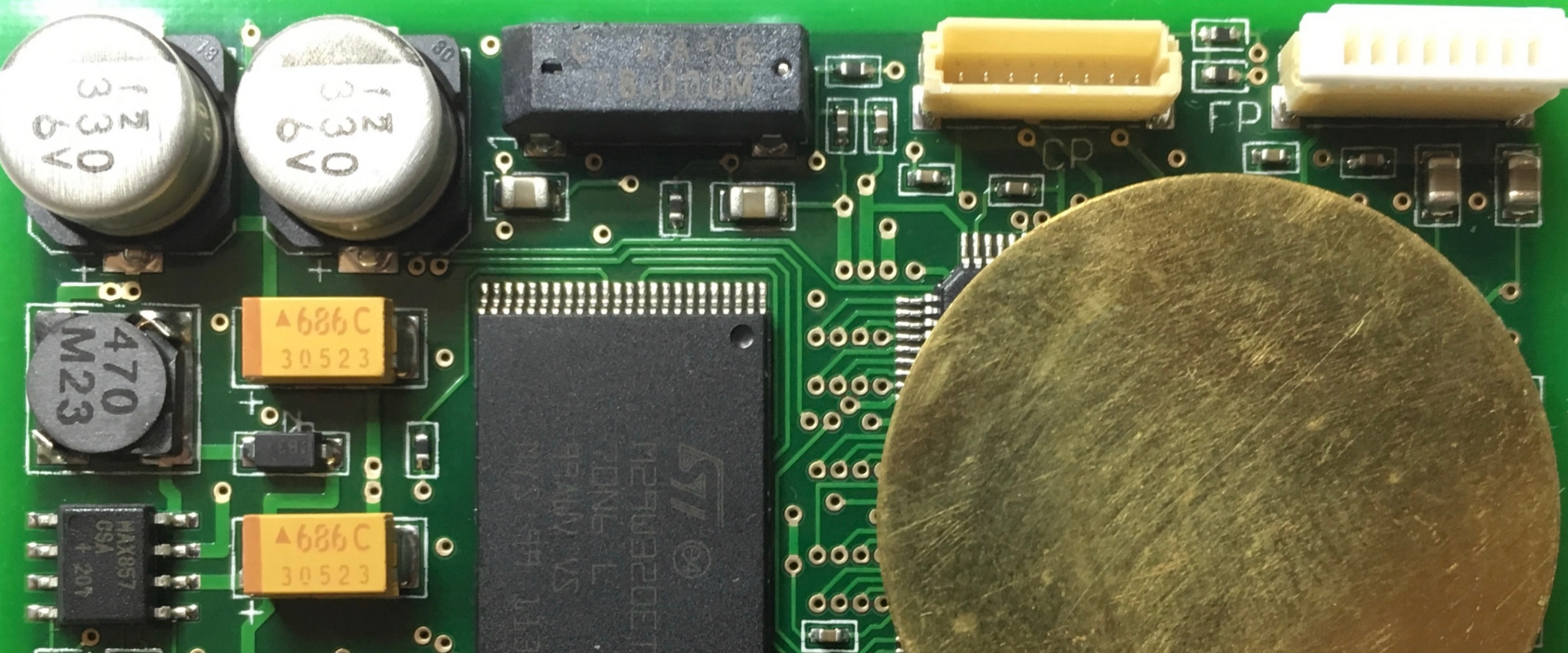




41CL FLASH UPDATE

By Sylvain Côté / HHHC 2017



AGENDA SUMMARY

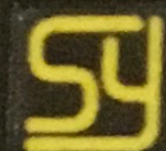
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SYSTEMYDE INTERNATIONAL

41CL

REFERENCE

ACKNOWLEDGEMENTS

Monte Dalrymple ...

for having created the 41CL

for having taken leadership of the 41CL update project

for having accepted to publish his sales statistics

for his patience, support & everything else

Robert Prosperi ...

for his help as a beta user, testing the update ROM images, reviewing documentations, suggesting improvements, etc.

for his invaluable inputs in making this presentation more accessible

Ángel Martín ...

for his help as a beta user, testing the update ROM images, reviewing documentations, suggesting improvements, etc.

NEWS

- A 41CL v5 board is currently being developed
 - PCBs have been ordered
 - Availability is when ready (hopefully 2017/2018)
 - Want a 41CLv5 ?
 - News available at:
www.hpmuseum.org/forum/thread-8507.html
www.systemyde.com/hp41/index.html
 - Place an order at:
www.systemyde.com/hp41/ordering.html
 - Due to components shortage, the v5 batch will probably be the last 41CL batch ever produced.
- A time module clone board is currently being developed
 - Prototype has been created and currently being debugged
 - Availability is when ready (hopefully 2017/2018)
 - News available at:
www.hpmuseum.org/forum/thread-8707.html
www.systemyde.com/hp41/index.html

DOCUMENTS, SOFTWARE & WEB SITES

Documents

NEWT CPU Technical Manual	www.systemyde.com/pdf/newt.pdf
41CL Calculator Manual	www.systemyde.com/pdf/sy41cl.pdf
41CL Extreme Functions Manual	www.systemyde.com/pdf/cl_extreme.pdf
41CL Memory Reference (v2 & beta)	www.systemyde.com/pdf/mem_ref_v2.pdf
41CL Memory Reference (v4 & v3)	www.systemyde.com/pdf/mem_ref.pdf
41CL Memory Reference (v5)	www.systemyde.com/pdf/mem_ref_v5.pdf
41CL Update Functions Manual	www.systemyde.com/pdf/cl_update.pdf
41CL Host Functions Manual	(upcoming)
41CL Host Software Manual	(upcoming)

Software

41CL Update Functions	www.systemyde.com/hp41/software.html
41CL Host Functions	www.systemyde.com/hp41/software.html
41CL Host Software Package	www.systemyde.com/hp41/files.html
ROM Files (first paragraph on web page)	www.systemyde.com/hp41/files.html

Web Sites

41CL Home	www.systemyde.com/hp41/
HP41 Home	www.hp41.org
The Museum of HP Calculators	www.hpmuseum.org

41CL BOARD MODELS

.....

Model	RAM Size	Flash Size	Flash Pages	Note
41CLv1	512 KB	2 MB	256	alpha boards are v1
41CLv2	512 KB	2 MB	256	beta boards are v2
41CLv3	1024 KB	4 MB	512	
41CLv4	1024 KB	4 MB	512	
41CLv5	1024 KB	8 MB	1024	upcoming

41CL BOARDS BUILT & SOLD

.....

Model	Production Batches	Built	Note	Sold
41CLv1	2	2		0
41CLv2	25+50	75		71
41CLv3	50+50	100		98
41CLv4	25+25+35+35+35	155	Sold value does not include Monte personal boards (x5)	138
41CLv5	tbd: 35 or 50	0		0
Total		332		307

41CL BOARDS SOLD WORLDWIDE DISTRIBUTION

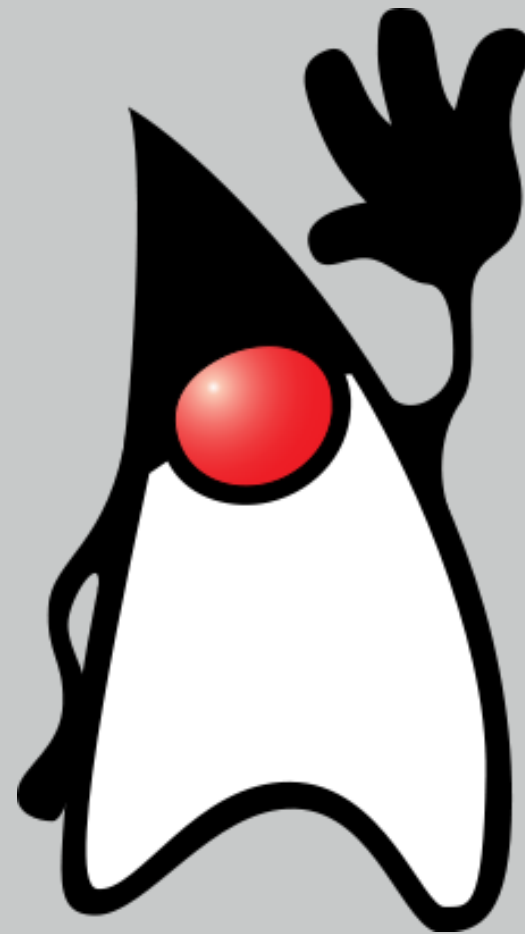
.....

Continent	Sold
Africa	5
Asia	4
Australia/Oceana	12
Europe	165
North America	112
South America	9
Total	307

41CL SYSTEM MODULES

ID	Page	XROM	Description	Filename	Updated
YFNZ	0x007	15	Extra Functions	YFNZ-4F.ROM	2017-06-19
* YFNS	0x062	31	Extra Functions	YFNS-4E.ROM	2014-11-21
YFNP	0x00F	15	Extra Functions Plus	YFNP-1F.ROM	2017-06-19
YFNF	0x0AF	16	Memory Functions (v2/beta)	YFNF-1F.ROM	2017-06-26
YFNF	0x167	16	Memory Functions (v5/4/3)	YFNF-1F.ROM	2017-06-26
YFNX	0x00A	15	Extreme Functions	YFNX-2C.ROM	2017-06-19
YLIB	0x00B	n/a	Extreme Library	YLIB-3B.ROM	2017-06-19
YUPS	0x062	31	Update Functions	UPDAT-2B.ROM	2017-08-14
		31	Host Functions (v5/4)	UPHST-1A.ROM	2017-06-03
IMDB	0x0DF	n/a	Image Database (v2/beta)	IMDB_V2.ROM	2017-08-14
IMDB	0x0DF	n/a	Image Database (v5/4/3)	IMDB.ROM	2017-08-14
FLDB	0x0DE	n/a	Flash Database (v2/beta)	FLDB_V2.ROM	2017-08-14
FLDB	0x0DE	n/a	Flash Database (v5/4/3)	FLDB.ROM	2017-08-14

* YFNS ROM image has been removed to make place for YUPS ROM image



PC HOST SOFTWARE

DESCRIPTION

- The goal of this PC host software is to ...
 - ease the process of maintaining your 41CL up-to-date
 - transfer ROM image files between your PC and the 41CL
 - manage zipped rom files content and file generation.
- The PC host software has successfully been tested on ...

macOS	v10.12.5	64 bits
Ubuntu Linux	v17.04	32 & 64 bits
Windows	v7 Pro	32 & 64 bits
- The PC host software support the following board versions ...

beta & v2	reported as first generation
v3 & v4	reported as second generation
v5	reported as third generation (upcoming)

PREREQUISITE (1 OF 2, DOWNLOAD & INSTALL JAVA)

- The PC host software is written in Java 8 and is a console program
- You need to install a Java 8 Runtime Environment (JRE8) or higher to run the PC host software

www.oracle.com/technetwork/java/javase/downloads/

- Press on: JRE DOWNLOAD
- Accept License Agreement
- Select the JRE that fit your operating system environment

Java SE Runtime Environment 8u144		
You must accept the Oracle Binary Code License Agreement for Java SE to download this software.		
Thank you for accepting the Oracle Binary Code License Agreement for Java SE; you may now download this software.		
Product / File Description	File Size	Download
Linux x86	59.13 MB	jre-8u144-linux-i586.rpm
Linux x86	75.01 MB	jre-8u144-linux-i586.tar.gz <i>Ubuntu Linux 32 bits</i>
Linux x64	56.48 MB	jre-8u144-linux-x64.rpm
Linux x64	72.41 MB	jre-8u144-linux-x64.tar.gz <i>Ubuntu Linux 64 bits</i>
Mac OS X	63.94 MB	jre-8u144-macosx-x64.dmg <i>macOS 64 bits</i>
Mac OS X	55.56 MB	jre-8u144-macosx-x64.tar.gz
Solaris SPARC 64-bit	52.12 MB	jre-8u144-solaris-sparcv9.tar.gz
Solaris x64	49.95 MB	jre-8u144-solaris-x64.tar.gz
Windows x86 Online	0.7 MB	jre-8u144-windows-i586-iftw.exe
Windows x86 Offline	54.57 MB	jre-8u144-windows-i586.exe <i>Windows 32 bits</i>
Windows x86	60.2 MB	jre-8u144-windows-i586.tar.gz
Windows x64 Offline	62.34 MB	jre-8u144-windows-x64.exe <i>Windows 64 bits</i>
Windows x64	63.99 MB	jre-8u144-windows-x64.tar.gz

- Run the installation program and follow the installation procedure
- To activate the new environment variables, some OS will ask you to do a re-login or a reboot

PREREQUISITE (2 OF 2, VALIDATE JAVA INSTALLATION)

- Test the JRE8 installation

- Starting the terminal application/window (aka command line)

Windows	press [Windows] + [R] to open "Run" box, type "cmd", click [OK]
Windows 10	press [Windows] + [R] to open "Run" box, type "powershell", click [OK]
macOS	click on "Finder" → "Applications" → "Utilities" → "Terminal"
Ubuntu Linux	open the dash, type "terminal", press [RETURN]

- Validate Java version active by default

Type	java -version
Output	Java version "1.8.0_144" Java(TM) SE Runtime Environment (build 1.8.0_144-b01)
Note	Version number should match the JRE8 that you have downloaded and installed

- Closing the terminal application/window

Windows	type "exit", press [RETURN]
macOS	press [command] + [w] (to close the Terminal window) press [command] + [q] (to close the Terminal application)
Ubuntu Linux	press [ctrl] + [d]

INSTALLATION

- PC Host Zip Package

Create	a folder to receive the PC host software
Download	clupdate-1.0.0-package.zip
From	www.systemyde.com/hp41/files.html
To	PC host software folder
Unzip	clupdate-1.0.0-package.zip

- PC Host Zip Package Content

cl_update.pdf	41CL update functions manual
UPDAT-2B.ROM	41CL update functions ROM image
UPHST-1A.ROM	41CL host functions ROM image
mini-how-to.txt	Instructions on how to use the PC host software
clupdate-1.0.0.jar	PC host software
log4j2.xml	PC host software logging configuration file
clupdate.log	Execution log file created by the PC host software
rom_files_170814.zip	ROM files package at 2017-08-14 (current release)
rom_files_170811.zip	ROM files package at 2017-08-11 (previous release)
TST-UP.ROM	Test ROM image (used in upload & download examples in this presentation)

- ROM Files Package

Download	rom_files_yymmdd.zip
From	www.systemyde.com/hp41/files.html
To	PC host software folder
Suggestion	keep all your old rom files, they will become handy later on (hint: --diff option)

HELP DISPLAY

java -jar clupdate-1-0-0.jar --help

command	parameter(s)	description
--help		list available commands
--manual		show user's manual
--list	file-or-dir-name	list rom_files content
--validate	file-or-dir-name	validate rom_files content
--diff	file-or-dir-name file-or-dir-name	show diff between two rom_files
--update	file-or-dir-name serial-port baud-rate	update to rom_files content
--upload	filename serial-port baud-rate	upload a ROM image to a 41CL
--download	filename serial-port baud-rate	download a ROM image from a 41CL

PC Input

PC Output

MANUAL DISPLAY

```
java -jar clupdate-1-0-0.jar --manual
```

```
=====
Users' manual
=====
...
...
...
-----
Command ....: --validate
Description: Validate mem_ref*.txt, FLDB*.ROM, all *.ROM files and list inconsistencies.
.....: For v2 board ...
.....:   mem_ref_v2.txt is loaded first, then FLDB_V2.ROM is loaded, then if found, all ROMs are loaded.
.....:   Finally, each ROM YCRC is calculated then an inconsistency report is printed on the console.
.....: For v3/4 boards ...
.....:   mem_ref.txt is loaded first, then FLDB.ROM is loaded, then if found, all ROMs are loaded.
.....:   Finally, each ROM YCRC is calculated then an inconsistency report is printed on the console.
Summary ....: --validate file-or-dir-name
Argument #1: zip filename or folder name (containing: mem_ref_v2.txt, mem_ref.txt and *.ROM files)
Windows ex.: zip file: java -jar clupdate-1.0.0.jar --validate c:\clupdate\rom_files_170814.zip
Linux   ex.:  folder: java -jar clupdate-1.0.0.jar --validate ~/tmp/rom_files_170814
macOS   ex.: zip file: java -jar clupdate-1.0.0.jar --validate rom_files_170814.zip
-----
...
...
...
```

PC Input

PC Output

ROM FILES LIST

```
java -jar clupdate-1-0-0.jar --list rom_files_170814.zip
```

```
=====
CSV filename: mem_ref_v2.txt
=====
Module { Page:0x000, YCRC:      [CSV:0xC67CA32B FLDB:1:0xC67CA32B calc:0xC67CA32B], Filename:NUT0-N.ROM      [File:found   Date:2015-10-13], ... }
Module { Page:0x001, YCRC:      [CSV:0x8BF110D6 FLDB:1:0x8BF110D6 calc:0x8BF110D6], Filename:NUT1-F.ROM      [File:found   Date:2015-10-13], ... }
...
Module { Page:0x0DE, YCRC:      [CSV:0x08142017 FLDB:1:0x08142017 calc:0x08142017], Filename:FLDB_V2.ROM      [File:found   Date:2017-08-14], ... }
Module { Page:0x0DF, YCRC:      [CSV:0x4EB0D909 FLDB:1:0x4EB0D909 calc:0x4EB0D909], Filename:IMDB_V2.ROM      [File:found   Date:2017-08-14], ... }
...
Module { Page:0x0FE, YCRC:      [CSV:0xC5A58BDE FLDB:1:0xC5A58BDE calc:0xC5A58BDE], Filename:PK_MATH.ROM      [File:found   Date:2015-04-12], ... }
Module { Page:0x0FF, YCRC:      [CSV:0x64F9C986 FLDB:1:0x64F9C986 calc:0x64F9C986], Filename:PK_PHYS.ROM      [File:found   Date:2015-04-12], ... }
-----
Invalid CRC: 0 / Files missing: 0
-----

=====
CSV filename: mem_ref.txt
=====
Module { Page:0x000, YCRC:      [CSV:0xC67CA32B FLDB:1:0xC67CA32B calc:0xC67CA32B], Filename:NUT0-N.ROM      [File:found   Date:2015-10-13], ... }
Module { Page:0x001, YCRC:      [CSV:0x8BF110D6 FLDB:1:0x8BF110D6 calc:0x8BF110D6], Filename:NUT1-F.ROM      [File:found   Date:2015-10-13], ... }
...
Module { Page:0x0DE, YCRC:      [CSV:0x08142017 FLDB:1:0x08142017 calc:0x08142017], Filename:FLDB.ROM        [File:found   Date:2017-08-14], ... }
Module { Page:0x0DF, YCRC:      [CSV:0xC1C2CDF6 FLDB:1:0xC1C2CDF6 calc:0xC1C2CDF6], Filename:IMDB.ROM        [File:found   Date:2017-08-14], ... }
...
Module { Page:0x1FE, YCRC:      [CSV:0x53D36BD2 FLDB:1:0x53D36BD2 calc:0x53D36BD2], Filename:ALL_FF.ROM      [File:found   Date:2017-02-25], ... }
Module { Page:0x1FF, YCRC:      [CSV:0x53D36BD2 FLDB:1:0x53D36BD2 calc:0x53D36BD2], Filename:ALL_FF.ROM      [File:found   Date:2017-02-25], ... }
-----
Invalid CRC: 0 / Files missing: 0
-----
```

ROM FILES VALIDATION (1 OF 2, HEALTHY FILE)

```
java -jar clupdate-1-0-0.jar --validate rom_files_170814.zip
```

=====

CSV filename: mem_ref_V2.txt

=====

Invalid CRC: 0 / Files missing: 0

=====

CSV filename: mem_ref.txt

=====

Invalid CRC: 0 / Files missing: 0

ROM FILES VALIDATION (2 OF 2, PROBLEMATIC FILE)

```
java -jar clupdate-1-0-0.jar --validate rom_files_170814_with_errors.zip
```

=====

CSV filename: mem_ref_v2.txt

=====

Module {	Page:0x062,	YCRC:C#c	[CSV:0x158BFD51	FLDB:1:0x158BFD51	calc:0xFFFFFFFF],	Filename:UPDAT-2B.ROM	[File:MISSING	Date:	], ... }
Module {	Page:0x0EA,	YCRC:C#F	[CSV:0xA2EAA593	FLDB:1:0xD7EAF53A	calc:0xD7EAF53A],	Filename:BLDROM.ROM	[File:found	Date:2011-08-02],	... }
Module {	Page:0x0FC,	YCRC:C#c	[CSV:0x5B47D616	FLDB:1:0x5B47D616	calc:0x158BFD51],	Filename:MCCRNAK.ROM	[File:found	Date:2017-08-14],	... }
Module {	Page:0x0FE,	YCRC:C#c	[CSV:0xC5A58BDE	FLDB:1:0xC5A58BDE	calc:0xFFFFFFFF],	Filename:PK_MATH.ROM	[File:MISSING	Date:	], ... }

Invalid CRC: 2 / Files missing: 2

=====

CSV filename: mem_ref.txt

=====

Module {	Page:0x062,	YCRC:C#c	[CSV:0x158BFD51	FLDB:1:0x158BFD51	calc:0xFFFFFFFF],	Filename:UPDAT-2B.ROM	[File:MISSING	Date:	], ... }
Module {	Page:0x0EA,	YCRC:C#F	[CSV:0xA2EAA593	FLDB:1:0xD7EAF53A	calc:0xD7EAF53A],	Filename:BLDROM.ROM	[File:found	Date:2011-08-02],	... }
Module {	Page:0x1AF,	YCRC:C#c	[CSV:0x5B47D616	FLDB:1:0x5B47D616	calc:0x158BFD51],	Filename:MCCRNAK.ROM	[File:found	Date:2017-08-14],	... }
Module {	Page:0x1B3,	YCRC:C#c	[CSV:0xC5A58BDE	FLDB:1:0xC5A58BDE	calc:0xFFFFFFFF],	Filename:PK_MATH.ROM	[File:MISSING	Date:	], ... }

Invalid CRC: 2 / Files missing: 2

ROM FILES COMPARISON

```
java -jar clupdate-1-0-0.jar --diff rom_files_170811.zip rom_files_170814.zip
```

=====

[rom_files_170811.zip::mem_ref_v2.txt] vs [rom_files_170814.zip::mem_ref_v2.txt]

UPDAT-2A.ROM	[Page:0x062 ID:YUPS Rev:2017-08-10 YCRC:0x4491106C]	!=	UPDAT-2B.ROM	[Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]
FLDB_V2.ROM	[Page:0x0DE ID:FLDB Rev:2017-08-11 YCRC:0x08112017]	!=	FLDB_V2.ROM	[Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]
IMDB_V2.ROM	[Page:0x0DF ID:IMDB Rev:2017-07-08 YCRC:0x43C16454]	!=	IMDB_V2.ROM	[Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0x4EB0D909]

Differences: 3

=====

[rom_files_170811.zip::mem_ref.txt] vs [rom_files_170814.zip::mem_ref.txt]

ALL_FF.ROM	[Page:0x05F ID: Rev: YCRC:0x53D36BD2]	!=	MPARIS.ROM	[Page:0x05F ID:5PAR Rev:2017-05-11 YCRC:0x0755544A]
UPDAT-2A.ROM	[Page:0x062 ID:YUPS Rev:2017-08-10 YCRC:0x4491106C]	!=	UPDAT-2B.ROM	[Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]
FLDB.ROM	[Page:0x0DE ID:FLDB Rev:2017-08-11 YCRC:0x08112017]	!=	FLDB.ROM	[Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]
IMDB.ROM	[Page:0x0DF ID:IMDB Rev:2017-07-08 YCRC:0x8D9F7D59]	!=	IMDB.ROM	[Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6]

Differences: 4

ROM IMAGE TRANSFER

ROM Image Import/Upload

"80D000-0FFF"

[XEQ][ALPHA]YIMP

physical destination address 0x80D000 and length 0x0FFF in RAM where the ROM image will be loaded

here we need to prepare the next function by pressing [XEQ] [ALPHA] [Y] [I] [M] [P]

java -jar clupdate-1-0-0.jar --upload TST-UP.ROM /dev/tty.usbserial 4800

HH:MM:SS --upload [fileName: TST-UP.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800]
HH:MM:SS File TST-UP.ROM loading ... done [YCRC=0x28C2D578 Rev:2015-03-03]
HH:MM:SS Serial /dev/tty.usbserial opened.
HH:MM:SS Sleeping 5 seconds before starting file transfer

[ALPHA]

RECEIVING

HH:MM:SS Sending 8192 = 8192 bytes sent
HH:MM:SS Serial /dev/tty.usbserial closed.

pressing [ALPHA] within the time allowed, executes the YIMP function and start the CL serial importation

CL Input

CL Output

CL Comment

PC Input

PC Output

ROM Image Export/Download

"80D000-0FFF"

YEXP

physical source address 0x80D000 and length 0x0FFF in RAM where the ROM image will be exported from

java -jar clupdate-1-0-0.jar --download TST-DOWN.ROM /dev/tty.usbserial 4800

HH:MM:SS --download [fileName: TST-DOWN.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800]
HH:MM:SS Serial /dev/tty.usbserial opened.
HH:MM:SS Receiving

SENDING

906 2187 2187 2187 725 = 8192 bytes received
HH:MM:SS File TST-DOWN.ROM saving ... done [YCRC=0x28C2D578]
HH:MM:SS Serial /dev/tty.usbserial closed.

CL Input

CL Output

CL Comment

PC Input

PC Output



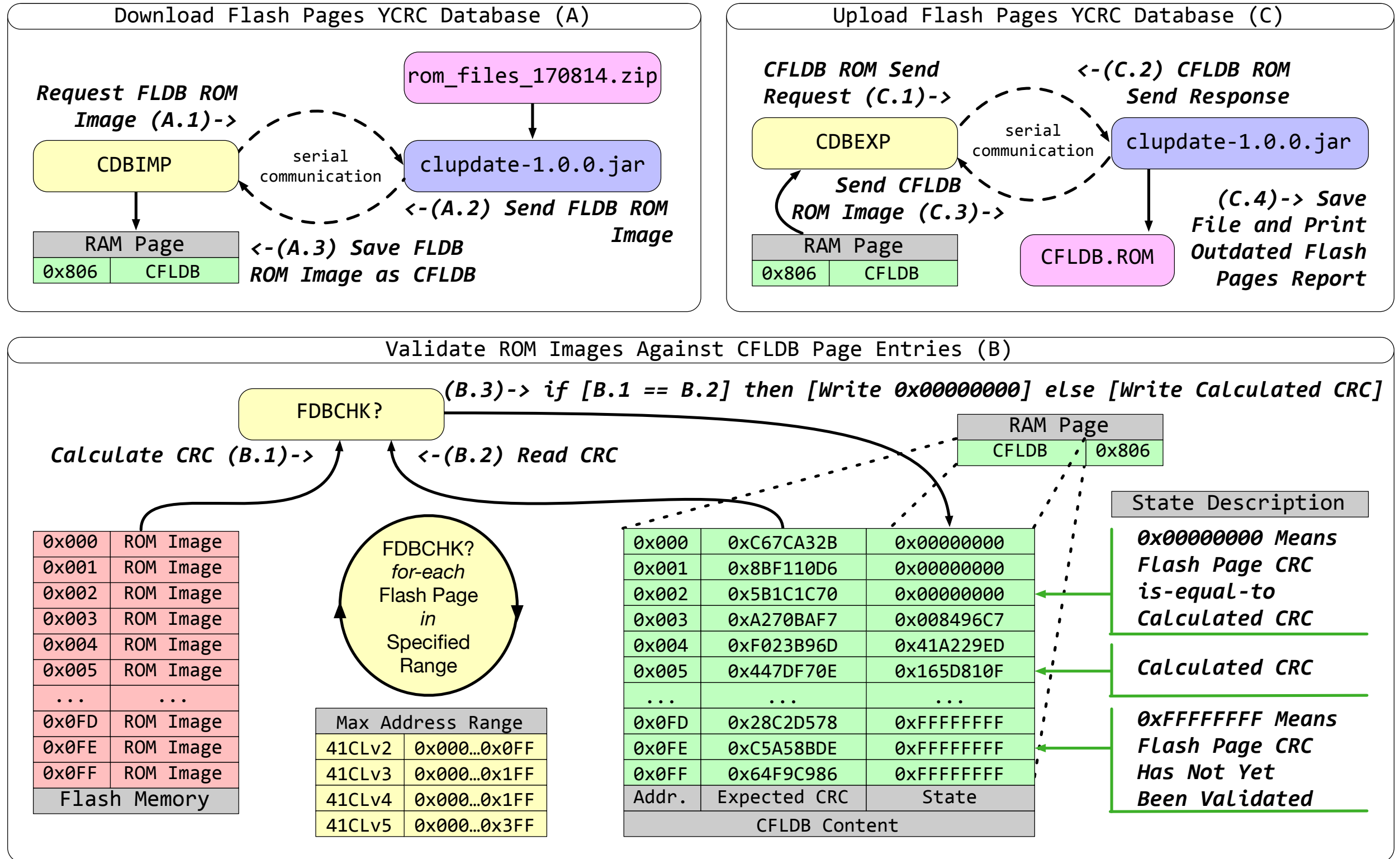
FLASH UPDATE INTRODUCTION

FLASH FACTS

.....

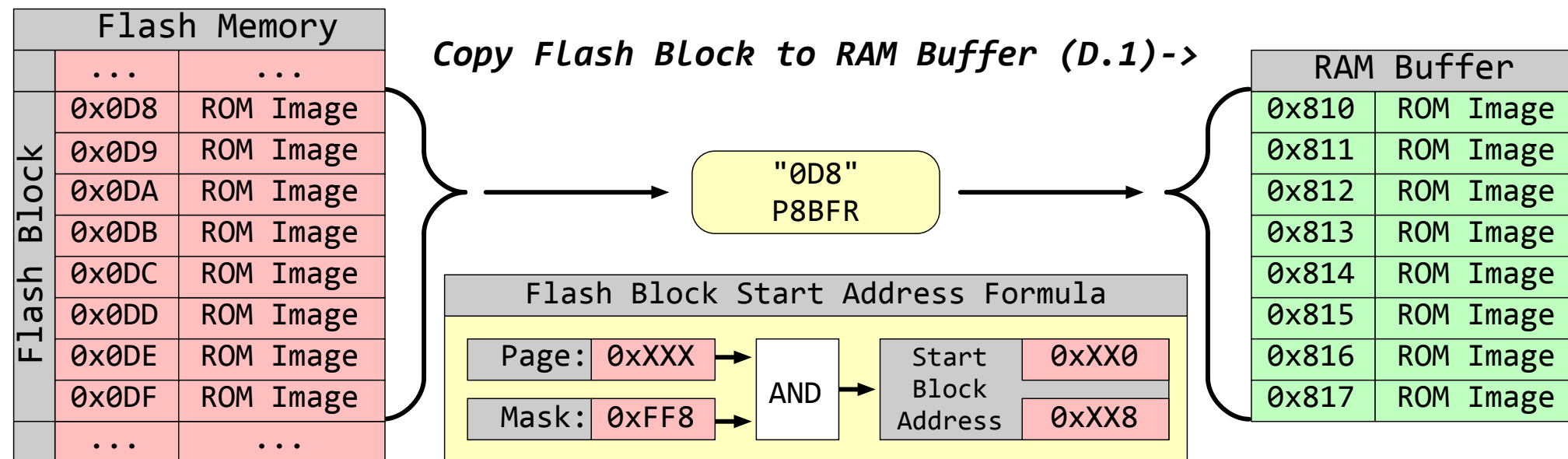
- Flash memory is a type of nonvolatile memory that erases data in units called blocks. A block stored on a flash memory chip must be erased before data can be written, or programmed, to the microchip. Flash memory retains data for an extended period of time whether a flash-equipped device is powered on or off.
- There is two types of Flash memory:
 - NOR : random access, SRAM interface, fast read, perfect for running code
 - NAND : sequential access, I/O interface, fast erase/write, perfect for data storage
- 41CL specific:
 - 41CL uses NOR Flash of 2MB (beta/v2), 4MB (v3/v4) and 8MB (v5)
 - 41CL has a typical Flash block size of 64KB
 - A HP-41C ROM image is 4096 Words of 10 bits (4K10bW) which is translated for the 41CL to 4096 Words of 16 bits (4K16bW) or 8192 Bytes (8KB)
 - 1 x 64KB Flash block contains 8 x 8KB ROM images
- Updating 41CL Flash stored ROM image(s) means:
 - Copy a Flash block to RAM Buffer (a 64KB RAM memory space temporary reserved for this purpose)
 - Update RAM Buffer page(s) with new ROM image(s)
 - Erase the outdated Flash block
 - Copy the updated RAM Buffer to the newly erased Flash block

FLASH UPDATE OVERVIEW (1 OF 3)

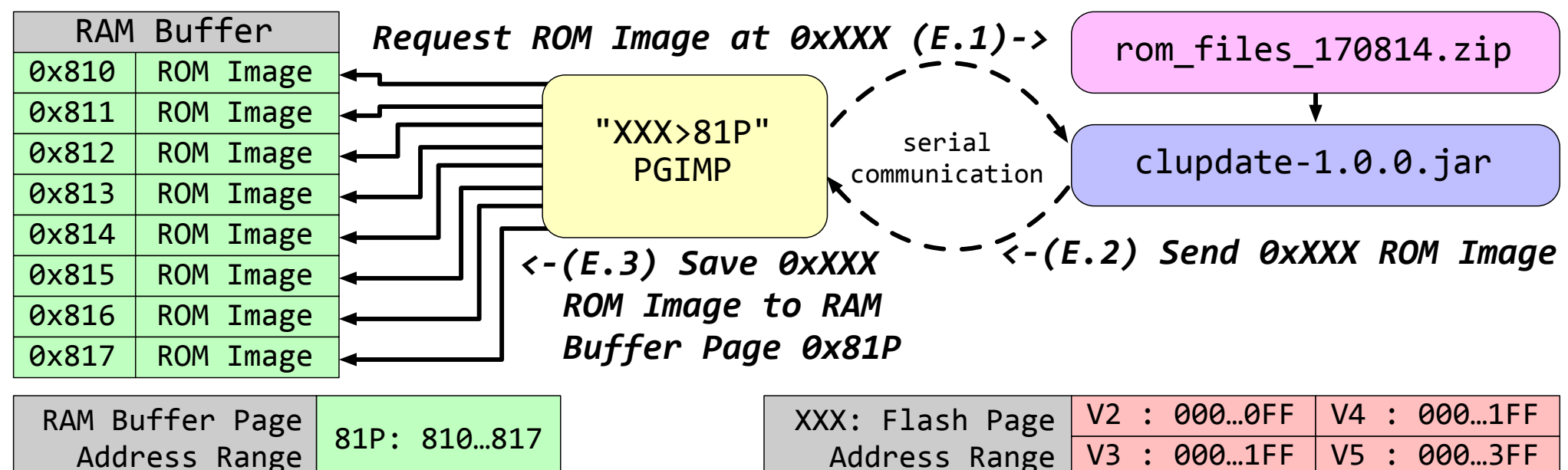


FLASH UPDATE OVERVIEW (2 OF 3)

Copying a Flash Block [8 Pages] to RAM Buffer (D)

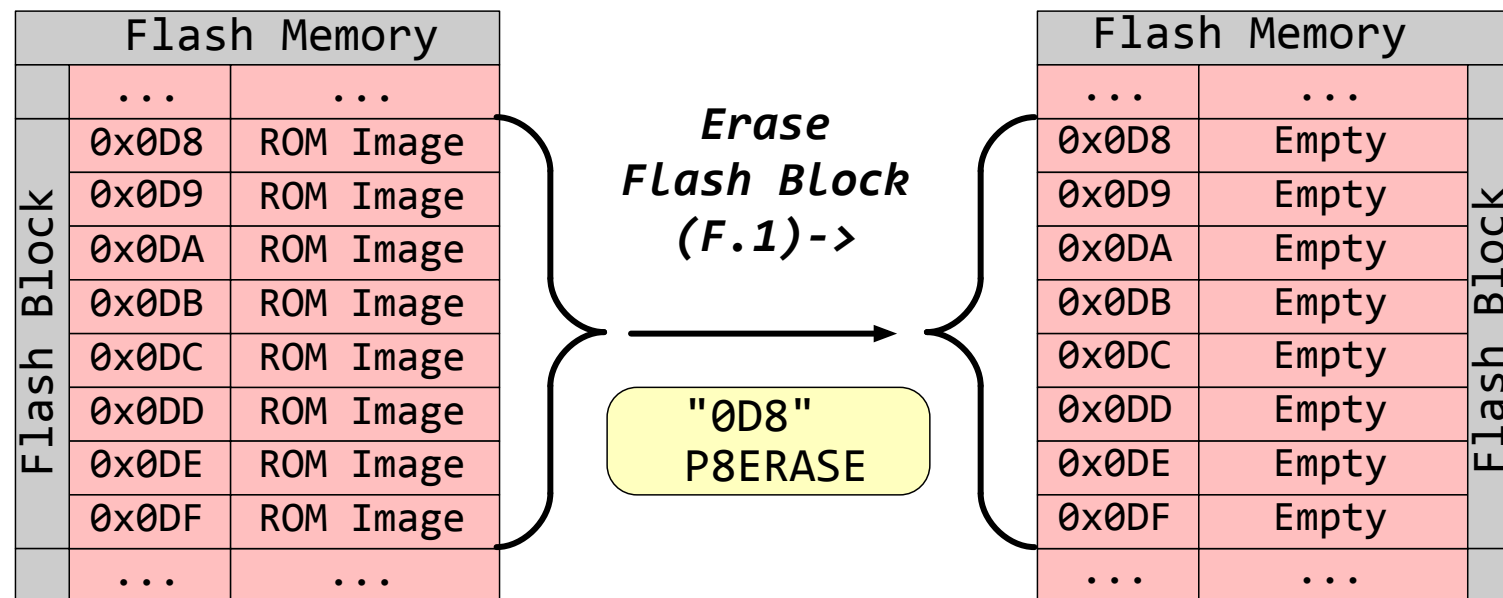


Updating Outdated ROM Image in RAM Buffer (E)



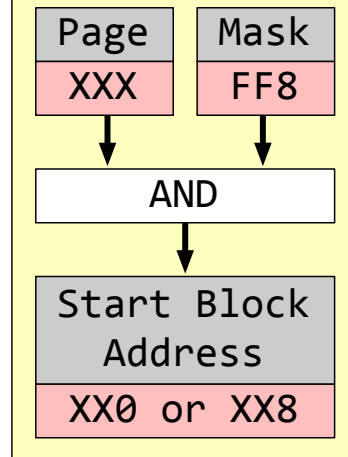
FLASH UPDATE OVERVIEW (3 OF 3)

Erasing a Flash Block [8 Pages] (F)

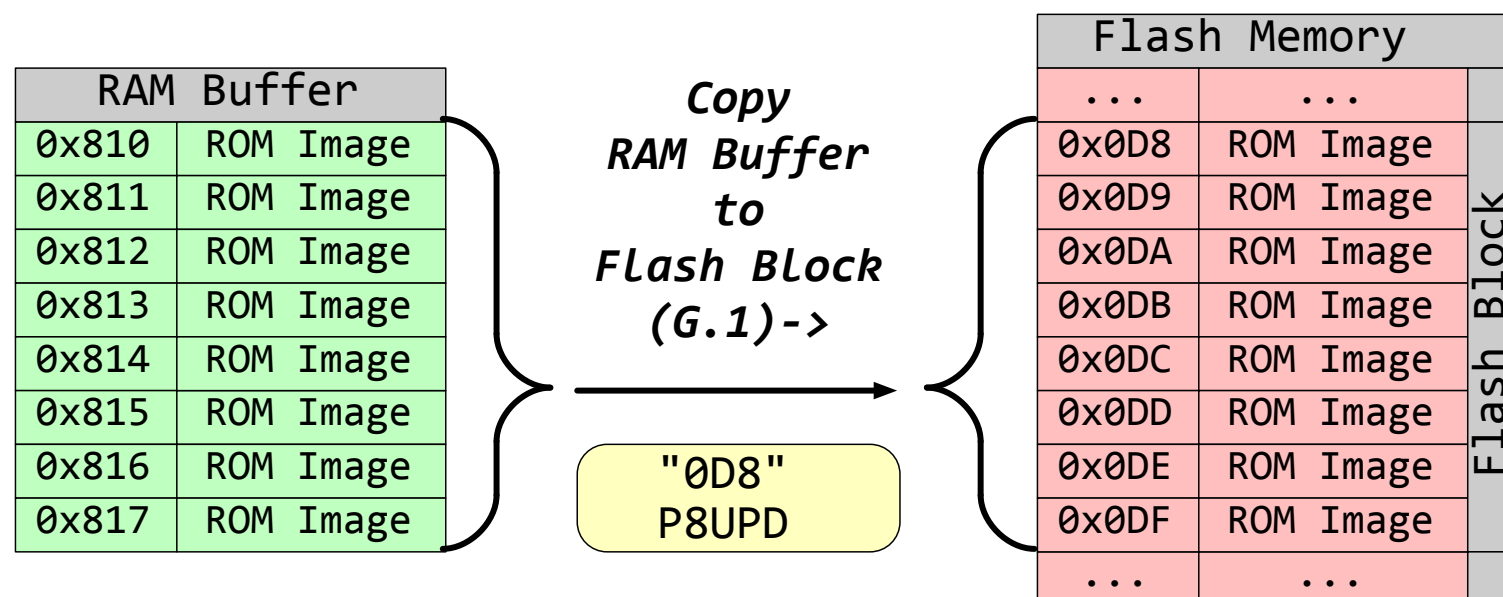


Flash Page Address Range	
V2	: 000...0FF
V3	: 000...1FF
V4	: 000...1FF
V5	: 000...3FF

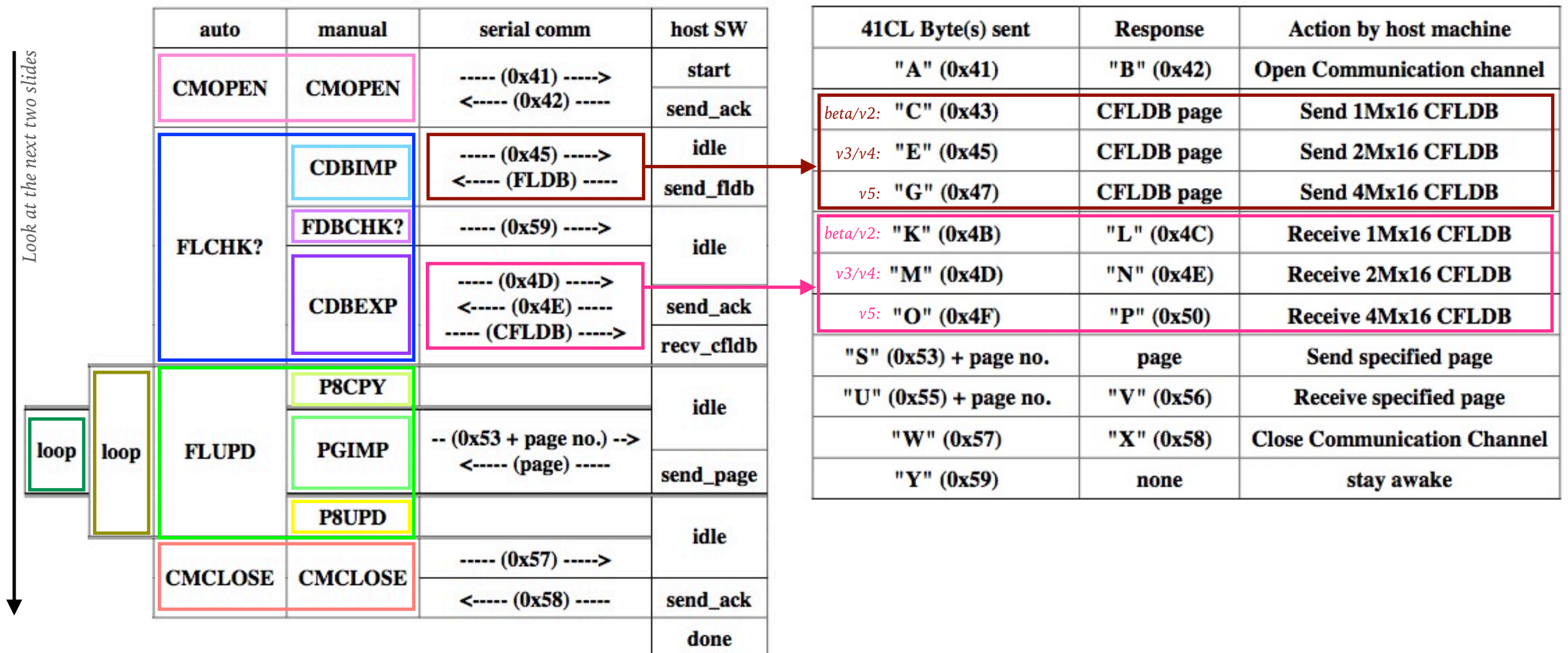
Flash Block Start Address Formula



Copying 8 RAM Buffer Pages to a Flash Block (G)



PROTOCOL OVERVIEW (1 OF 3)



Manual: 41CL Update Functions, rev. 2017/08/15, Page 35 & 36

File: www.systemyde.com/pdf/cl_update.pdf

PROTOCOL OVERVIEW (2 OF 3)

.....

- Open communication channel
- Scan Flash memory for outdated ROM image in specified Flash page range
 - Download new CFLDB ROM image
 - For each Flash page in specified Flash page range
 - YCRC ROM image located in Flash page
 - Compare calculated YCRC value to the stored YCRC value in CFLDB
 - If both values are identical
 - Then mark ROM image entry in CFLDB as valid
 - Else mark ROM image entry in CFLDB as invalid
 - Upload updated CFLDB ROM

PROTOCOL OVERVIEW (3 OF 3)

.....

- Update outdated ROM image in Flash within specified Flash page range
 - For each Flash block that has at least one CFLDB invalid ROM image entry within the specified Flash page range
 - Copy Flash block to RAM buffer block
 - For each outdated RAM buffer page in RAM buffer block
 - Download new ROM image from serial port
 - Write new ROM image to RAM buffer page
 - Erase Flash block
 - Copy RAM buffer block to Flash block
- Close communication channel

FUNCTIONS RUNTIME

.....

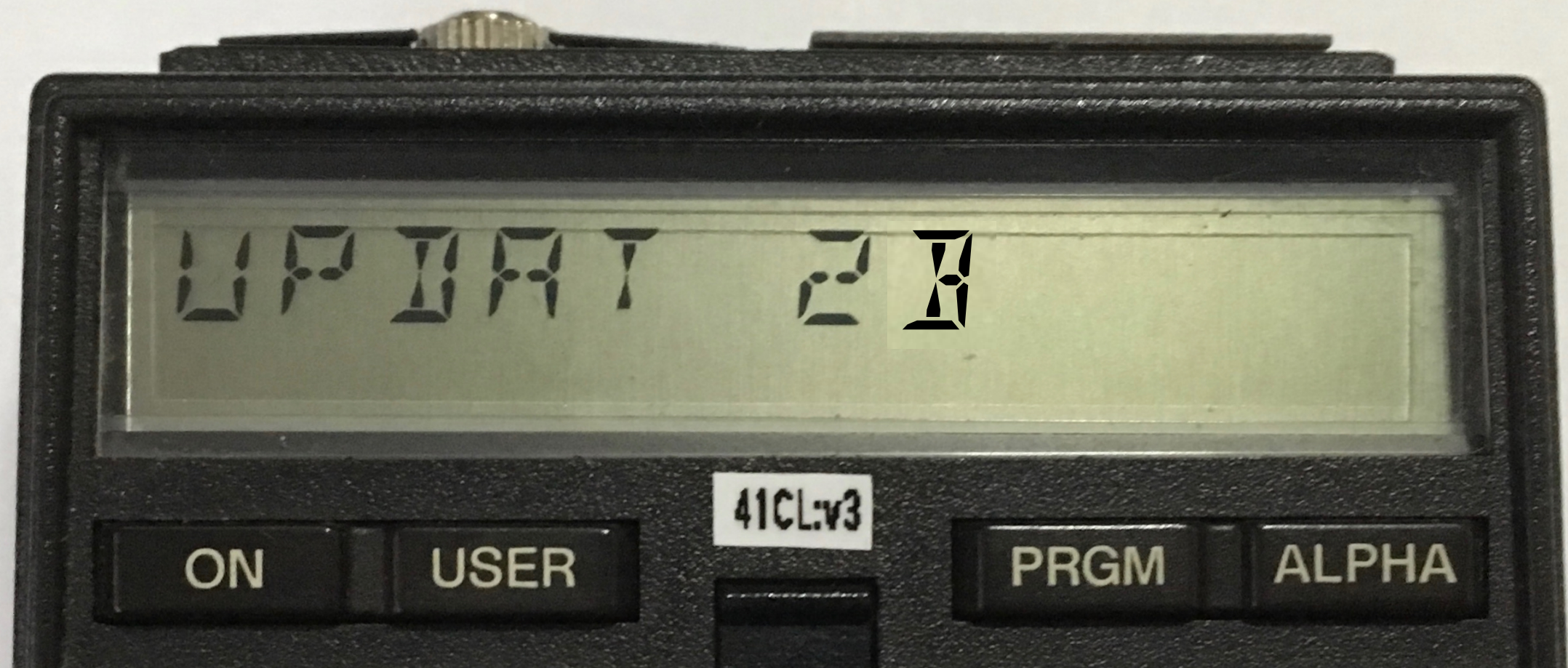
Command	Runtime	Note
CMOPEN	1 sec.	Open serial port
CDBIMP	19 sec.	Download CFLDB Image from Serial to RAM
FDBCHK?	10 sec.	Validate a ROM image & update CFLDB
CDBEXP	19 sec.	Upload CFLDB Image from RAM to Serial
P8BFR/P8CPY	34 sec.	Copy 64KB from Flash to RAM
PGIMP	19 sec.	Download a ROM Image from Serial to RAM
P8ERASE	6 sec.	Erase 64KB Flash block
P8UPD/P8WR	120 sec.	Copy 64KB from RAM to Flash
CMCLOSE	1 sec.	Close serial port
YCRC	10 sec.	Validate a ROM image

FULL SCAN TIMES

Board	Runtime	"*" FLCHK?
41CLbeta 41CLv2	43m 18s	CDBIMP [19s] + (FDBCHK? [10s] x 256) + CDBEXP [19s]
41CLv3 41CLv4	1h 25m 58s	CDBIMP [19s] + (FDBCHK? [10s] x 512) + CDBEXP [19s]
41CLv5	2h 51m 18s	CDBIMP [19s] + (FDBCHK? [10s] x 1024) + CDBEXP [19s]

FLASH BLOCK UPDATE TIMES

Pages	Runtime	"BEG>END" FLUPD (within one Flash block)
1	2m 59s	= P8BFR [34s] + (PGIMP [19s] x 1) + P8ERASE [6s] + P8UPD [120s]
2	3m 18s	= P8BFR [34s] + (PGIMP [19s] x 2) + P8ERASE [6s] + P8UPD [120s]
3	3m 37s	= P8BFR [34s] + (PGIMP [19s] x 3) + P8ERASE [6s] + P8UPD [120s]
4	3m 56s	= P8BFR [34s] + (PGIMP [19s] x 4) + P8ERASE [6s] + P8UPD [120s]
5	4m 15s	= P8BFR [34s] + (PGIMP [19s] x 5) + P8ERASE [6s] + P8UPD [120s]
6	4m 34s	= P8BFR [34s] + (PGIMP [19s] x 6) + P8ERASE [6s] + P8UPD [120s]
7	4m 53s	= P8BFR [34s] + (PGIMP [19s] x 7) + P8ERASE [6s] + P8UPD [120s]
8	5m 12s	= P8BFR [34s] + (PGIMP [19s] x 8) + P8ERASE [6s] + P8UPD [120s]



FLASH UPDATE WITH PC HOST



UPDATE OVERVIEW

CL : Configure target calculator for the upcoming update

CL : Download latest update functions rom image

PC : Run host software in update (slave) mode

CL : Open communication channel

CL : Scan Flash for outdated and/or missing images

CL : Update Flash with updated and/or new images

CL : Close communication channel

CL : Post-update calculator cleanup (optional)

TARGET CALCULATOR SETUP

CL Input	CL Output	CL Comment
MMUDIS		Disable memory management unit
MMUCLR		Clear memory management unit configuration
"YFNX" PLUG1L		Delecting extreme functions [YFNX] ROM image Plug virtual module to port address 8
MMUEN		Activate memory management unit
SERINI		Initialize serial port (needed for YIMP later on)
BAUD 48	BAUD <u> </u> BAUD 48	Set transmission rate to 4800 bauds (needed for YIMP later on)
ON		Deactivate auto-off mode
CF 26		Deactivate beeper (optional)

UPDATE FUNCTIONS DOWNLOAD

"80F000-0FFF"		Physical destination address 0x80F000 and length 0x0FFF in RAM where the ROM image will be loaded	
[XEQ][ALPHA]YIMP		Here we need to prepare the next function by pressing [XEQ] [ALPHA] [Y] [I] [M] [P]	
		java -jar clupdate-1-0-0.jar --upload UPDAT-2B.ROM /dev/tty.usbserial 4800	
		HH:MM:SS --upload [fileName: UPDAT-2B.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS File UPDAT-2B.ROM loading ... done [YCRC=0x158BFD51 Rev:2017-08-14] HH:MM:SS Serial /dev/tty.usbserial opened. HH:MM:SS Sleeping 5 seconds before starting file transfer	
[ALPHA]	RECEIVING	HH:MM:SS Sending 8192 = 8192 bytes sent HH:MM:SS Serial /dev/tty.usbserial closed.	Pressing [ALPHA] within the time allowed, executes the YIMP function and start the CL serial importation
"80F" YCRC	WORKING 158BFD51	Selecting RAM page 0x80F000 Validating CRC of the RAM page Expecting YCRC=0x158BFD51 for UPDAT-2B.ROM	
"-80F 9" PPLUG		Map UPDAT-2B.ROM image at RAM physical address 0x80F000 to port address 9 Activate the virtual module	
CAT 2	-TIME 3A -CL TIME -YFNX 2C -SYS FNS -SER FNS -MISC FNS UPDAT 2B -EXT FCN 3B -CL EXT FCN	Validating configuration Time module CL Time module CL Extreme Functions module - MMU functions CL Extreme Functions module - System functions CL Extreme Functions module - Serial functions CL Extreme Functions module - Miscellaneous functions CL Update Functions module Extended Functions module CL Extended Functions module	
		CL Input	CL Output
		CL Comment	PC Input
			PC Output

START HOST & OPEN COMMUNICATION

.....

CMOPEN

```
java -jar clupdate-1-0-0.jar --update rom_files_170814.zip /dev/tty.usbserial 4800
```

```
HH:MM:SS --update [fileName: rom_files_170814.zip] [portName: /dev/tty.usbserial] [baudRate: 4800]
HH:MM:SS File      rom_files_170814.zip loading ... done
HH:MM:SS Serial    /dev/tty.usbserial opened at 4800 baud.
HH:MM:SS Waiting   for 41CL commands ...
```

Open communication channel

```
HH:MM:SS Received  OPEN_CHANNEL_REQUEST(0x41)
HH:MM:SS Sent      OPEN_CHANNEL_RESPONSE(0x42)
```

CL Input CL Comment PC Input PC Output

COMPLETE FLASH SCAN (BETA & V2)

This example assume the board has previously been updated to the rom_files_170811.zip level.

We scan the entire flash memory space, which is: 2MB or 256 ROM images for beta & v2 boards.

**		We scan the entire flash memory space, which is: 2MB or 256 ROM images for beta & v2 boards.				
FLCHK?	CDBIMP	IMP 806	HH:MM:SS Received	FLDB_2MB_IMPORT_REQUEST(0x43) [Page: 0x0DE] [boardGeneration: FIRST]		
			HH:MM:SS File	[FileName: FLDB_V2.ROM] [YCRC:0x08142017] [Rev: 2017-08-14]		
			HH:MM:SS Sending	8192 = 8192 bytes sent		
FDBCHK?	FDBCHK?	CRC 000	HH:MM:SS Received	KEEP_ALIVE(0x59)		
		...	...			
		CRC 0FF	HH:MM:SS Received	KEEP_ALIVE(0x59))		
CDBEXP	CDBEXP	EXP 806	HH:MM:SS Received	CORR_FLDB_2MB_EXPORT_REQUEST(0x4B)		
			HH:MM:SS Sent	CORR_FLDB_2MB_EXPORT_RESPONSE(0x4C)		
			HH:MM:SS Receiving	2185 2187 2187 1633 = 8192 bytes received		
			HH:MM:SS File	CFLDB.ROM saved		
			HH:MM:SS Report	Outdated ROM images [boardGeneration: FIRST]		
			HH:MM:SS Report	UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]		
			HH:MM:SS Report	FLDB_V2.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]		
			HH:MM:SS Report	IMDB_V2.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0x4EB0D909]		
			HH:MM:SS Report	Summary: 3 outdated of 512 ROM images		
The full scan of a beta or a v2 board, takes around 45m to complete.						
CL Internal Low Level Functions Calls		CL Input	CL Output	CL Comment	PC Output	Comment

The full scan of a beta or a v2 board, takes around 45m to complete.

UPDATE OUTDATED IMAGES (BETA & V2)

**		Update all outdated Flash pages marked in CFLDB located at physical RAM page 0x806000				
FLUDP	P8BFR	CPY 060 ... CPY 067	Copying Flash page 0x060000 to RAM page 0x810000 ... Copying Flash page 0x067000 to RAM page 0x817000		The update, in this specific case, takes around 6m17s to complete.	
	PGIMP	IMP 812	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x062] HH:MM:SS Image UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51] HH:MM:SS Sending 8192 = 8192 bytes sent			
	P8ERASE	ERS 060	Erasing the Flash block starting at physical address 0x060000 and ending at 0x067FFF			
	P8UPD	WR 060 ... WR 067	Copying RAM page 0x810000 to flash page 0x060000 ... Copying RAM page 0x817000 to flash page 0x067000			
	P8BFR	CPY 0D8 ... CPY 0DF	Copying flash page 0x0D8000 to RAM page 0x810000 ... Copying flash page 0x0DF000 to RAM page 0x817000			
	PGIMP	IMP 816	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0DE] HH:MM:SS Image FLDB_V2.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017] HH:MM:SS Sending 8192 = 8192 bytes sent			
	PGIMP	IMP 817	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0DF] HH:MM:SS Image IMDB_V2.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0x4EB0D909] HH:MM:SS Sending 8192 = 8192 bytes sent			
	P8ERASE	ERS 0D8	Erasing the Flash block starting at physical address 0x0D8000 and ending at 0x0DFFFF			
	P8UPD	WR 0D8 ... WR 0DF	Copying RAM page 0x810000 to flash page 0x0D8000 ... Copying RAM page 0x817000 to flash page 0x0DF000			
CL Internal Low Level Functions Calls		CL Input	CL Output	CL Comment	PC Output	Comment

The update, in this specific case, takes around 6m17s to complete.

COMPLETE FLASH SCAN (V3 & V4)

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This example assume the board has previously been updated to the rom_files_170811.zip level.

We scan the entire flash memory space, which is: 4MB or 512 ROM images for v3 & v4 boards.

FLCHK?

CDBIMP

FDBCHK?

CDBEXP

IMP 806

CRC 000
...
CRC 1FF

EXP 806

HH:MM:SS Received FLDB_4MB_IMPORT_REQUEST(0x45) [Page: 0x0DE] [boardGeneration: SECOND]
HH:MM:SS File [FileName: FLDB.ROM] [YCRC: 0x08142017] [Rev: 2017-08-14]
HH:MM:SS Sending 8192 = 8192 bytes sent

HH:MM:SS Received KEEP_ALIVE(0x59)
...
HH:MM:SS Received KEEP_ALIVE(0x59))

HH:MM:SS Received CORR_FLDB_4MB_EXPORT_REQUEST(0x4D)
HH:MM:SS Sent CORR_FLDB_4MB_EXPORT_RESPONSE(0x4E)
HH:MM:SS Receiving 2185 2187 2187 1633 = 8192 bytes received
HH:MM:SS File CFLDB.ROM saved
HH:MM:SS Report Outdated ROM images [boardGeneration: SECOND]
HH:MM:SS Report MPARIS.ROM [Page:0x05F ID:5PAR Rev:2017-05-11 YCRC:0x0755544A]
HH:MM:SS Report UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]
HH:MM:SS Report FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]
HH:MM:SS Report IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6]
HH:MM:SS Report Summary: 4 outdated of 512 ROM images

The full scan of a v3 or a v4 board, takes around 1h30m to complete.

CL Internal Low Level Functions Calls

CL Input

CL Output

CL Comment

PC Output

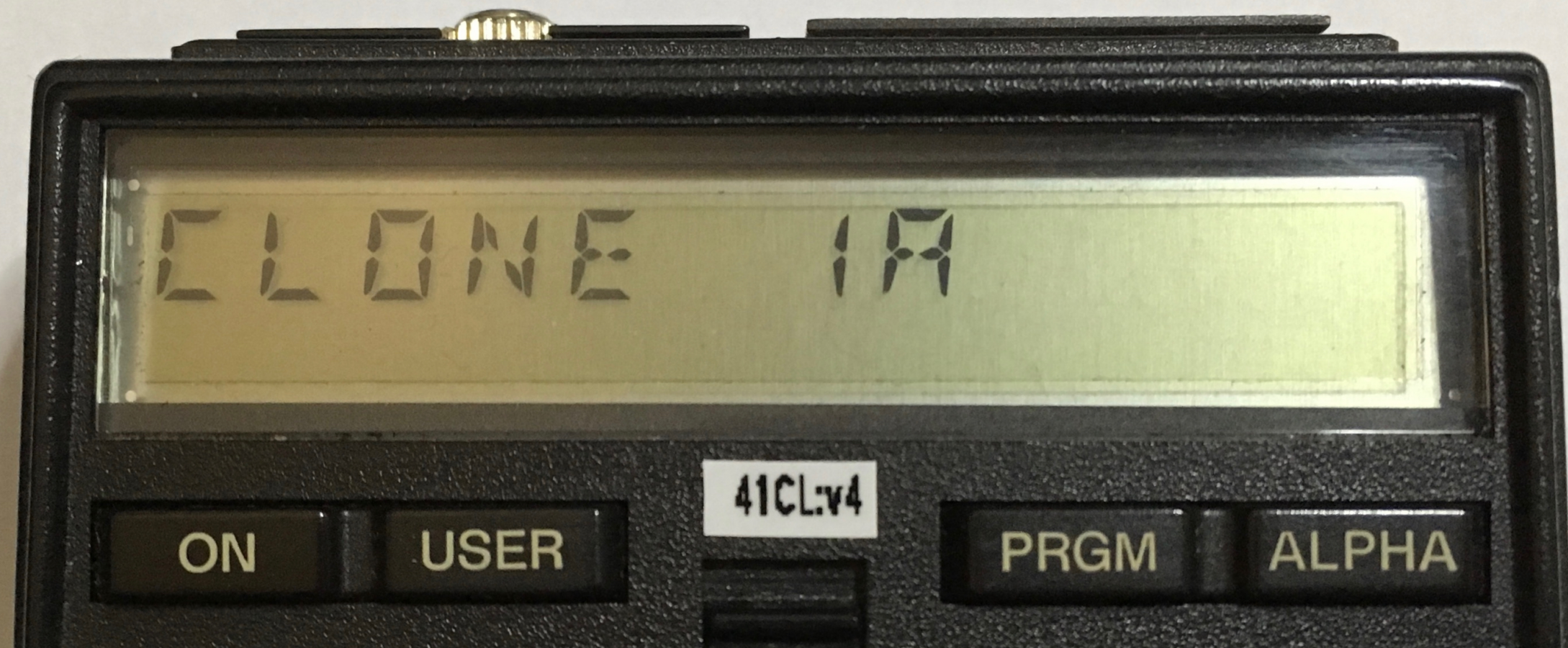
Comment

UPDATE OUTDATED IMAGES (V3 & V4)

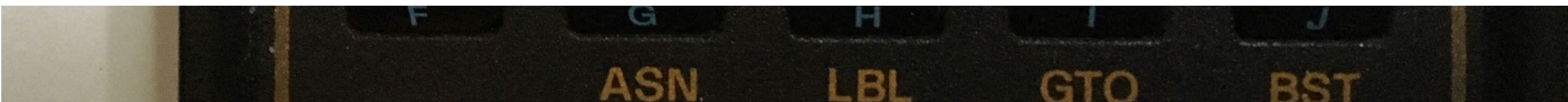
" * "		Update all outdated Flash pages marked in CFLDB located at physical RAM page 0x806000		
FLUDP	P8BFR	CPY 058 ... CPY 05F	Copying Flash page 0x058000 to RAM page 0x810000 ... Copying Flash page 0x05F000 to RAM page 0x817000	
	PGIMP	IMP 817	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x05F] HH:MM:SS Image MPARIS.ROM [Page:0x05F ID:5PAR Rev:2017-05-11 YCRC:0x075544A] HH:MM:SS Sending 8192 = 8192 bytes sent	
	P8ERASE	ERS 058	Erasing the Flash block starting at physical address 0x058000 and ending at 0x05FFFF	
	P8UPD	WR 058 ... WR 05F	Copying RAM page 0x810000 to flash page 0x058000 ... Copying RAM page 0x817000 to flash page 0x05F000	
	P8BFR	CPY 060 ... CPY 067	Copying Flash page 0x060000 to RAM page 0x810000 ... Copying Flash page 0x067000 to RAM page 0x817000	
	PGIMP	IMP 812	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x062] HH:MM:SS Image UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51] HH:MM:SS Sending 8192 = 8192 bytes sent	
	P8ERASE	ERS 060	Erasing the Flash block starting at physical address 0x060000 and ending at 0x067FFF	
	P8UPD	WR 060 ... WR 067	Copying RAM page 0x810000 to flash page 0x060000 ... Copying RAM page 0x817000 to flash page 0x067000	
	P8BFR	CPY 0D8 ... CPY 0DF	Copying flash page 0x0D8000 to RAM page 0x810000 ... Copying flash page 0x0DF000 to RAM page 0x817000	
	PGIMP	IMP 816	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0DE] HH:MM:SS Image FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017] HH:MM:SS Sending 8192 = 8192 bytes sent	
	PGIMP	IMP 817	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0DF] HH:MM:SS Image IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6] HH:MM:SS Sending 8192 = 8192 bytes sent	
	P8ERASE	ERS 0D8	Erasing the Flash block starting at physical address 0x0D8000 and ending at 0x0DFFFF	
	P8UPD	WR 0D8 ... WR 0DF	Copying RAM page 0x810000 to flash page 0x0D8000 ... Copying RAM page 0x817000 to flash page 0x0DF000	
			The update, in this specific case, takes around 9m16s to complete.	
CL Internal Low Level Functions Calls		CL Input	CL Output	CL Comment
			PC Output	Comment

CLOSE COMMUNICATION & CLEANUP

CMCLOSE	HH:MM:SS Received CLOSE_CHANNEL_REQUEST(0x57) HH:MM:SS Sent CLOSE_CHANNEL_RESPONSE(0x58) HH:MM:SS Serial /dev/tty.usbserial closed.	close communication channel
MMUDIS	disable memory management unit	
MMUCLR	clear memory management unit configuration	
OFF ON	reactivate auto-off mode	
At this point your 41CL should be up-to-date to the rom_files_170814 level.		
	CL Input	CL Comment
		PC Output
		Comment



FLASH UPDATE WITH CL HOST



UPDATE OVERVIEW

CL-B : Configure host & target calculators for the upcoming update

CL-H : Download latest host functions rom image

CL-T : Download latest update functions rom image

CL-B : Open communication channel &
Scan Flash for outdated and/or missing images

CL-B : Update Flash with updated and/or new images &
Close communication channel

CL-B : Post-update calculator cleanup (optional)

Notes: CL-H (host) internal rom images is used to update CL-T (target), CL-B means both calculators.

This process need a CLv4 board or higher to act as a host and can only update a CLv3 board or higher.

There is currently no way to update a CLv2 board with this process, you absolutely need to PC to update a CLv2 board.

HOST & TARGET CALCULATORS SETUP

MMUDIS		Disable memory management unit
MMUCLR		Clear memory management unit configuration
"YFNX" PLUG1L		Delecting extreme functions [YFNX] ROM image Plug virtual module to port address 8
MMUEN		Activate memory management unit
SERINI		Initialize serial port (needed for YIMP later on)
BAUD 48	BAUD <u> </u> BAUD 48	Set transmission rate to 4800 bauds (needed for YIMP later on)
ON		Deactivate auto-off mode
CF 26		Deactivate beeper (optional)
		CL InputCL OutputCL Comment

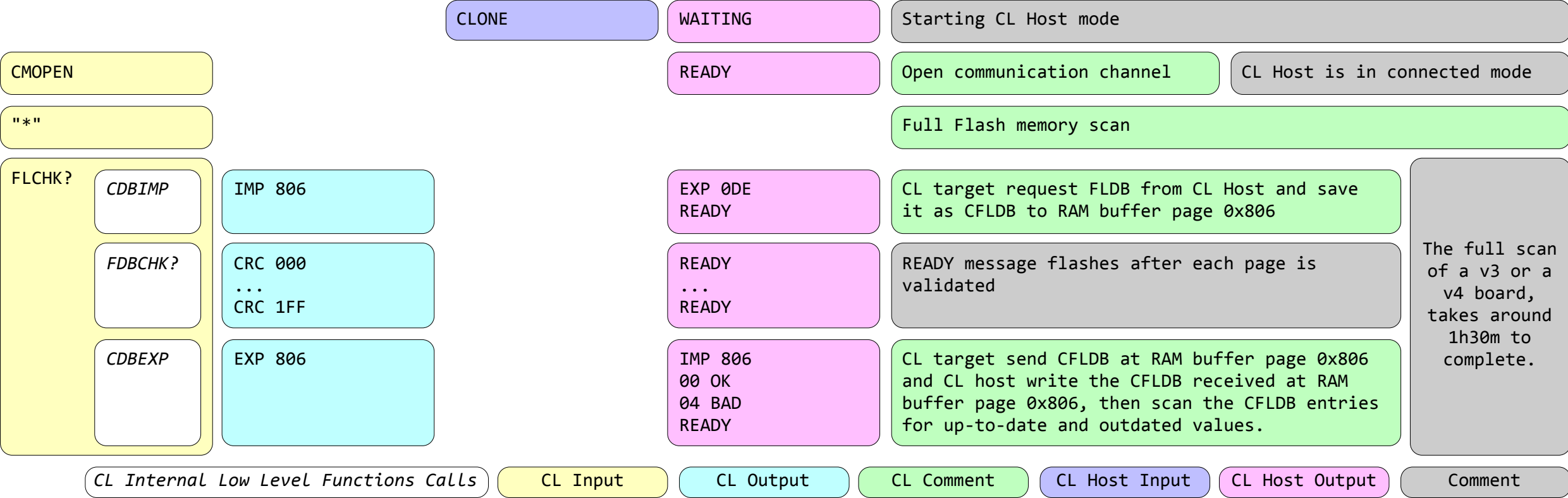
HOST FUNCTIONS DOWNLOAD ON HOST

"80E000-0FFF"		Physical destination address 0x80E000 and length 0x0FFF in RAM where the ROM image will be loaded
[XEQ][ALPHA]YIMP		Here we need to prepare the next function by pressing [XEQ] [ALPHA] [Y] [I] [M] [P]
		java -jar clupdate-1-0-0.jar --upload UPHST-1A.ROM /dev/tty.usbserial 4800
		HH:MM:SS --upload [fileName: UPHST-1A.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS File UPHST-1A.ROM loading ... done [YCRC=0xFE986F59 Rev:2017-06-03] HH:MM:SS Serial /dev/tty.usbserial opened. HH:MM:SS Sleeping 5 seconds before starting file transfer
[ALPHA]	RECEIVING	HH:MM:SS Sending 8192 = 8192 bytes sent HH:MM:SS Serial /dev/tty.usbserial closed.
		Pressing [ALPHA] within the time allowed, executes the YIMP function and start the CL serial importation
"80E" YCRC	WORKING FE986F59	Selecting RAM page 0x80E000 Validating CRC of the RAM page Expecting YCRC=0xFE986F59 for UPHST-1A.ROM
"-80E 9" PPLUG		Map UPHST-1A.ROM image at RAM physical address 0x80E000 to port address 9 Activate the virtual module
CAT 2	-TIME 3A -CL TIME -YFNX 2C -SYS FNS -SER FNS -MISC FNS CLONE 1A -EXT FCN 3B -CL EXT FCN	Validating configuration Time module CL Time module CL Extreme Functions module - MMU functions CL Extreme Functions module - System functions CL Extreme Functions module - Serial functions CL Extreme Functions module - Miscellaneous functions CL Host Functions module Extended Functions module CL Extended Functions module
CL Input CL Output CL Comment PC Input PC Output		

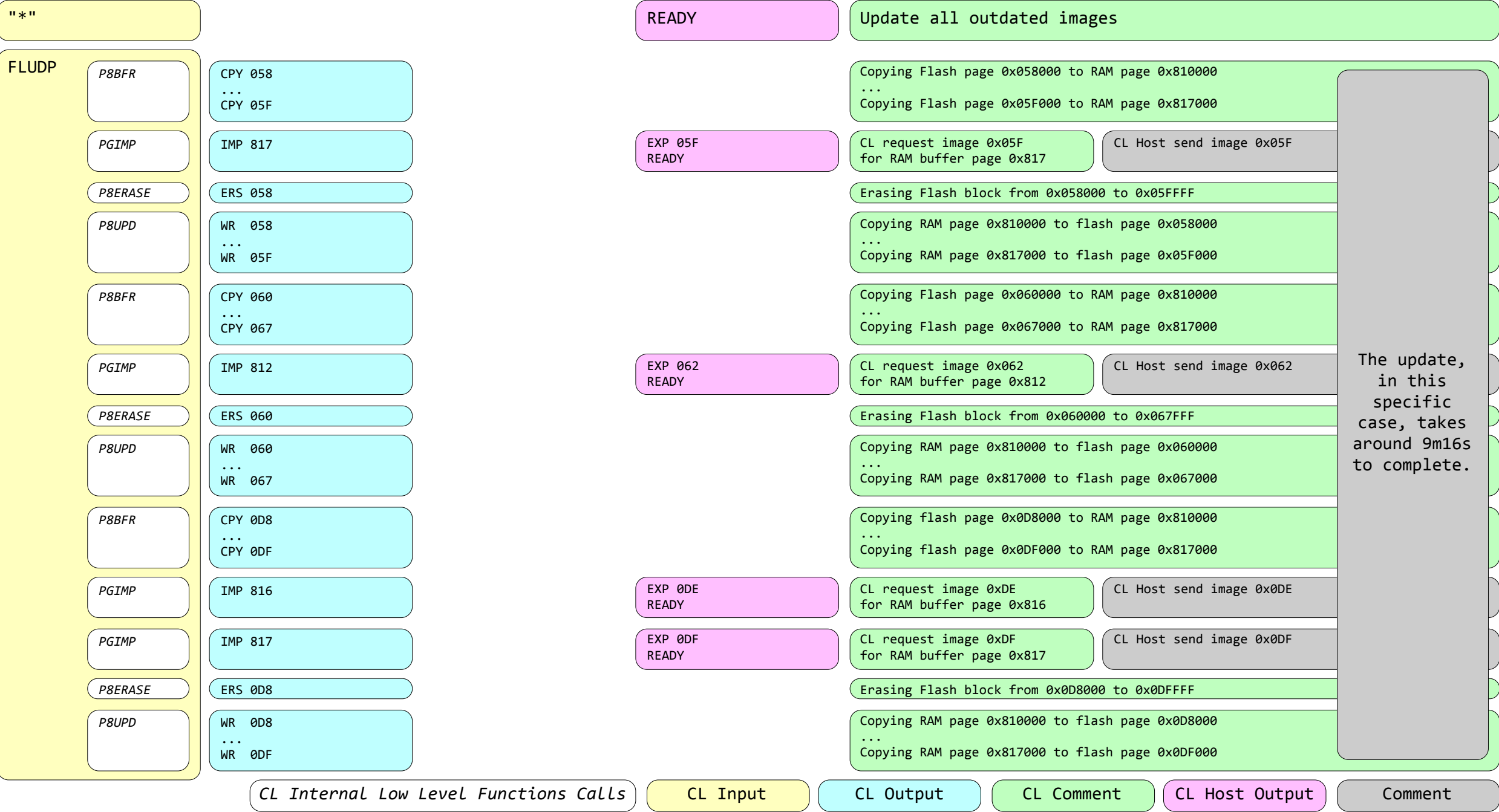
UPDATE FUNCTIONS DOWNLOAD ON TARGET

"80F000-0FFF"		Physical destination address 0x80F000 and length 0x0FFF in RAM where the ROM image will be loaded
[XEQ][ALPHA]YIMP		Here we need to prepare the next function by pressing [XEQ] [ALPHA] [Y] [I] [M] [P]
		java -jar clupdate-1-0-0.jar --upload UPDAT-2B.ROM /dev/tty.usbserial 4800
		HH:MM:SS --upload [fileName: UPDAT-2B.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS File UPDAT-2B.ROM loading ... done [YCRC=0x158BFD51 Rev:2017-08-14] HH:MM:SS Serial /dev/tty.usbserial opened. HH:MM:SS Sleeping 5 seconds before starting file transfer
[ALPHA]	RECEIVING	HH:MM:SS Sending 8192 = 8192 bytes sent HH:MM:SS Serial /dev/tty.usbserial closed.
		Pressing [ALPHA] within the time allowed, executes the YIMP function and start the CL serial importation
"80F" YCRC	WORKING 158BFD51	Selecting RAM page 0x80F000 Validating CRC of the RAM page Expecting YCRC=0x158BFD51 for UPDAT-2B.ROM
"-80F 9" PPLUG		Map UPDAT-2B.ROM image at RAM physical address 0x80F000 to port address 9 Activate the virtual module
CAT 2	-TIME 3A -CL TIME -YFNX 2C -SYS FNS -SER FNS -MISC FNS UPDAT 2B -EXT FCN 3B -CL EXT FCN	Validating configuration Time module CL Time module CL Extreme Functions module - MMU functions CL Extreme Functions module - System functions CL Extreme Functions module - Serial functions CL Extreme Functions module - Miscellaneous functions CL Update Functions module Extended Functions module CL Extended Functions module
		CL Input CL Output CL Comment PC Input PC Output

START HOST, OPEN COMM & FLASH SCAN (V3 & V4)

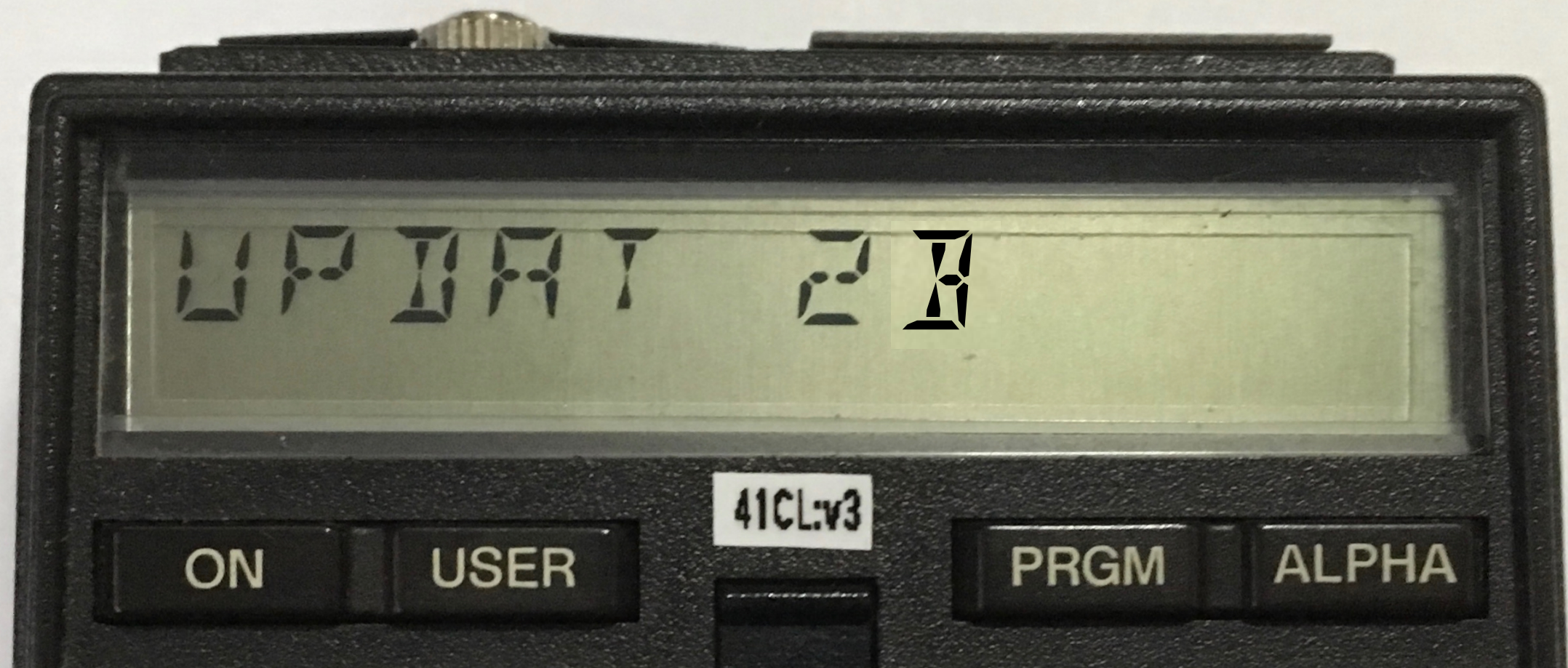


UPDATE OUTDATED IMAGES (V3 & V4)



CLOSE COMMUNICATION & CLEANUP

CMCLOSE		0.0000	Close communication channel	CL Host (CLONE) terminated		
MMUDIS	MMUDIS		disable MMU	disable MMU		
MMUCLR	MMUCLR		clear MMU configuration	clear MMU configuration		
OFF ON	OFF ON		reactivate auto-off mode	reactivate auto-off mode		
At this point your 41CL should be up-to-date to the rom_files_170814 level.						
	CL Input	CL Output	CL Comment	CL Host Input	CL Host Output	Comment



FLASH UPDATE ADVANCED

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UPDATE OVERVIEW *

CL : Configure target calculator for the upcoming update

CL : Download latest update functions rom image

PC : Figure out what files needs to be updated (2 parts, optional)

PC : Run host software in update (slave) mode

CL : Open communication channel

CL : Scan Flash for outdated and/or missing images

CL : Manually tag Flash pages as outdated

CL : Update Flash with updated and/or new images

CL : Close communication channel

CL : Post-update calculator cleanup (optional)

* Only second generation boards (v3/v4) will be demonstrated in this section

TARGET CALCULATOR SETUP

CL Input	CL Output	CL Comment
MMUDIS		Disable memory management unit
MMUCLR		Clear memory management unit configuration
"YFNX" PLUG1L		Delecting extreme functions [YFNX] ROM image Plug virtual module to port address 8
MMUEN		Activate memory management unit
SERINI		Initialize serial port (needed for YIMP later on)
BAUD 48	BAUD <u> </u> BAUD 48	Set transmission rate to 4800 bauds (needed for YIMP later on)
ON		Deactivate auto-off mode
CF 26		Deactivate beeper (optional)

UPDATE FUNCTIONS DOWNLOAD

"80F000-0FFF"		Physical destination address 0x80F000 and length 0x0FFF in RAM where the ROM image will be loaded	
[XEQ][ALPHA]YIMP		Here we need to prepare the next function by pressing [XEQ] [ALPHA] [Y] [I] [M] [P]	
		java -jar clupdate-1-0-0.jar --upload UPDAT-2B.ROM /dev/tty.usbserial 4800	
		HH:MM:SS --upload [fileName: UPDAT-2B.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS File UPDAT-2B.ROM loading ... done [YCRC=0x158BFD51 Rev:2017-08-14] HH:MM:SS Serial /dev/tty.usbserial opened. HH:MM:SS Sleeping 5 seconds before starting file transfer	
[ALPHA]	RECEIVING	HH:MM:SS Sending 8192 = 8192 bytes sent HH:MM:SS Serial /dev/tty.usbserial closed.	Pressing [ALPHA] within the time allowed, executes the YIMP function and start the CL serial importation
"80F" YCRC	WORKING 158BFD51	Selecting RAM page 0x80F000 Validating CRC of the RAM page Expecting YCRC=0x158BFD51 for UPDAT-2B.ROM	
"-80F 9" PPLUG		Map UPDAT-2B.ROM image at RAM physical address 0x80F000 to port address 9 Activate the virtual module	
CAT 2	-TIME 3A -CL TIME -YFNX 2C -SYS FNS -SER FNS -MISC FNS UPDAT 2B -EXT FCN 3B -CL EXT FCN	Validating configuration Time module CL Time module CL Extreme Functions module - MMU functions CL Extreme Functions module - System functions CL Extreme Functions module - Serial functions CL Extreme Functions module - Miscellaneous functions CL Update Functions module Extended Functions module CL Extended Functions module	
		CL Input	CL Output
		CL Comment	PC Input
			PC Output

OUTDATED FILES LIST

FDBVER?

08/11/2017

Flash Database Version from the update ROM,
tell us that we have a board that has previously been updated with files from rom_files_170811.zip

The next action will show what has changed between 2017/08/11 and 2017/08/14

java -jar clupdate-1.0.0.jar --diff rom_files_170811.zip rom_files_170814.zip

```
=====
[rom_files_170811.zip::mem_ref_v2.txt] vs [rom_files_170814.zip::mem_ref_v2.txt]
=====
UPDAT-2A.ROM [Page:0x062 ID:YUPS Rev:2017-08-10 YCRC:0x4491106C] != UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]
FLDB_V2.ROM [Page:0x0DE ID:FLDB Rev:2017-08-11 YCRC:0x08112017] != FLDB_V2.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]
IMDB_V2.ROM [Page:0x0DF ID:IMDB Rev:2017-07-08 YCRC:0x43C16454] != IMDB_V2.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0x4EB0D909]
=====
Differences: 3
=====

[rom_files_170811.zip::mem_ref.txt] vs [rom_files_170814.zip::mem_ref.txt]
=====
ALL_FF.ROM [Page:0x05F ID: Rev: YCRC:0x53D36BD2] != MPARIS.ROM [Page:0x05F ID:5PAR Rev:2017-05-11 YCRC:0x0755544A]
UPDAT-2A.ROM [Page:0x062 ID:YUPS Rev:2017-08-10 YCRC:0x4491106C] != UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]
FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-11 YCRC:0x08112017] != FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]
IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-07-08 YCRC:0x8D9F7D59] != IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6]
=====
Differences: 4
=====
```

The above report reveals that four ROM images have changed between these two dates. Four flash pages: 0x05F, 0x062, 0x0DE & 0x0DF located in three flash blocks (0x058...0x05F, 0x060...0x067 & 0x0D8...0x0DF)

CL Input

CL Output

CL Comment

PC Input

PC Output

Comment

OUTDATED FILES MAP

Flash Blocks								
↓	Flash Pages							
	0x000	0x001	0x002	0x003	0x004	0x005	0x006	0x007
	0x008	0x009	0x00A	0x00B	0x00C	0x00D	0x00E	0x00F
	0x010	0x011	0x012	0x013	0x014	0x015	0x016	0x017
	0x018	0x019	0x01A	0x01B	0x01C	0x01D	0x01E	0x01F
	0x020	0x021	0x022	0x023	0x024	0x025	0x026	0x027
	0x028	0x029	0x02A	0x02B	0x02C	0x02D	0x02E	0x02F
	0x030	0x031	0x032	0x033	0x034	0x035	0x036	0x037
	0x038	0x039	0x03A	0x03B	0x03C	0x03D	0x03E	0x03F
	0x040	0x041	0x042	0x043	0x044	0x045	0x046	0x047
	0x048	0x049	0x04A	0x04B	0x04C	0x04D	0x04E	0x04F
	0x050	0x051	0x052	0x053	0x054	0x055	0x056	0x057
	0x058	0x059	0x05A	0x05B	0x05C	0x05D	0x05E	0x05F
	0x060	0x061	0x062	0x063	0x064	0x065	0x066	0x067
	0x068	0x069	0x06A	0x06B	0x06C	0x06D	0x06E	0x06F
	0x070	0x071	0x072	0x073	0x074	0x075	0x076	0x077
	0x078	0x079	0x07A	0x07B	0x07C	0x07D	0x07E	0x07F

Flash Blocks								
↓	Flash Pages							
	0x080	0x081	0x082	0x083	0x084	0x085	0x086	0x087
	0x088	0x089	0x08A	0x08B	0x08C	0x08D	0x08E	0x08F
	0x090	0x091	0x092	0x093	0x094	0x095	0x096	0x097
	0x098	0x099	0x09A	0x09B	0x09C	0x09D	0x09E	0x09F
	0x0A0	0x0A1	0x0A2	0x0A3	0x0A4	0x0A5	0x0A6	0x0A7
	0x0A8	0x0A9	0x0AA	0x0AB	0x0AC	0x0AD	0x0AE	0x0AF
	0x0B0	0x0B1	0x0B2	0x0B3	0x0B4	0x0B5	0x0B6	0x0B7
	0x0B8	0x0B9	0x0BA	0x0BB	0x0BC	0x0BD	0x0BE	0x0BF
	0x0C0	0x0C1	0x0C2	0x0C3	0x0C4	0x0C5	0x0C6	0x0C7
	0x0C8	0x0C9	0x0CA	0x0CB	0x0CC	0x0CD	0x0CE	0x0CF
	0x0D0	0x0D1	0x0D2	0x0D3	0x0D4	0x0D5	0x0D6	0x0D7
	0x0D8	0x0D9	0x0DA	0x0DB	0x0DC	0x0DD	0x0DE	0x0DF
	0x0E0	0x0E1	0x0E2	0x0E3	0x0E4	0x0E5	0x0E6	0x0E7
	0x0E8	0x0E9	0x0EA	0x0EB	0x0EC	0x0ED	0x0EE	0x0EF
	0x0F0	0x0F1	0x0F2	0x0F3	0x0F4	0x0F5	0x0F6	0x0F7
	0x0F8	0x0F9	0x0FA	0x0FB	0x0FC	0x0FD	0x0FE	0x0FF

START HOST & OPEN COMMUNICATION

.....

CMOPEN

```
java -jar clupdate-1-0-0.jar --update rom_files_170814.zip /dev/tty.usbserial 4800
```

```
HH:MM:SS --update [fileName: rom_files_170814.zip] [portName: /dev/tty.usbserial] [baudRate: 4800]
HH:MM:SS File      rom_files_170814.zip loading ... done
HH:MM:SS Serial    /dev/tty.usbserial opened at 4800 baud.
HH:MM:SS Waiting   for 41CL commands ...
```

Open communication channel

```
HH:MM:SS Received  OPEN_CHANNEL_REQUEST(0x41)
HH:MM:SS Sent      OPEN_CHANNEL_RESPONSE(0x42)
```

CL Input CL Comment PC Input PC Output

SELECTIVE FLASH SCAN (V3 & V4)

"0DE>0DF"

FLCHK?

CDBIMP

FDBCHK?

CDBEXP

IMP 806

CRC 0DE
CRC 0DF

EXP 806

The previous report reveals that four ROM images have changed between these two dates. Four flash pages: 0x05F, 0x062, 0x0DE & 0x0DF located in three flash blocks (0x058...0x05F, 0x060...0x067 & 0x0D8...0x0DF)

First, lets start with the last two pages by entering a range: from 0x0DE to 0x0DF

HH:MM:SS Received FLDB_4MB_IMPORT_REQUEST(0x45) [Page: 0x0DE] [boardGeneration: SECOND]

HH:MM:SS File [FileName: FLDB.ROM] [YCRC: 0x08142017] [Rev: 2017-08-14]

HH:MM:SS Sending 8192 = 8192 bytes sent

HH:MM:SS Received KEEP_ALIVE(0x59)

HH:MM:SS Received KEEP_ALIVE(0x59))

HH:MM:SS Received CORR_FLDB_4MB_EXPORT_REQUEST(0x4D)

HH:MM:SS Sent CORR_FLDB_4MB_EXPORT_RESPONSE(0x4E)

HH:MM:SS Receiving 2185 2187 2187 1633 = 8192 bytes received

HH:MM:SS File CFLDB.ROM saved

HH:MM:SS Report Outdated ROM images [boardGeneration: SECOND]

HH:MM:SS Report FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]

HH:MM:SS Report IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6]

HH:MM:SS Report Summary: 2 outdated of 512 ROM images

NOTICE: the higher level function FLCHK? Check Flash Memory Against CFLDB uses three lower level functions CDBIMP Import Correlated Flash Database FDBCHK? Check Flash Database CDBEXP Export Correlated Flash Database to do its work. We will use them later.

"05F"

FDBCHK?

"062"

FDBCHK?

CDBEXP

CRC 05F

CRC 062

EXP 806

Second, lets continue with a specific Flash page (0x05F) instead of a range like we have done previously

Third, lets finish with a specific Flash page (0x062)

HH:MM:SS Received KEEP_ALIVE(0x59)

HH:MM:SS Received KEEP_ALIVE(0x59))

HH:MM:SS Received CORR_FLDB_4MB_EXPORT_REQUEST(0x4D)

HH:MM:SS Sent CORR_FLDB_4MB_EXPORT_RESPONSE(0x4E)

HH:MM:SS Receiving 2185 2187 2187 1633 = 8192 bytes received

HH:MM:SS File CFLDB.ROM saved

HH:MM:SS Report Outdated ROM images [boardGeneration: SECOND]

HH:MM:SS Report MPARIS.ROM [Page:0x05F ID:SPAR Rev:2017-05-11 YCRC:0x0755544A]

HH:MM:SS Report UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51]

HH:MM:SS Report FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017]

HH:MM:SS Report IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6]

HH:MM:SS Report Summary: 4 outdated of 512 ROM images

NOTICE: we do not use FLCHK? this time, but instead uses lower level functions FDBCHK? and CDBEXP, why? If we had used FLCHK?, we would have lost the previous Flash scan result. The reason is, the first thing FLCHK? does is downloading a new CFLDB ROM image and by doing so, overriding the previous one who contained our scanned results.

CL Internal Low Level Functions Calls

CL Input

CL Output

CL Comment

PC Output

Comment

MANUAL FLASH INVALIDATION (V3 & V4)

.....				
The previous report reveals that four ROM images have changed between these two dates. Four flash pages: 0x05F, 0x062, 0x0DE & 0x0DF located in three flash blocks (0x058...0x05F, 0x060...0x067 & 0x0D8...0x0DF)				
CDBIMP	IMP 806	HH:MM:SS Received FLDB_4MB_IMPORT_REQUEST(0x45) [Page: 0x0DE] [boardGeneration: SECOND] HH:MM:SS File [FileName: FLDB.ROM] [YCRC: 0x08142017] [Rev: 2017-08-14] HH:MM:SS Sending 8192 = 8192 bytes sent		
"05F" PGINV		Manually invalidating Flash page 0x05F (MPARIS.ROM)		
"062" PGINV		Manually invalidating Flash page 0x062 (UPDAT-2B.ROM)		
"0DE" PGINV		Manually invalidating Flash page 0x0DE (FLDB.ROM)		
"0DF" PGINV		Manually invalidating Flash page 0x0DF (IMDB.ROM)		
CDBEXP	EXP 806	HH:MM:SS Received CORR_FLDB_4MB_EXPORT_REQUEST(0x4D) HH:MM:SS Sent CORR_FLDB_4MB_EXPORT_RESPONSE(0x4E) HH:MM:SS Receiving 2185 2187 2187 1633 = 8192 bytes received HH:MM:SS File CFLDB.ROM saved HH:MM:SS Report Outdated ROM images [boardGeneration: SECOND] HH:MM:SS Report MPARIS.ROM [Page:0x05F ID:5PAR Rev:2017-05-11 YCRC:0x0755544A] HH:MM:SS Report UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51] HH:MM:SS Report FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017] HH:MM:SS Report IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6] HH:MM:SS Report Summary: 4 outdated of 512 ROM images		
		CL Input	CL Output	CL Comment
				PC Output
				Comment

UPDATE OUTDATED IMAGES

" * "		Update all outdated Flash pages marked in CFLDB located at physical RAM page 0x806000		
FLUDP	P8BFR	CPY 058 ... CPY 05F	Copying Flash page 0x058000 to RAM page 0x810000 ... Copying Flash page 0x05F000 to RAM page 0x817000	
	PGIMP	IMP 817	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x05F] HH:MM:SS Image MPARIS.ROM [Page:0x05F ID:5PAR Rev:2017-05-11 YCRC:0x075544A] HH:MM:SS Sending 8192 = 8192 bytes sent	
	P8ERASE	ERS 058	Erasing the Flash block starting at physical address 0x058000 and ending at 0x05FFFF	
	P8UPD	WR 058 ... WR 05F	Copying RAM page 0x810000 to flash page 0x058000 ... Copying RAM page 0x817000 to flash page 0x05F000	
	P8BFR	CPY 060 ... CPY 067	Copying Flash page 0x060000 to RAM page 0x810000 ... Copying Flash page 0x067000 to RAM page 0x817000	
	PGIMP	IMP 812	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x062] HH:MM:SS Image UPDAT-2B.ROM [Page:0x062 ID:YUPS Rev:2017-08-14 YCRC:0x158BFD51] HH:MM:SS Sending 8192 = 8192 bytes sent	
	P8ERASE	ERS 060	Erasing the Flash block starting at physical address 0x060000 and ending at 0x067FFF	
	P8UPD	WR 060 ... WR 067	Copying RAM page 0x810000 to flash page 0x060000 ... Copying RAM page 0x817000 to flash page 0x067000	
	P8BFR	CPY 0D8 ... CPY 0DF	Copying flash page 0x0D8000 to RAM page 0x810000 ... Copying flash page 0x0DF000 to RAM page 0x817000	
	PGIMP	IMP 816	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0DE] HH:MM:SS Image FLDB.ROM [Page:0x0DE ID:FLDB Rev:2017-08-14 YCRC:0x08142017] HH:MM:SS Sending 8192 = 8192 bytes sent	
	PGIMP	IMP 817	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0DF] HH:MM:SS Image IMDB.ROM [Page:0x0DF ID:IMDB Rev:2017-08-14 YCRC:0xC1C2CDF6] HH:MM:SS Sending 8192 = 8192 bytes sent	
	P8ERASE	ERS 0D8	Erasing the Flash block starting at physical address 0x0D8000 and ending at 0x0DFFFF	
	P8UPD	WR 0D8 ... WR 0DF	Copying RAM page 0x810000 to flash page 0x0D8000 ... Copying RAM page 0x817000 to flash page 0x0DF000	
			The update, in this specific case, takes around 9m16s to complete.	
CL Internal Low Level Functions Calls		CL Input	CL Output	CL Comment
			PC Output	Comment

CLOSE COMMUNICATION & CLEANUP

CMCLOSE	HH:MM:SS Received CLOSE_CHANNEL_REQUEST(0x57) HH:MM:SS Sent CLOSE_CHANNEL_RESPONSE(0x58) HH:MM:SS Serial /dev/tty.usbserial closed.	close communication channel
MMUDIS	disable memory management unit	
MMUCLR	clear memory management unit configuration	
OFF ON	reactivate auto-off mode	
At this point your 41CL should be up-to-date to the rom_files_170814 level.		
	CL Input	CL Comment
		PC Output
		Comment



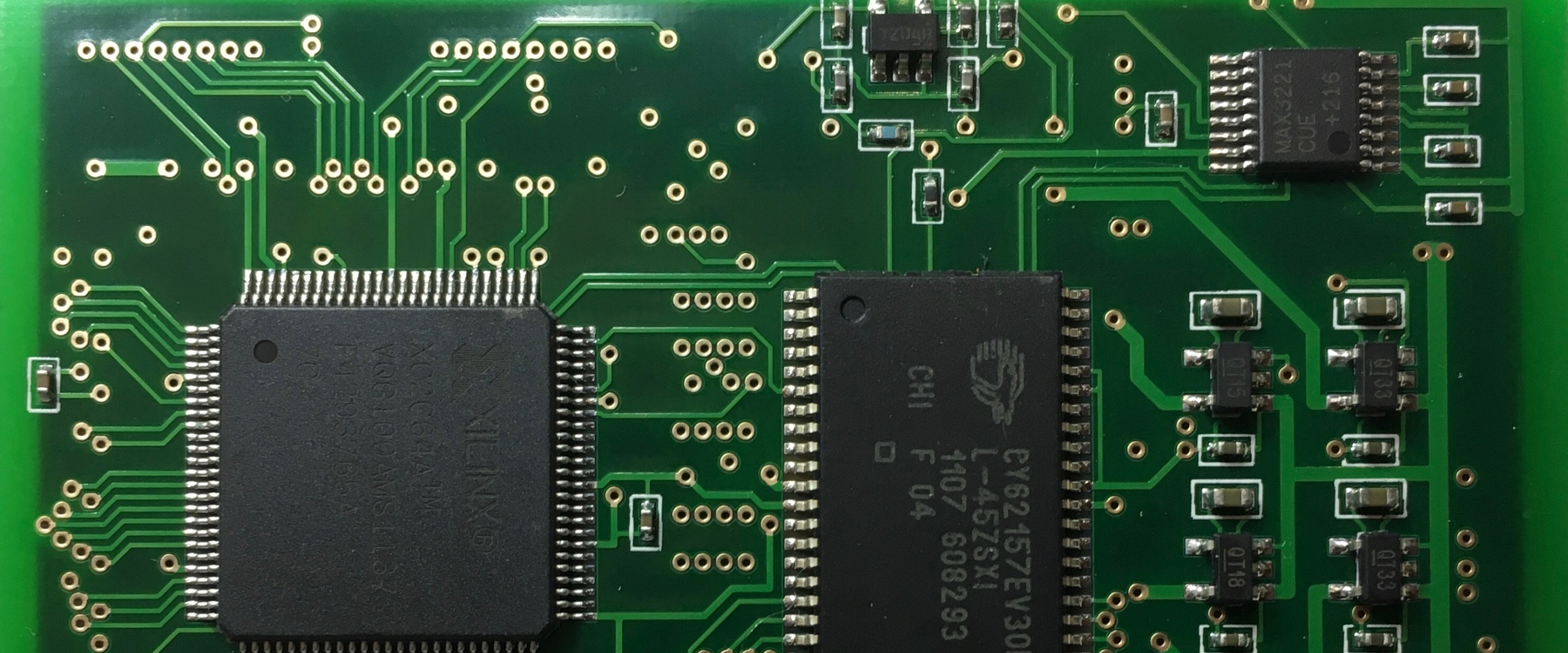
CLOSING TOPICS

PLANNED FEATURES

- Creating CFLDB from two rom_files.zip
- Sending CFLDB on request 0x45 instead of sending FLDB
- Displaying expected update time (based on a CFLDB)
- Making console less verbose
- Adding a GUI version
- Writing a users' manual
- Writing uses cases and their solutions
- Publishing source code under open source license
- ...

QUESTIONS & ANSWERS





41CL FLASH UPDATE

By Sylvain Côté / HHHC 2017