

HHC 2015 HP 41CL update Outline for presentation

1) Introduction

- What is the 41CL? You supply a fullnut HP 41 and replace the original CPU board.
 - o The Systemyde SY-41CL takes advantage of modern technology to significantly add to the capabilities of the Hewlett-Packard 41C system. The 41CL circuit board replaces the original CPU board in the calculator and provides all the features of an HP-41CX except for the Time Module. CX Time functions (the software) are included, but a real physical Time module plugged into a Port is required for full timer functionality.
 - o The full 600-register Extended Memory and over 260 plug-in module images are built in. Functions are included to allow these images to be virtually plugged into a calculator Port and unplugged from a calculator Port, either from the keyboard or from within a program.
 - o A Turbo mode is included that allows the calculator to run at up to 50X normal speed.
 - o A total of 512 pages (4K in length) of Flash memory are available for non-volatile storage. Roughly 410 of these pages are pre-loaded with 41C software. This includes every HP produced application pac, every non-HP application pac known, and all sorts of user-created rom images.
 - o A total of 128 pages (4K in size) of RAM are available. Seven of these pages are pre-allocated for 41C use, for register memory, extended memory, MMU contents, and 41CL buffers. A sophisticated Memory Management Unit (MMU) allows full access to the large physical memory.
 - o Full bus compatibility for the Ports is preserved, allowing the use of any peripheral designed for the HP-41 system.
- How much does it cost?
 - o \$235 41CL PC board – this must be installed in a fullnut HP 41 you already have.
 - o \$25 (optional) Serial connector (not mounted in Port cover)
 - o \$10 (optional) Modify Port cover (that you supply) & install serial connector
 - o \$6 (optional) Serial cable (so you don't have to order one from CableClub)
- What are my alternatives?
 - o **NoVRAM 64 module** – Costs 215 Euro or about \$245. Fits in an HP 41 module housing. Requires a PC to load or change flash images.
 - - 48K (12pages) Flash ROM distributed as follows:
 - 4 pages (block 0) holding Advanced HEPAX emulation.
 - 4 pages (block 1) to load primary user selected ROM images.
 - 4 pages (block 2) to load secondary user selected ROM images.
 - Block 0 is always active providing HEPAX functionality.
 - Block 1 is active by default when the module is plugged.
 - Block 2 can be swapped with Block 1 by means of control word
 - Allowed pages for ROM blocks are #C to #F
 - - 64K (16 pages) non-volatile RAM.

- 4 blocks of 4 pages each, addressed to pages #8 to #B, can be used as HEPAX RAM or to hold ROM images.
- Active RAM block is also selected by means of control word at H'4100. There must always be an active RAM block.
- **MLDL 2000** – Costs 260 Euro + 100 Euro for assembly. About \$410. Fits into an HP 41 card reader housing. Features of the MLDL2000 are:
 - 255 ROM Banks of FLASH EPROM memory, each 4k * 10 bits, can be relocated to any HP41 ROM location at any bank, including the HP41 System ROMS.
 - 63 banks of MLDL SRAM memory, each 4k * 10 bits, can be relocated to any HP41 ROM location at any bank, including the HP41 System ROMS
 - Bi-directional serial I/O interface, can be relocated to any HP41 ROM location
 - Each ROM/RAM block can be individually enabled or disabled
 - Non-volatile Settings Registers, with multiple sets of Settings Registers enabled by switches
 - USB interface to connect to PC
 - FLASH and SRAM memory programmable through PC interface, no eraser or programmer required
 - In-System Programmable CPLD as control interface to allow upgrades and/or functional changes (special JTAG programmer cable required)

2) What's new in the 41CL world and why would I want it?

An incredible collection of new rom images have been created for the 41CL in the last couple of years that greatly expand the abilities of this calculator.

- Library 4 - ID Lib4

○ **What does it do?**

- Review: HP 41 ROM page structure
 - HP 41 addresses sixteen 4k pages, from 0 to F. Pages 0-3 hold the HP 41CX OS. Page 5 is for Time Module and CX functions (these bank-switch as needed). Page 6 is for the dedicated or IR printer. Page 7 is for HPIL. Pages 8 through F represent upper and lower pages of the four ports.
 - Page 4 is usually a “take-over” rom location. Roms designed for this page take over control of the HP 41. The HP Service rom is one example and the Forth rom is another.
- The Library 4 rom is a non-takover rom that resides in page 4. The HP 41 OS is tricked into ignoring its presence. However, HP 41 MCode calls can be made to functions residing in page 4 to save a great amount of local MCode programming space in application roms.
 - Remember the steps / bytes saved by a subroutine diagram / tables from back in the day? The Library 4 rom provides big savings in MCode calls in the same way.
- Just three examples of over 100 Library 4 functions:

- 1) In HP 41 MCode, to add 1 to register C, the following call is made in a Library 4 aware rom: ?NC XQ, ->4078. This two-byte call saves 7 bytes each time a local MCode “add one to C” would be needed.
 - 2) Dividing a number in C by two takes two bytes to replace 8 bytes of local MCode.
 - 3) To perform MOD(C,2) to see if a number is odd or even, ?NC XQ, ->4FF6 takes 2 bytes and replaces a 13 byte routine in local MCode.
 - These savings occur every time one of these functions is needed. Note as well that the arithmetic in Library 4 routines uses the internal HP 41 OS 13-digit precision.
 - Library 4 requires the OS to be HP-41CX level. No C or CV models, but since the 41CL is running as a 41CX, this is not a problem.
 - **What’s the big deal?**
 - This is essentially an MCode subroutine rom. Truly the descendant of the PPC ROM’s initial goal.
- **CCD OS Extensions and beyond (Library 4 required) – ID OSX3**
 - **What does it do?**
 - Contains 55 OS Extension functions from the CCD and Paname roms, from Skwid, Ken Emery, Ross Cooling and more.
 - **What’s the big deal?**
 - This rom takes a single page but has 16K of code. It is a bank-switched rom with 4 pages taking a single port. It can be placed in port 6, 7, 8-F.
 - This rom gives you many great features:
 - System extensions
 - Enhanced catalogs
 - Direct catalog of system pages (CAT A, CAT F, etc.).
 - Extended XEQ and ASN functions
 - Direct memory functions
 - Alpha character input
 - Prompt lengthener
 - Buffer catalogs
 - I/O page catalogs
 - Ram editor
 - Alpha strings and display functions
 - Alpha backspace, append integer part to alpha, alpha swap at comma, toggle lowercase, display test, more.
 - Hex functions
 - Hex prompt, ARCL hex, view hex, append hex characters to alpha.
 - Main and X-memory functions
 - Clear extended memory, rename or retype files, read and write x-memory to disk, peek and poke, more.
 - Other utility functions
 - Toggle private, compile GTO distances, program length, code, decode, Fix/Eng mode, toggle flag.
 - The AECROM program generator.

- **Extreme Y functions – ID YFNX**

- What does it do?
 - The 41CL Extreme Functions provide extra functionality beyond the normal 41CL Extra Functions. If you rarely plug in new software images the normal 41CL Extra Functions are probably sufficient for your needs. But if you frequently change the MMU configuration of your 41CL, the 41CL Extreme Functions will make using your 41CL easier.
- What's the big deal?
 - The 41CL Extreme Functions support four different sets of MMU configurations, allowing you to completely change the personality of your 41CL with just one command. MMU entries now support a "Locked" status, which prevents you from accidentally writing over critical MMU programming (like the location of the 41CL Extreme Functions.) Other MMU functions allow searching the MMU programming for current contents, either by mnemonic or address.

- **PowerCL Exteme (library 4 and Extreme Y functions roms required) – ID PWRX**

- What does it do?
 - PowerCL comes in two flavors: Regular and Extreme. These should be paired with the regular or extreme version of the 41CL Y-functions rom image. Both versions of the PowerCL rom are 16K roms with a 4K footprint. They can be placed in port 6, 7, 8-F.
- What's the big deal?
 - PowerCL includes 242 functions. Types of functions include:
 - Enhanced 41CL plug and unplug functions.
 - 41CL functions to save/recall memory from flash.
 - Ram and rom editors
 - X-memory functions: run programs, save status registers to XM, peek, poke, change file names and types, more.
 - Hepax functions: automatic creation of 4k, 8k and 16k Hepax ram pages and file system initiation.
 - Missing functions from the HP41 are provided: FS?S, FC?S, number of data registers, number of free registers, get and put program counter, delete one return address from stack, find summation registers, set and clear any flag, more.
 - Large selection of bit functions: One's and two's compliment, byte and bit rotations, X and Y, X or Y, X+Y, Y-X, more.
 - Buffer, key assignment, file utilities.
 - Thirty alpha functions, including LEFT\$, RIGHT\$, MID\$, REV\$, alpha empty?, Upper, lower, left and right alpha delete character, more.
 - These are only a selection of the available functions.
 - PowerCL includes special "launcher" functions that allow most of these functions to be accessed from the keyboard or entered into a program even though there are no CAT 2 entries for them.
 - Overlays are available to simplify using this rom.

- **Sandmath 4x4 – ID SM44**

- What does it do?

- The Sandmath 4x4 rom is a **32K rom** that works with the Library 4 rom. It has an 8K footprint, taking up two pages. It includes 128 functions in the two main FATs and 101 functions in the secondary FAT.
 - What's the big deal?
 - Rather than re-invent the wheel, the SandMath uses optimized versions of the best math software available for the 41 platform. Angel added a few enhancements to the code (like using 13-digit OS routines or other MCODE tweaks) but all credit should go to the original authors.
 - Some functions in the rom are very nice for regular use, such as
 - Hyperbolic trig functions
 - A fractions package
 - RCL arithmetic
 - Probability functions and distributions
 - Sine, cosine integrals as well as their hyperbolic integrals
 - Prime factorization
 - A wealth of Bessel functions
 - Numeric integration and root finders
 - Base conversions
 - Powers of two, harmonic numbers, geometric sums, and lots more.
 - Other functions in this rom have very large code segments such as the Curve Fitting section (about 1.5k in size in total!), but also some others fall in the same category as well (TAYLOR, takes about 1k, and IERF takes about 650 bytes by itself – to mention just two).
 - This module includes the all-time favorite MCode Solve and Integrate functionality, first released by HP in the Advantage Module - and now available here as FROOT and FINTG. The twist has been the modification of the original code to run in a bank-switched configuration, located in bank-3 of the upper page.
 - The rom also includes the Geometry Solvers from the AECROM. The three solvers – TRIA for triangles, CIRC for circles, and SARR for slope, angles, rise and run - are consolidated into a single function, SOLVER.
 - The rom also includes a full implementation of the Last Function functionality. Similar to LastX but applied to the last function executed, it allows repeated execution of the same function using a convenient shortcut that bypasses all the launcher paths. This is very useful for sub-functions, which cannot be assigned to any key in USER mode and that might otherwise be buried behind multiple keystrokes to access.
 - The rom also includes the Time Value of Money functionality from the just released TVM ROM: an all-MCODE implementation of the classic functions that rivals with that in the HP-12C in speed and accuracy.
 - And last but not least, the Unit Management System (UMS), the Advantage Base Conversion functions and the AECROM program generator functionality are now included in revision 4x4.
 - Overlays are available to simplify using this rom.
- **Sandmatrix – ID 4MTI**
 - What does it do?

- The Sandmatrix 16K rom works with the Library 4 rom and Sandmath. It has an 8K footprint and includes 128 functions in the two main FATs and 54 functions in the secondary FAT.
 - SandMatrix is a complete algebra module not only with powerful Matrix capabilities but also Vector and Polynomial functions.
 - What's the big deal?
 - Sandmatrix is the ultimate (IMO) matrix and polynomial rom for the HP 41 system. Functions include:
 - The CCD MCode Matrix set, 3D Vector calculator functions, the execution tables for the three launchers, the code for the orthogonal polynomials, and the EQT function that displays the type of curve being fit. Also included are the "return" snippets to support the Advantage-style bank-switching calls to the upper page, Advanced Matrix and Polynomial sections, MCODE for the CCD Matrix functions and the major matrix calculations (MSYS, MINV, MDET, TRNPS).
 - Overlays are available to simplify using this rom.
- **Poul Kaarup's MCode roms**
 - What do they do?
 - These six 4K rom images contain an incredible variety of MCode functions/programs in areas such as
 - Alpha and pointers
 - Math and Physics
 - Flags and stack
 - Program utilities (It includes a function X=YZT?)
 - Timer utilities
 - What's the big deal?
 - These roms were completed 25 years after their coding was started.
 - Poul's comments:
 - "I bought my HEPAX in 1988 and also got Ken Emery's book HP-41 MCODE FOR BEGINNERS. I soon got into MCode programming and Emery's book was a tremendous help. Many of my programs came from ideas I got from this book and also from the VASM listings. Many programs are there just because I wanted to test the techniques and not so much because they had a purpose (like it's not very often you would need a triple test X=YZT? but it was fun programming it.) The programs JUMP1 and JUMP3 are in the HEPAX manual, but as FOCAL. I used the partial key sequence to make an MCode version that has a fancier input, but basically does the same thing). In 1990 I bought some ZEPROMs and put my programs into actual Modules. They were never meant to be published. In summer of 2014 Ángel Martin asked the HP Community to contribute all the ROMs existing to be used for the CL project. I sent him the FORECASTER ROMs and some others that I thought he might not have. And I also sent him some of my own ROMs, not to be part of the CL, but because I thought he might

appreciate some of the techniques because he is the MCode master of the 21st Century. Angél thought that the ROMs were so good that they should be published. A tremendous thanks goes to Ángel who has put a lot of work into this.

- Gene: I agree!

- **PPC User Applications rom – ID PPCU**

- What does it do?
 - The original PPC ROM module is available in the 41CL, of course. This new 8K rom includes the PPC ROM applications programs from the PPC ROM manual in this new rom image. No need to scan the barcode from the manual.
- What's the big deal?
 - You now have easy access to the special characters program (SC and SCDEMO), Loan Payments and Amortization Schedule (LPAS), Curve Plot (CVPL), several High-res Plot and Multiple function Plot application programs and more are available here. That's a lot of ram space no longer taken up.

- **Roms for user written books with bar code – ID MCCK, WWDB, JARR, KRGM, UCCD.**

- What do they do?
 - Includes programs from these books:
 - Synthetic Programming Made Easy
 - Extended functions Made Easy
 - Advanced Programming Tips book
 - Wlodek's Extending your HP 41
 - John Dearing's routines book
 - Kruse/Gosmann books, and
 - The CCD ROM manual examples.
- What's the big deal?
 - Again, no need to find the books and scan the programs. Simply plug in the .rom image.

- **PPC Journal / Datafile programs rom (Sadly called "Gene's Raw files rom" – ID GRAW)**

- What does it do?
 - This 8K rom includes a selection of the biggest programs from years of the PPC Journal and Datafile publications (that were not yet available in other roms). This selection does not include programs whose functionality is already provided in shorter / faster MCode. For example, a combinations program from a PPC Journal issue would not be included here given a good MCODE COMB function already provided in the SandMath 4x4 rom.
- What's the big deal?
 - Some of these programs are masterful works of programming and deserve not only to be preserved but studied and still used.
 - Programs on this rom include:
 - A FAST program to calculate PI to 1000 digits and e to 2900 digits.
 - The fastest calendar printing program ever written for the HP 41

- A slightly shorter but still fast calendar-printing program.
 - The H67 computer interpreter. This is an amazing program.
 - A double integral program, a learning curve program and a Snedecor's F test calculation program.
 - Sea Battle game
 - Music / tone programs included:
 - Jingle Bells
 - Star Wars
 - Rasp tone
 - Buzz mode on / off
 - Toneset program that plays all 128 synthetic tones in a row.
 - Printer programs included:
 - Banner program
 - Biorhythm printer
 - Star Trek Enterprize character printer
 - Valentine printer (by Roger Hill)
- **HP Solution books in rom**
- What do they do?
 - These rom images include the programs from the HP produced solutions books for the HP 41 series.
 - Solution books included as rom images:
 - Antennas
 - Business Stats / Sales
 - Chemistry
 - Chemical Engineering
 - Civil Engineering
 - Control Systems
 - Electrical Engineering
 - Geometry
 - Fluid Dynamics
 - High-Level Math
 - HVAC
 - Lend/Lease/Savings
 - Mechanical Engineering
 - Optometry
 - Physics
 - Solar Engineering
 - Test Statistics
 - Timer
 - What's the big deal?
 - No need for the wand. A wealth of prewritten programs. Note that the Games and Games II solution books were incorporated into the 32K Funstuff rom along with other games from the PPC Journal (including two of my games!

- **HP16C Emulator – ID 16CS**

- What does it do?
 - The HP16C emulator is a 16K rom and works with the Library 4 rom. It has a 4K footprint (one page!) and includes 125 functions in the main and secondary FATs.
- What's the big deal?
 - This module provides support for up to 64-bit word size in all functions – beyond any previous attempt implemented on the 41 system ever before – by using two registers to hold the 64bits. The normal XYZT and L have a corresponding “high bit” counterpart in a new 16C buffer.
 - The HP16C “stack” can be saved and retrieved from extended memory.
 - Overlays are available to simplify using this rom. The PDF manual is 63 pages long and references the original HP 16c calculator manual for more information.
 - An example HP-16C program and its HP16C emulator equivalent are shown below.

Let's see an example of how the 16C Emulator module functions are used in a program. We'll use the Checksum Calculation example from the 16C manual, pages 90, 91 and 92.

The program assumes you have pre-loaded 4-bit hex values in registers R1 to R10, as follows:

R01: A	R03: B	R05: 3	R07: A	R09: D
R02: 7	R04: 1	R06: D	R08: 2	R10: 6

The table below shows both the original program and the equivalent using the Emulator functions for a side-to-side comparison; not surprisingly very similar in concept but with some differences – especially in the 16C stack management.

hp-16c Program	16C Emulator Code
1 LBL D	1 LBL "CHKS"
2 UNSIGN	2 UCMP
3 4	3 4
4 WSIZE	4 16WSZ
5 HEX	5 HEXM
6 "A"	6 10
7 STO I	7 STO 00
8 0	8 CLX16
9 ENTER^	9 16ENT^
10 LBL 0	10 LBL 00
11 RCL (I)	11 16RCL
12 B#	12 128
13 +	13 #BITS
14 X<>Y	14 16+
15 0	15 16X<>Y
16 RLC	16 0
17 +	17 16LOW^
18 X<>Y	18 RLC
19 DSZ	19 16+
20 GTO 0	20 16X<>Y
21 RTN	21 DSZ
	22 GTO 00
	23 SHOW
	24 END

Remarks:

1. Indirect Register "I" corresponds to R00
2. RCL (I) uses the indirect capability of **16RCL**, adding 128 to the 16C-register number.
3. Note the non-merged arrangement in lines 11 & 12 for **16RCL**, with the rg# in the next program line.
4. Note how the parameter for the word size is in the 16X register – lines 3 & 4. In fact here we use an insider's trick using just the real-X register (only valid for 16WSZE!)
5. Sub-functions (in brown color) really use the **16C#** launcher followed by an index number
6. Entering 16C values requires either 16NPT or **LOW16^** for numbers below 32 bits. This is how zero was input in lines 16 and 17.
7. **DSZ** operates on standard values – as an index very much like ISG and DSE do.
8. A final **SHOW** instruction has been added to see the 16C result.

My setup. I have three completely different configurations available on my 41CL using the Y Functions Extreme. **Note:** Four configurations are possible by keeping track of Configuration 0's rom setup and exchanging it with Configuration 1, 2, or 3 when another set is desired. I gladly make use of the Library 4 aware roms.

- The three configurations below can be swapped by executing RCLCFG and entering a 1, 2, or 3 at the prompt...if you have set up all three configurations using the instructions shown later.

- **Configuration 1**

- Page 4 – LIB4 - Library 4 – 4K subroutine rom
- Page 5 – Time module – 4K rom – physical module plugged into port
- Page 6 – OSX3 – OS Extensions – 16K rom in 4K footprint
- Page 7 – PWRX - PowerCL extreme rom – 16K rom in a 4K footprint
- Page 8 – YFNX (Y functions eXtreme) – 8k rom
- Page 9 – HEP2 – Hepax rom – 32K in a 4K footprint
- Pages A and B – 8K of Hepax RAM for my user programs
- Pages C and D – SM44 - Sandmath – 32K rom in an 8K footprint
- Pages E and F – 4MTI - Sandmatrix – 16K rom in an 8K footprint

- **Configuration 2**

- Page 4 – LIB4 - Library 4 – 4K subroutine rom
- Page 5 – Time module – 4K rom – physical module plugged into port
- Page 6 – OSX3 – OS Extensions – 16K rom in 4K footprint
- Page 7 – PWRX - PowerCL extreme rom – 16K rom in a 4K footprint
- Page 8 – YFNX (Y functions eXtreme) – 8k rom
- Page 9 – PPCU User applications rom page 1 – 4K
- Pages A and B – PPC ROM module – 8K
- Pages C and D – Gene's Raw Files (GRAW) – 8K
- Page E – MCCK - Adv Programming tips rom (McCornack/Jarrett) – 4K
- Page F – GTWN – Ghost Town game rom – 4K

- **Configuration 3**

- Page 4 – LIB4 - Library 4 – 4K subroutine rom
- Page 5 – Time module – 4K rom – physical module plugged into port
- Page 6 – OSX3 – OS Extensions – 16K rom in 4K footprint
- Page 7 – PWRX - PowerCL extreme rom – 16K rom in a 4K footprint
- Page 8 – YFNX (Y functions eXtreme) – 8k rom
- Page 9 – TREK – Star Trek rom – 4K
- Page A – TVMY – Time value of money rom – 4K
- Page B – WWDB – Wlodek, Wickes, Dearing books rom – 4K
- Pages C, D, E and F – Funstuff – 32K rom

- That's 128K of rom in configuration 1, then 24K of rom in configuration 2, and 44K of rom in configuration 3 for a total of 196K of different rom and 8K of Hepax ram in my HP 41CL in addition to the 2K main ram and 600 registers of extended memory. Not bad for a model introduced in 1979.

To set up saved configuration state 1:

- From a memory lost state:
- 1) XEQ ALPHA MMUCLR ALPHA
- 2) For V3/V4 boards:
ALPHA 804040-8120 ALPHA

For V2 boards
ALPHA 804040-803F ALPHA
- 3) XEQ YPOKE
- 4) ALPHA OSX3 ALPHA
XEQ PLUGP (Note: This means no IR or dedicated printer available)
- 5) ALPHA PWRX ALPHA
XEQ PLUGH (Note: This means no HPIL available)
- 6) ALPHA YFNX ALPHA
- XEQ PLUG1L
- 7) ALPHA SM44 ALPHA
XEQ PLUG3
- 8) ALPHA 4MTI ALPHA
XEQ PLUG4
- 9) XEQ MMUEN
- 10) Press OFF then ON
- 11) XEQ HPX8
Y (at prompt)
SIGMA+ (at prompt... Note: this chooses page A for the Hepax 8K ram)
- 12) XEQ HEPINI
2
A
- 13) XEQ STOCFG
1

To set up saved configuration state 2:

- From a memory lost state: (Yes, go ahead and do a master clear!)
- 1) XEQ ALPHA MMUCLR ALPHA
- 2) For V3/V4 boards:
ALPHA 804040-8120 ALPHA

For V2 boards
ALPHA 804040-803F ALPHA
- 3) XEQ YPOKE
- 4) ALPHA OSX3 ALPHA
XEQ PLUGP (Note: This means no IR or dedicated printer available)
- 5) ALPHA PWRX ALPHA
XEQ PLUGH (Note: This means no HPIL available)
- 6) ALPHA YFNX ALPHA
XEQ PLUG1L
- 7) ALPHA 804090-81A8 ALPHA
XEQ YPOKE (Note: the 090 specifies page 9 and 1A8 indicates the flash page location of the top half of the PPC User Applications rom. Using it this way can cause unusual results.)
- 8) ALPHA PPCM ALPHA
XEQ PLUG2
- 9) ALPHA GRAW ALPHA
XEQ PLUG3
- 10) ALPHA MCCK ALPHA
XEQ PLUG4L
- 11) ALPHA GTWN ALPHA
XEQ PLUG4U
- 12) XEQ MMUEN
- 13) Press OFF then ON
- 14) XEQ STOCFG
2

To set up saved configuration state 3:

- From a memory lost state: (Yes, go ahead and do a master clear!)
- 1) XEQ ALPHA MMUCLR ALPHA
- 2) For V3/V4 boards:
ALPHA 804040-8120 ALPHA

For V2 boards
ALPHA 804040-803F ALPHA
- 3) XEQ YPOKE
- 4) ALPHA OSX3 ALPHA
XEQ PLUGP (Note: This means no IR or dedicated printer available)
- 5) ALPHA PWRX ALPHA
XEQ PLUGH (Note: This means no HPIL available)
- 6) ALPHA YFNX ALPHA
XEQ PLUG1L
- 7) ALPHA TREK ALPHA
XEQ PLUG1U
- 8) ALPHA TVMY ALPHA
XEQ PLUG2L
- 9) ALPHA WWDB ALPHA
XEQ PLUG2U
- 10) ALPHA FUNS ALPHA
XEQ PLUG3
- 11) XEQ MMUEN
- 12) Press OFF then ON
- 13) XEQ STOCFG
3

To switch between configurations, simply XEQ RCLCFG and choose 1, 2, or 3.

That's it. The configurations you can set up are incredible. With nearly 300 pages of prewritten roms loaded in the 41CL, you are set.