.
F6	Decrease Note Duration Decrease the length of each note.

Key Combination	Action
F7	Increase Number of Voices Increase the number of voices by one. You can have one to three voices. Each note is played in succession by each voice.
F8	Decrease Number of Voices Decrease the number of voices by one.
Space	Octave Down Increase the current octave by one. The current octave is a number from zero to six.
Shift-Space.	Octave Up Decrease the current octave by one.
Cursor Right	Next Parameter On page two and page three move the cursor right to the next parameter.
Cursor Left	Previous Parameter On page two and page three move the cursor left to the previous parameter.
Cursor Down	Decrease Parameter On page two and page three decrease the value of the parameter identified by the cursor.

Key Combination   **Action**

Cursor Up . . . . Increase Parameter
On page two and page three
increase the value of the
parameter identified by the
cursor.

UTILITY SYSTEM CONFIGURATION

UTILITIES uses two special parameters when saving letters and sprites to diskette or cassette. The first number is the starting line number for all saved Basic programs. You can change this number to a number not used in your program. This will allow you to add a saved letter or sprite to your program. The second number tells UTILITIES which device to save letters and sprites to. This number should be 1 to save to a cassette drive and 8 to save to a diskette drive.

REGISTRATION AND REPLACEMENT

Filling out and sending us the enclosed information card entitles you to special product update offers and allows the purchase of a backup copy of the product for only $5.00 per diskette or cassette (this covers the cost of the media and shipping). The C64 TUTOR diskette is copy protected and may not be duplicated using the Commodore 64. To order a backup copy, make sure you have sent your information card in and contact us at:

Comprehensive Software Support
2316 Artesia Boulevard, Suite B
Redondo Beach, California 90278

If C64 TUTOR doesn't run correctly, take it back to the place of purchase and ask them to assist you. If you purchased C64 TUTOR through the mail, pleae write down everything you did to try and run C64 TUTOR and send that information along with the cassette or diskette to the address above. If the problem was caused by us, an updated version will be sent to you without charge. If the media was misused or erased, a service charge of $5.00 must be included for us to send you another copy. You must have sent us the enclosed information card to receive another copy of C64 TUTOR.

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2316 Artesia Blvd.
Suite B
Redondo Beach, CA 90278

C64 TUTOR
DISK 1