

YPRT - HP41CL Serial Printer ROM

Introduction

The HP41CL is a very powerful version of the HP41 calculator. Interfacing to other equipment is limited to legacy interfaces like the HP-IL Interface Loop or HP4 peripherals, like the printer. In these case the actual hardware is needed, even though the IL system can eventually interface to a modern computer or network. Inspired by the IR printer possibility on the DM41X an attempt was made to enable something similar with the serial port of the HP41CL. The Serial Printer ROM is a modified Printer ROM based on the HP82143A printer that uses the HP41CL serial port to connect to the emulated printer, or even a real serial printer (although that is not tested).

This document is work in progress and for now applies to the BETA version. Use at your own risk! Please report any issues that you may have.

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April 2022

1. Credits

Many thanks to Monte Dalrymple for the creation of the HP41CL and his support, Diego Diaz for the USB-41 printer emulator. Without Doug Wilders “HP82143 Printer Study” this project would not have been possible. Further support for Ángel Martin and Robert Prospero, and inspiration from the DM41X creators and Martin Hepperle’s IR printer signal decoder.

2. Conventions

- 00FF Hexadecimal numbers are used to indicate addresses, leading zeroes are typically used to indicate the total possible range, e.g. 00FFFF. The ‘x’ character is used for a “don’t care” situation
- 0x040 The 0x sequence is used to indicate hexadecimal values when context is not clear
- 0b1010 Binary values are preceded with the 0b sequence, the ‘x’ character is used for don’t care bits
- HP41 HP41 indicates all versions of the HP41 calculator, including HP41C, CV, CX, CL, DM41X
- 41CL Is used when specifically referring to the HP41CL system, also 41CL is used
- TEXT** in **blue** is actually typed as input in the examples, when quotes are used this means that the text is typed in ALPHA mode. When used in the text it refers to an actual HP41 command
- [ALPHA]** when in a bracket this is an HP41 key
- 0.0000** is the result of an operation, what is in the display in **green**

3. Copyrights and Disclaimer

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[5. Differences with the standard printer ROM](#)

Base of the Serial Printer ROM is the standard Printer 1E ROM for the HP82143A printer. The modified ROM uses exactly the same functions and entry point to fully emulate the printer much like the PRINTER ROM in the DM41X. The most important differences are:

- Used exclusively with the HP41CL serial port
- All printer instructions with SELP 9 are modified
- MAN, NORM and TRACE printer modes are achieved with a combination of Flag 15 and 16 as used in the HP-IL Printer and the DM41X
- Serial communication is one-way only, there is no emulation of any printer buttons, printer status, paper status. There is no detection of anything connected to the serial port.
- The Serial Printer ROM has 2 banks must be plugged in Page 6, just as the standard Printer ROM
- The name of the new printer ROM is “-YPRINT1B” (bank 1) and -YPRINT2B” (bank 2), the XROM number is the same

[6. Use of the YPRT ROM](#)

The Serial Printer Rom YPRT can be used only with the HP41CL. Since the serial port is used the power consumption of the HP41CL will be higher than without the serial port active. Please refer to the manual of the HP82143A printer for a full description of the functions.

[6.1. Installation](#)

The YPRT ROM can be plugged using the PLUG command in the 41CL Extreme Functions Rom (YFNX). The ROM uses Bank 1 and Bank 2 and must be plugged in Page 6. It cannot be used in any other Page!

Before using any of the printer functions the serial port must be initialized (with SERINI) and the required baud rate must be set matching the baud rate of the computer it is connected to. The current version (version B, Beta) only works with the Windows emulator USB-82143A by Diego Diaz. This is part of the USB-41 module. This can be downloaded from <https://www.clonix41.org/>, under Projects -> USB-41

HP41CL RAM location 0x804031 is used for temporary storage.

6.2. Instructions

When plugged in Page 6 and connected nearly all printer functions can be used, except the graphics functions. The current version only works with a printer emulator on a PC.

MAN, TRACE and NORM mode can be set with the User Flags 15 and 16. These flags are always clear when the HP41 is powered on.

Flag 15	Flag 16	Printer Mode
clear	clear	MAN (manual)
clear	set	NORM (normal)
set	clear	TRACE
set	set	TRACE (TRACE with stack is NOT supported)

The behavior of User Flag 21 is not changed. Double Wide and Lowercase modes (User Flags 12 and 13) are not implemented. Flag 55 will always test as set when YPRT is plugged in Port 6.

The YPRT ROM can be plugged using the PLUG command in the 41CL Extreme Functions Rom (YFNX) or PLUGP in the 41CL Extra Functions ROM (YFNZ). The YPRT uses Bank 1 and Bank 2 and must be plugged in Page 6. It cannot be used in any other Page!

When using the printer functions the serial port must be initialized (with SERINI) and the required baud must be set according to the settings in the printer emulator on the PC.

6.3. Limitations

The current version of YPRT has the following limitations or errors:

- The beta version uses the HP41CL RAM location 0x804031 for temporary storage. This location is also used by the update functions in the YUPS ROM!
- A print buffer is not implemented, this depends on the printer emulator
- Graphics or special character creation (with ACSPEC and BLDSPEC for example) is not supported
- Works only with the USB-82143A emulator on Windows
- The current version does not support throttling of the serial stream for a physical serial printer
- The printer is always detected as powered on, even if the serial port is not enabled, and Flag 55 is always set
- After plugging YPRT, Flag 55 and 21 may not be immediately set. An ON/OFF cycle may be needed. Similar, after unplugging YPRT, FLAG 55 and 21 may still be set, requiring an OFF/ON cycle.
- There is no detection of printer buttons, printer status or out of paper

- Cannot be used at the same time as other functions or ROMs that use the serial port, especially not in TRACE mode. Do not use together with the HP41CL Update Rom YUPS due to the use of the same reserved memory locations. Unplug YPRT when using the update ROM!

Remember that with the serial port enabled power consumption of the HP41CL is higher.

7. [Change log](#)

Version 0.1	April 2022	Initial version for beta release	
		Applies to ROMs	-YPRINT1B- RomRev YP-1B (bank 1 ROM)
			-YPRINT2B- RomRev YP-2B (bank 2 ROM)