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| Ultimate-II MPS Printer Emulation |
| User’s Guide |
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Table of Contents

[1. Introduction 3](#_Toc450861427)

[1.1. Context 3](#_Toc450861428)

[1.2. Purpose of this document 3](#_Toc450861429)

[2. Configuration 4](#_Toc450861430)

[2.1. Overview 4](#_Toc450861431)

[2.2. Enable the printer 4](#_Toc450861432)

[2.3. Printer configuration items 4](#_Toc450861433)

[3. Using the printer 5](#_Toc450861434)

[3.1. Printing from the C64/C128 5](#_Toc450861435)

[3.2. Flushing the printer spool 5](#_Toc450861436)

[3.3. Resetting the printer 5](#_Toc450861437)

[3.4. Performances 5](#_Toc450861438)

[4. Commodore printer commands 6](#_Toc450861439)

[4.1. Simple example 6](#_Toc450861440)

[4.2. Secondary address 6](#_Toc450861441)

[4.3. Commands 6](#_Toc450861442)

[4.3.1. Graphical operations 6](#_Toc450861443)

[4.3.2. Paper feeding 10](#_Toc450861444)

[4.3.3. Format control 10](#_Toc450861445)

[4.3.4. Graphic Bitmap 12](#_Toc450861446)

[4.3.5. Character creation, Down Line Loading (DLL) 13](#_Toc450861447)

[5. PETASCII character table 15](#_Toc450861448)

[6. Commodore commands reference 16](#_Toc450861449)

[7. Technical Specifications 17](#_Toc450861450)

[8. Print Sample 18](#_Toc450861451)

[9. Document Revisions 19](#_Toc450861452)

# Introduction

## Context

The printer emulation is a new feature on 3.0 firmware. With this functionality you can print from your Commodore 64/128 using an emulated IEC device #4 or #5.

This emulation simulates a Commodore MPS-1230 printer with all the commands that this printer can understand. Not all commands are executed as some of them are hardware related and cannot obviously be implemented. The results are printed to PNG image files, one file per page. You can also choose to bypass the printer emulation and to send the raw data from #4 or #5 IEC device to a file.

MPS-1230 was a mid-range black ink ribbon 9 dot matrix printer sold by Commodore in the late 80’s.

This printer is compatible with nearly all the usual programs that have been edited for C64/C128

## Purpose of this document

This document describes how to use and configure the Ultimate-II embedded printer emulation.

You will also find all the commands and charsets supported by the printer. Then you can add printer facility to your own BASIC programs!

# Configuration

## Overview

You will find all the configuration items for the printer in the IEC configuration menu.

## Enable the printer

To enable the printer, you need to enable the software IEC feature in the Ultimate-II:

* Use the F2 Menu to enter Ultimate-II configuration and then select “**Software IEC Settings**”
* Then on item “**IEC Drive and Printer**” select “**Enabled**”

## Printer configuration items

* **Printer Bus ID** : 4 or 5 (default is 4)  
  This will assign device ID 4 or 5 to the printer.
* **Printer output file** : default is */SD/printer*  
  You can select file base name that the printer emulation will use to create the PNG files. If you choose to generate PNG files they will be named */SD/printer-001.png*, */SD/printer-002.png*, and so on. If you chose the bypass the emulation and write raw data to disk the file will be named */SD/printer* with no extension.
* **Printer output type** : PNG or RAW (default is PNG)  
  PNG are images created by the printer emulator each time a page is ejected from the printer. Caution, if a file with the same name already exists, it will not be overwritten and the page is lost. RAW is the data directly sent by the C64/128 to the IEC port and recorded to a file. If the file already exists, the new data will be appended to it.
* **Printer ink density** : Low, Medium or High (default is Medium)  
  You can consider this as “how strong is the pin impact on the paper”. *Low* will only print very small dots and *High* larger dots. As a consequence, this will change the resulting contrast. *High* gives the best result for DRAFT character mode. *Medium* may be well suited for NLQ character mode. Just test and see what match your needs.

# Using the printer

## Printing from the C64/C128

Just use your program and tell it that you have a connected printer compatible with MPS Commodore series (e.g.: MPS-801/MPS-803 are the most frequently supported commodore printers).

## Flushing the printer spool

The printer has a very small buffer (128 bytes) and some data may still be in the buffer waiting to be printed when your print job is finished. The printer doesn’t know that your job is finished and waits for more data to print until the end of the page.

You need to tell the printer that you want all the buffered data to be printed and to eject the current page. This works as the *Form Feed* button on the real MPS-1230 to eject the page.

Go to F5 Menu and select “**Flush printer/Eject Page**”. In PNG mode, this will make the current page to be written to a file. Next print job will start on a blank page. In RAW mode this will write the buffered data to the file.

## Resetting the printer

You may need to reset printer to go back to an initial state. Go to F5 Menu and select “**Reset IEC and Printer**”. Current data in printer buffer is lost. Current page that was being printed is also lost.

## Performances

Composing a page full of text and creating the PNG file will need approximatively 15 seconds on the Ultimate-II (28 seconds using NLQ mode). You may think it’s slow but this is much faster than a real MPS-1230 printer (1 min in DRAFT mode, 4 min in NLQ mode) !

At this time, with firmware 3.0 beta, the Ultimate-II middle button becomes unresponsive while composing a page. Be patient and look the storage LED activity. You will see the file written to disk. There may be more than one page to compose.

RAW mode is nearly immediate. There is no process time to wait.

# Commodore printer commands

This chapter describes the commands the printer can understand. You will find Commodore BASIC sample to explain you how to use them.

## Simple example

This will print a first line with HELLO WORLD! on it and a second line with HELLO printed with double width characters.

10 OPEN1,4

20 PRINT#1,”HELLO WORLD!”

30 PRINT#1,CHR$(14)”HELLO”

40 CLOSE1



## Secondary address

When you use the OPEN basic command you can specify an optional secondary address:

* **0** : Select PETASCII charset with uppercases and graphic chars
* **7** : Select PETASCII charset with lowercases and uppercases

If no secondary address is specified, 0 is the default.

## Commands

### Graphical operations

|  |  |
| --- | --- |
| **ESC g**  **27 71**  **1Bh 47h** | Select the **Double Strike** print mode. Characters are printed twice and paper is lifted 1/216” between the two passes.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);chr$(71);”DOUBLE STRIKE”  30 CLOSE1 |
| **ESC h**  **27 72**  **1Bh 48h** | Disable **Double Strike** print mode  10 OPEN1,4,7  20 PRINT#1,CHR$(27);chr$(72);  30 CLOSE1 |
| **EN ON**  **14**  **0Eh** | Select the **Double Width** print mode (Enhanced ON)  10 OPEN1,4  20 PRINT#1,CHR$(14);”DOUBLE WIDTH”  30 CLOSE1 |
| **EN OFF**  **15**  **0Fh** | Disable the **Double Width** print mode (Enhanced OFF)  10 OPEN1,4  20 PRINT#1,CHR$(15);  30 CLOSE1 |
| **RVS ON**  **18**  **12h** | Select the **Reverse** print mode. Each character is printed in negative.  10 OPEN1,4  20 PRINT#1,CHR$(18);”REVERSE”  30 CLOSE1 |
| **RVS OFF**  **146**  **92h** | Disable the **reverse** print mode  10 OPEN1,4  20 PRINT#1,CHR$(146);  30 CLOSE1 |
| **ESC - 1**  **27 45 49**  **1Bh 2Dh 31h** | Select the **Underline** print mode for all characters and spaces that follow.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(45);CHR$(49);”UNDERLINE”  30 CLOSE1 |
| **ESC - 0**  **27 45 48**  **1Bh 2Dh 30h** | Disable the Underline print mode.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(45);CHR$(48);  30 CLOSE1 |
| **ESC e**  **27 69**  **1Bh 45h** | Select the **Bold** print mode.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(69);”BOLD”  30 CLOSE1 |
| **ESC f**  **27 70**  **1Bh 46h** | Disable the Bold print mode.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(70);  30 CLOSE1 |
| **ESC 4**  **27 52**  **1Bh 34h** | Select the **Italic** print mode.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(52);”ITALIC”  30 CLOSE1 |
| **ESC 5**  **27 53**  **1Bh 35h** | Disable the **Italic** print mode.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(53);  30 CLOSE1 |
| **ESC [ n**  **27 91 n**  **1Bh 5Bh n** | Select the spacing mode depending on parameter “n” as described on this table:   |  |  |  | | --- | --- | --- | | n | SPACING | | | 0 | PICA | 10 chars/inch | | 1 | ELITE | 12 chars/inch | | 2 | MICRO | 15 chars/inch | | 3 | CONDENSED | 17.1 chars/inch | | 4 | PICA COMPRESSED | 20 chars/inch | | 5 | ELITE COMPRESSED | 24 chars/inch | | 6 | MICRO COMPRESSED | 30 chars/inch |   10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(91);CHR$(n);  30 CLOSE1 |
| **ESC s 0**  **27 83 48**  **1Bh 53h 30h** | Select the **Superscript** print mode. Characters are half high than the normal height and are printer on the upper half interline.  10 OPEN1,4  20 PRINT#1,”NORMAL”;CHR$(27);CHR$(83);CHR$(48);”SUPERSCRIPT”  30 CLOSE1 |
| **ESC s 1**  **27 83 49**  **1Bh 53h 31h** | Select the **Subscript** print mode. Characters are half high than the normal height and are printer on the lower half interline.  10 OPEN1,4  20 PRINT#1,”NORMAL”;CHR$(27);CHR$(83);CHR$(49);”SUBSCRIPT”  30 CLOSE1 |
| **ESC t**  **27 84**  **1Bh 54h** | Disable Superscript and Subscript print mode.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(84);  30 CLOSE1 |
| **ESC X n**  **27 120 n**  **1Bh 78h n** | If n=0, select standard quality mode (Draft)  If n=1, select near letter quality mode (NLQ)  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(120);CHR$(n);  30 CLOSE1 |
| **NLQ ON**  **31**  **1Fh** | Select the Near Letter Quality print mode (NLQ)  10 OPEN1,4  20 PRINT#1,CHR$(31);  30 CLOSE1 |
| **NLQ OFF**  **159**  **9Fh** | Disable the Near Letter Quality print mode (NLQ)  10 OPEN1,4  20 PRINT#1,CHR$(159);  30 CLOSE1 |
| **CRSR DWN**  **17**  **11h** | Select PETASCII charset for uppercases/lowercases characters. With this charset, a limited number of graphical characters are available.  10 OPEN1,4  20 PRINT#1,CHR$(17);  30 CLOSE1 |
| **CRSR UP**  **145**  **91h** | Select PETASCII charset for uppercases only characters. With this charset, all graphical characters are available.  10 OPEN1,4  20 PRINT#1,CHR$(145);  30 CLOSE1 |

### Paper feeding

|  |  |
| --- | --- |
| **LF**  **10**  **0Ah** | A **Line Feed** returns the print head to le left margin and advances the paper to the next line (behavior is LF+CR).    10 OPEN1,4,7  20 PRINT#1,CHR$(10);  30 CLOSE1 |
| **CR**  **13**  **0Dh** | A **Carriage Return** returns the print head to le left margin and advances the paper to the next line (behavior is CR+LF).  10 OPEN1,4,7  20 PRINT#1,CHR$(13);  30 CLOSE1 |
| **FF**  **12**  **0Ch** | A **Form Feed** prints the current page to a PNG file and then continue printing on the first line of a new blank page.  10 OPEN1,4,7  20 PRINT#1,CHR$(12);  30 CLOSE1 |
| **CS**  **141**  **8Dh** | Returns the print head to le left margin but stays in the same line (behavior is CR).  10 OPEN1,4,7  20 PRINT#1,CHR$(141);  30 CLOSE1 |

### Format control

|  |  |
| --- | --- |
| **ESC c n**  **27 67 n**  **1Bh 43h n** | Defines the page length in number of interlines (range 1-127).  This command is ignored by Ultimate-II MPS Printer Emulation.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);CHR$(67);CHR$(1-127);  30 CLOSE1 |
| **ESC c NUL n**  **27 67 0 n**  **1Bh 43h 00h n** | Defines the page length in inches (range 1-22).  This command is ignored by Ultimate-II MPS Printer Emulation.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);CHR$(67);CHR$(0);CHR$(1-22);  30 CLOSE1 |
| **ESC n m**  **27 78 m**  **1Bh 4Eh m** | Define the **Bottom of Form** (BOF) in number “m” of interlines at the end of the page that are not used to print and are automatically skipped.  This command is ignored by Ultimate-II MPS Printer Emulation.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);CHR$(78);CHR$(m);  30 CLOSE1 |
| **ESC o**  **27 79**  **1Bh 4Fh** | Disable the **Bottom of Form** (BOF).  This command is ignored by Ultimate-II MPS Printer Emulation.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);CHR$(79);  30 CLOSE1 |
| **ESC 8**  **27 56**  **1Bh 38h** | Disable the end of paper detector to be able to print until the end of the paper.  This command is ignored by Ultimate-II MPS Printer Emulation.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);CHR$(56);  30 CLOSE1 |
| **ESC 9**  **27 57**  **1Bh 39h** | Enable the end of paper detector.  This command is ignored by Ultimate-II MPS Printer Emulation.  10 OPEN1,4,7  20 PRINT#1,CHR$(27);CHR$(57);  30 CLOSE1 |
| **HTAB**  **9**  **09h** | This is the traditional horizontal tabulation. Head jumps to the next tabulation stop. Stops are located every 8 PICA character position since the beginning of a line. This is fixed, not configurable.  10 OPEN1,4  20 PRINT#1,CHR$(9);”THIS IS THE PRINT POSITION 8”  30 CLOSE1 |
| **POS n1 n2**  **16 n1 n2**  **10h n1 n2** | On the current line, jump to the horizontal position corresponding to the n1n2 decimal number of PICA characters since the beginning of the line. Each parameter is a value between 0 and 9. 00 is the position of the first character. n1n2 can range from 00 to 79. Does nothing is current position is already over the n1n2 position.  10 OPEN1,4  20 PRINT#1,CHR$(16);CHR$(2);CHR$(6);”THIS IS THE PRINT POSITION 26”  30 CLOSE1 |
| **ESC POS n1 n2**  **27 16 n1 n2**  **1Bh 10h n1 n2** | On the current line, jump to the horizontal position corresponding to the dot position given by parameters n1 and n2 from the beginning of the line. Parameter is calculated using the formula n1x256+n2. Value range is 0 to 480  Examples:   |  |  |  | | --- | --- | --- | | n1 | n2 | POSITION | | CHR$(0) | CHR$(20) | 0 + 20 = 20 | | CHR$(1) | CHR$(0) | 256 + 0 = 256 | | CHR$(1) | CHR$(224) | 256 + 224 = 480 |   10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(16);CHR$(1);CHR$(6);”THIS IS THE PRINT POSITION 262”  30 CLOSE1 |

### Graphic Bitmap

Printer can print graphic data using the Bit Image Mode (BIM). An image is defined by a bit array of 7 rows. Each column is encoded in a byte, LSB is up, MSB is not printed and always set to 1.

Example for a 16 columns array:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1 | □ | □ | □ | ■ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | □ | ■ | □ |
| 2 | □ | □ | ■ | □ | ■ | □ | □ | □ | □ | ■ | ■ | ■ | □ | □ | ■ | □ |
| 4 | □ | ■ | □ | □ | □ | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | □ | □ | □ |
| 8 | ■ | □ | □ | □ | □ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 16 | □ | ■ | □ | □ | □ | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | □ | □ | □ |
| 32 | □ | □ | ■ | □ | ■ | □ | □ | □ | □ | ■ | ■ | ■ | □ | □ | ■ | □ |
| 64 | □ | □ | □ | ■ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | □ | ■ | □ |
| Total | 136 | 148 | 162 | 193 | 162 | 148 | 136 | 136 | 156 | 190 | 255 | 190 | 156 | 136 | 235 | 136 |

Don’t forget that bit 27 is always set, this adds 128 to each value.

First byte with 27 bit not set means that BIM data has ended. As BIM is always printed using the double width mode, you can use code **EN OFF** (15 0Fh) to tell the printer that BIM data has ended.

When in BIM, interline is automatically set to 7 dot height.

|  |  |
| --- | --- |
| **BIT IMG**  **8**  **08h** | Select the **Bit Image Mode**. Provided data is printed as an array of dots as described above. Maximum BIM data width that can be printed on printable area is 480 dots.  10 OPEN1,4,7  20 A$=””  30 FOR I=1 TO 16  40 READ A:A$=A$+CHR$(A)  50 NEXT I  60 FOR J=1 TO 3  70 PRINT#1,CHR$(8);A$  80 NEXT J  90 CLOSE1  100 END  110 DATA 136,148,162,193,162,148,136,136  120 DATA 156,186,255,186,156,136,235,136 |
| **BIT IMG SUB n**  **8 26 n**  **08h 1Ah n** | Select the repeated Bit Image Mode. The BIM data is printed n times on the same row. If n=0 data will be repeated 256 times. If you need more than 256 repetitions, you will have to call BIT IMG SUB with the data several times.  BIM data size must be less than 255 bytes, extra data is ignored.  10 OPEN1,4,7  20 A$=””  30 FOR I=1 TO 16  40 READ A:A$=A$+CHR$(A)  50 NEXT I  60 FOR J=1 TO 3  70 PRINT#1,CHR$(8);CHR$(26);CHR$(10);A$  80 NEXT J  90 CLOSE1  100 END  110 DATA 136,148,162,193,162,148,136,136  120 DATA 156,186,255,186,156,136,235,136 |

### Character creation, Down Line Loading (DLL)

On a MPS-1230 user can create from 1 to 94 custom characters to replace normal characters. These characters are loaded in RAM. Consecutive characters can be defined in a single sequence beginning by the first character. DLL has to be enabled in the configuration of a real MPS-1230 printer and RAM buffer is smaller as a part of the RAM is reserved for DLL.

On Ultimate-II MPS Printer Emulation, DLL is not available but commands are correctly recognized and skipped with all their data.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ESC =**  **27 61**  **1Bh 3Dh** | This code has to be followed by parameters **m n c s a p1 p2**…**p11** which represents decimal byte codes to describe characters to load.  **m** and **n** are the number of bytes to load. Use the formula  t = (number of chars x 13) +2 then calculate m and n in order to have m + (n x 256) = t using formulas n = t / 256 (keep entire part only) m = t – (n x 256)  E.g.: for 94 characters, t = (94 x 13) +2 = 1224 n = 1224 / 256 = 4 m = 1224 – (4 x 256) = 200  **c** Is the decimal ASCII code of the first character of the sequence. Only decimal codes from 33 to 126 can be used for DDL. Code 65 is “A”  **s** Is a constant value 20 (14h) (missing from official documentation but present in all examples)  **a** This parameter tells if character has to be printed using the upper 8 dots of the printer head or the 8 lower dots. a = 0 : use the 8 upper dots of the 9 dot printer head a = 1 : use the 9 lower dots of the 9 dot printer head  **p1 p2…p11** Represents the 11 columns defining the dots printed for the character.   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | | 1 | ■ | □ | ■ | □ | ■ | □ | ■ | □ | □ | □ | □ | | 2 | ■ | □ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | | 4 | ■ | □ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | | 8 | ■ | □ | ■ | □ | ■ | □ | ■ | □ | □ | □ | □ | | 16 | ■ | □ | □ | □ | □ | □ | ■ | □ | □ | □ | □ | | 32 | ■ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | □ | | 64 | ■ | □ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | | 128 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | | Total | 136 | 0 | 9 | 0 | 9 | 0 | 25 | 32 | 70 | 0 | 0 |   This represents the real R character in DRAFT quality.  In the 8x11 matrix you have to remind that a dot active in a column cannot be active in the next column to let the head recycle. Ultimate-II MPS Printer emulator does not suffer from this limitation.  *Note from the author: I tested this command on a real MPS-1230 because explanations given by Commodore seems to be false. I can’t make it work, example in the MPS-1230 manual prints nothing. Where are the 13 bytes by character? I only count 12 (****a p1 p2****…****p11****)* |
| **ESC i n**  **27 73 n**  **1Bh 49h n** | Select the print quality depending on parameter “n”  n=0 standard quality (draft) and normal characters  n=2 near letter quality (NLQ) and normal characters  n=4 standard quality (draft) and special characters created with Down Line Loading (DLL). Not supported on Ultimate-II MPS Printer Emulation, same behavior as n=0.  n=6 near letter quality (NLQ) and special characters created with Down Line Loading (DLL). Not supported on Ultimate-II MPS Printer Emulation, same behavior as n=2.  10 OPEN1,4  20 PRINT#1,CHR$(27);CHR$(73);CHR$(n);  30 CLOSE1 |
|  |  |

# PETASCII character table



Table : USA/UK Charset in Uppercase/Graphic Mode (Secondary address = 0)



Table USA/UK Charset in Lowercase/Uppercase Mode (Secondary address = 7)

# Commodore commands reference

| CODE | | | DESCRIPTION | PAGE |
| --- | --- | --- | --- | --- |
| ASCII | DEC | HEX |
| BIT IMG | 8 | 08 | Select graphic Bit Image Mode | 12 |
| BIM IMG SUB | 8 26 | 08 1A | Select repeated graphic Bit Image Mode | 12 |
| HTAB | 9 | 09 | Horizontal tabulation | 11 |
| LF | 10 | 0A | Line Feed | 10 |
| FF | 12 | 0C | Form Feed | 10 |
| CR | 13 | 0D | Carriage Return | 10 |
| EN ON | 14 | 0E | Double width character ON | 6 |
| EN OFF | 15 | 0F | Double width character OFF | 7 |
| POS | 16 | 10 | Jump to horizontal position in number of characters | 11 |
| CRSR DWN | 17 | 11 | Select Commodore charset with lowercases and uppercases | 9 |
| RVS ON | 18 | 12 | Negative character ON | 7 |
| ESC | 27 | 1B | ASCII code for the Escape character |  |
| NLQ ON | 31 | 1F | Near Letter Quality ON | 9 |
| ESC POS | 16 | 10 | Jump to horizontal position in number of dots | 11 |
| ESC - | 45 | 2D | Underline ON/OFF | 7 |
| ESC 4 | 52 | 34 | Italic ON | 8 |
| ESC 5 | 53 | 35 | Italic OFF | 8 |
| ESC 8[[1]](#footnote-1) | 57 | 38 | Disable paper end sensor | 11 |
| ESC 9\* | 58 | 39 | Enable paper end sensor | 11 |
| ESC =\* | 61 | 3D | Custom character definition using Down Line Loading (DLL) | 13 |
| ESC c\* | 67 | 43 | Set paper height in number of interlines | 10 |
| ESC c NUL\* | 67 0 | 43 00 | Set paper height in inches | 10 |
| ESC e | 69 | 45 | Bold character ON | 7 |
| ESC f | 70 | 46 | Bold character OFF | 7 |
| ESC g | 71 | 47 | Double Strike ON | 6 |
| ESC h | 72 | 48 | Double Strike OFF | 6 |
| ESC i | 73 | 49 | Select character print definition | 14 |
| ESC n\* | 78 | 4E | Define Bottom of Page (BOF) | 10 |
| ESC o\* | 79 | 4F | Disable Bottom of Page (BOF) | 11 |
| ESC s | 83 | 53 | Select Superscript or Subscript character mode | 8 |
| ESC t | 84 | 54 | Disable Superscript and Subscript character mode | 9 |
| ESC [ | 91 | 5B | Select character spacing (PICA, ELITE, …) | 8 |
| ESC X | 120 | 78 | Select NLQ or DRAFT | 9 |
| CS | 141 | 8D | Carriage Return with no Line Feed | 10 |
| CRSR UP | 145 | 91 | Select Commodore charset with uppercases and graphics | 9 |
| RVS OFF | 146 | 92 | Negative character OFF | 7 |
| NLQ OFF | 159 | 9F | Near Letter Quality OFF | 9 |

# Technical Specifications

**Output Type** PNG file 2-bit depth (4 grey levels) with lossless compression  
typical file size range is 30kB - 140kB

**Page size** 1984 x 2580

**Printable area size** 1920 x 2516 (80 x 71 PICA characters)

**Horizontal Resolution** 240 dpi

**Vertical Resolution** 216 dpi

**Physical ratio** A4 (21cm x 29,7cm)

**Character matrix** 8V x 11H in draft mode  
16V x 11H in NLQ mode

**Print pitches** Pica, 10 char/in, 80 char/line  
Elite, 12 char/in, 96 char/line  
Micro, 15 char/in, 120 char/line  
Condensed, 17.1 char/in, 137 char/line  
Pica Compressed, 20 char/in, 160 char/line  
Elite Compressed, 24 char/in, 192 char/line  
Micro Compressed, 30 char/in, 240 char/line

**Printing styles** Boldface  
Double width  
Superscript  
Subscript  
Double strike  
Underlined  
Italic  
Reversed

# Print Sample

With Printer Ink Density set to Medium



# Document Revisions

|  |  |  |  |
| --- | --- | --- | --- |
| Revision | Date | Author | Description |
| 1.0 | May 11, 2016 | René Garcia | Initial release |

1. Ignored in the Ultimate-II MPS Printer Emulation [↑](#footnote-ref-1)