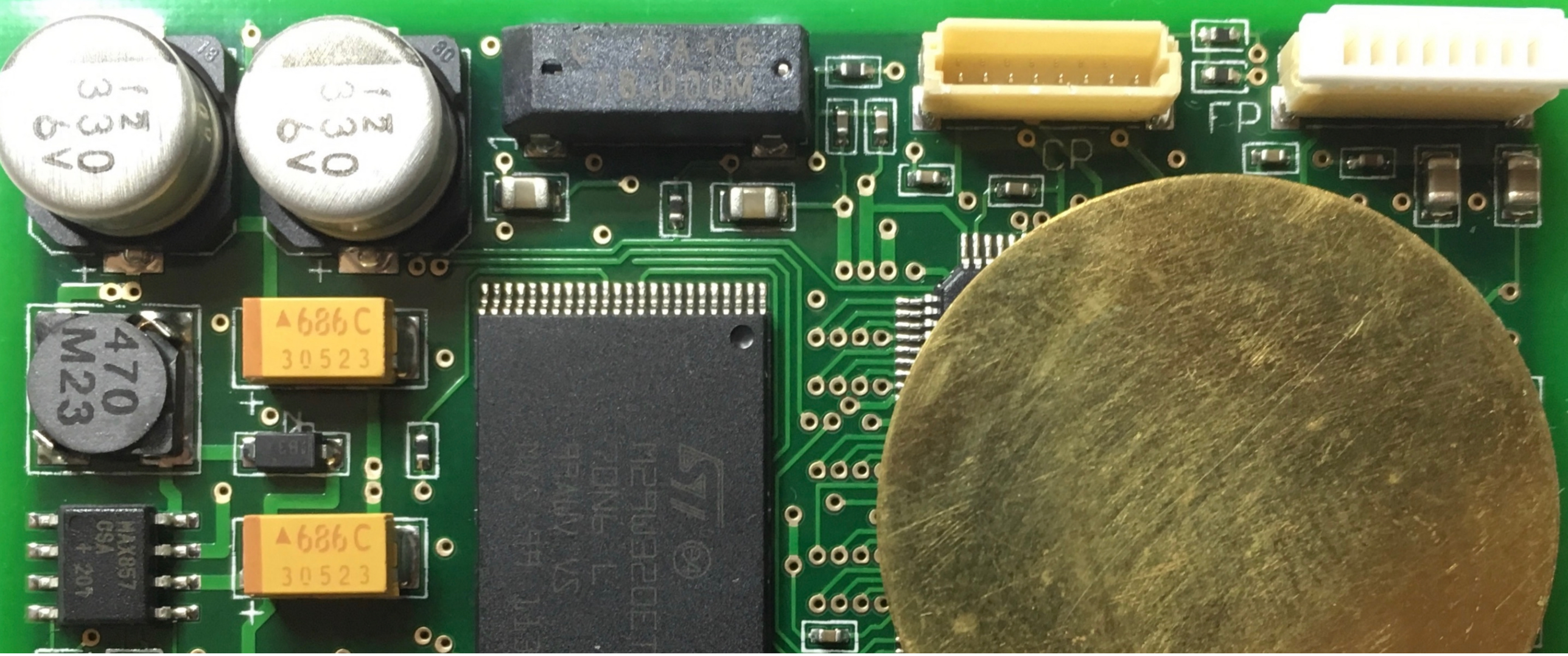

41CL FLASH UPDATE

Allschwil 2018

By Sylvain Côté

AGENDA SUMMARY

Front Cover 1

Reference 4

PC Host Software 13

Flash Update Introduction 26

Flash Update Setup 37

Flash Update 42

Manual Flash Update 48

Closing Topics 56

Back Cover 59

AGENDA DETAILED

Front Cover 1
- Agenda Summary 2
- Agenda Detailed 3

Reference 4
- Acknowledgements 5
- News 6
- Documents, Software & Web Sites 7
- 41CL Board Models 9
- 41CL Boards Built, Sold & Available 10
- 41CL Boards Sold Worldwide 11
- 41CL System Modules 12

PC Host Software 13
- Description 14
- Prerequisite 15
- Installation 17
- Help Display 18
- Manual Display 19
- ROM Files Validation 20
- ROM Files List 22
- ROM Files Comparison 23
- ROM Image Transfer 24

Flash Update Introduction 26
- Flash Facts 27
- Protocol Overview 28
- Flash Update Overview 31
- Functions Runtime 34
- Full Scan Times 35
- Flash Block Update Times 36

Flash Update Setup 37
- Target Calculator Setup : New Procedure 38
- Target Calculator Setup : Old Procedure 39
- Target Calculator Cleanup 41

Flash Update 42
- Update Overview 43
- Start Host & Open Communication 44
- Automatic Flash Pages Invalidation 45
- Update Outdated Pages 46
- Close Communication & Validation 47

Manual Flash Update 48
- Update Overview 49
- Outdated Files List 50
- Outdated Files Map 51
- Start Host & Open Communication 52
- Manual Flash Pages Invalidation 53
- Update Outdated Pages 54
- Close Communication & Validation 55

Closing Topics 56
- Upcoming Features 57
- Questions & Answers 58

Back Cover 59

REFERENCE

Allschwil 2018

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Monte Dalrymple ...

for having created the 41CL, an HP-41 on steroids
for having taken leadership of the 41CL update project
for having accepted to publish his sales statistics
for continuously pushing the limits
for his patience, support & friendship

Robert Prosperi ...

for his help and invaluable inputs in everything I publish

for his patience, support & friendship

Ángel Martin ...

for his help and invaluable inputs on the 41CL update project

for his mind bending modules he is creating, the MCode master of masters

for his friendship

NEWS

41CL v5 is currently available

Flexible Hardware Module (FHM) design is completed

FHM based Time module is available (41CL mounted only for now)

FHM based X-Memory (x2) has been prototyped

FHM based X-Functions with X-Memory (x2) has been prototyped

FHM based Time module with X-Memory (x2) has been prototyped

FHM based GNSS module has been prototyped

Many more modules using FHM design are currently explored

Monte Dalrymple's 41C Flexible Hardware Module

Slides: http://systemyde.com/pdf/41C_FHM.pdf

Video: https://www.youtube.com/watch?v=g7yT50lPA4E

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 Functions Manual	systemyde.com/pdf/cl_memory.pdf
41CL Update Functions Manual	www.systemyde.com/pdf/cl_update.pdf
41CL Clone Functions Manual	www.systemyde.com/pdf/cl_clone.pdf
41CL Memory Reference (v2)	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 Flexible Hw Module Manual	www.systemyde.com/pdf/fhm_manual.pdf
41CL GNSS Hw Module Manual	www.systemyde.com/pdf/gnss_manual.pdf

DOCUMENTS, SOFTWARE & WEB SITES

Documents

41CL Update Software Manual	(to be released)
New Modules Manuals (mostly from Ángel)	www.systemyde.com/hp41/documents.html

Software

41CL Update Functions	www.systemyde.com/hp41/software.html
41CL Clone Functions	www.systemyde.com/hp41/software.html
41CL Update 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/
HP-41 Home	www.hp41.org
The Museum of HP Calculators	www.hpmuseum.org

41CL BOARD MODELS

Model	RAM Size	RAM Pages	Flash Size	Flash Pages	Note
41CLv1	512 KB	64	2 MB	256	alpha boards are v1
41CLv2	512 KB	64	2 MB	256	beta boards are v2
41CLv3	1024 KB	128	4 MB	512	
41CLv4	1024 KB	128	4 MB	512	
41CLv5	1024 KB	128	8 MB	1024	

41CL BOARDS BUILT, SOLD & AVAILABLE 2018-10-29

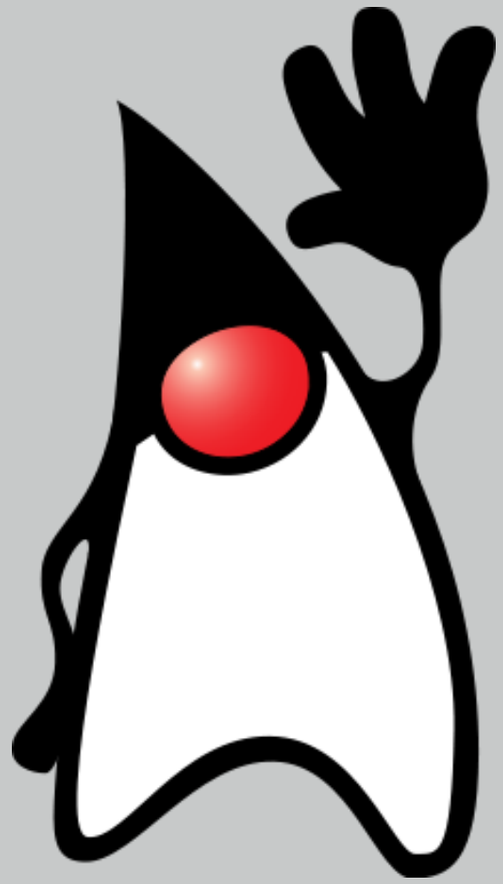
Model	Production Batches	Built	Sold	Available
41CLv1	2	2	0	0
41CLv2	25+50	75	71	0
41CLv3	50+50	100	98	0
41CLv4	25+25+35+35+35	155	143	0
41CLv5	50+50	100	79	21
Total		432	391	21

41CL BOARDS SOLD WORLDWIDE 2018-10-29

Continent	Sold
Africa	5
Asia	8
Australia/Oceana	13
Europe	194
North America	162
South America	9
Total	391

41CL SYSTEM MODULES 2018-10-29

ID	Page:v2-	Page:v3+	XROM	Description	Filename	Updated
YFNZ	0x007	0x007	15	Extra Functions	YFNZ-4F.ROM	2017-06-19
~~YFNS~~	~~0x062~~	~~0x062~~	~~31~~	~~Extra Functions~~	~~YFNS-4E.ROM~~	~~2014-11-21~~
YFNP	0x00F	0x00F	15	Extra Functions Plus	YFNP-1F.ROM	2017-06-19
YFNF	0x0AF	0x167	16	Memory Functions	YFNF-2A.ROM	2017-09-11
YFNX	0x00A	0x00A	15	Extreme Functions	YFNX-3A.ROM	2018-01-22
YLIB	0x00B	0x00B	n/a	Extreme Library	YLIB-3D.ROM	2018-01-22
YUPS	0x062	0x062	31	Update Functions	UPDAT-3B.ROM	2017-11-06
YCLN	0x063	0x063	31	Host Functions (v4+)	UPHST-1B.ROM	2017-10-01
IMDB	0x0DF	0x0DF	n/a	Image Database	IMDB_V2.ROM	2018-09-25
FLDB	0x0DE	0x0DE	n/a	Flash Database	FLDB_V2.ROM	2018-09-28



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 generations

The PC host software has successfully been tested on ...

macOS	v10.13.6	64 bits
Ubuntu Linux	v18.10	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

PREREQUISITE

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 Licence Agreement

Select the JRE that fit your operating system environment

Java SE Development Kit 8u191

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 ARM 32 Hard Float ABI	72.97 MB	jdk-8u191-linux-arm32-vfp-hflt.tar.gz	
Linux ARM 64 Hard Float ABI	69.92 MB	jdk-8u191-linux-arm64-vfp-hflt.tar.gz	
Linux x86	170.89 MB	jdk-8u191-linux-i586.rpm	
Linux x86	185.69 MB	jdk-8u191-linux-i586.tar.gz	*Ubuntu Linux 32 bits*
Linux x64	167.99 MB	jdk-8u191-linux-x64.rpm	
Linux x64	182.87 MB	jdk-8u191-linux-x64.tar.gz	*Ubuntu Linux 64 bits*
Mac OS X x64	245.92 MB	jdk-8u191-macosx-x64.dmg	*macOS 64 bits*
Solaris SPARC 64-bit (SVR4 package)	133.04 MB	jdk-8u191-solaris-sparcv9.tar.Z	
Solaris SPARC 64-bit	94.28 MB	jdk-8u191-solaris-sparcv9.tar.gz	
Solaris x64 (SVR4 package)	134.04 MB	jdk-8u191-solaris-x64.tar.Z	
Solaris x64	92.13 MB	jdk-8u191-solaris-x64.tar.gz	
Windows x86	197.34 MB	jdk-8u191-windows-i586.exe	*Windows 32 bits*
Windows x64	207.22 MB	jdk-8u191-windows-x64.exe	*Windows 64 bits*

Run the installation program and follow the installation procedure

To activate the new environment variables, some OS will ask you to do a re-logon or a reboot.

PREREQUISITE

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_191" Java(TM) SE Runtime Environment (build 1.8.0_191-b12)
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

CL Update Software Download

Create	the clupdate folder under your home directory
Download	www.systemyde.com/zip/clupdate-1.1.0.zip
To	your new clupdate folder
Unzip	clupdate-1.1.0.zip

CL Update Software Zip File Content

Release Notes	clupdate-1.1.0-release-notes.txt
PC host software	clupdate-1.1.0.jar
Basic Instructions	clupdate-1.1.0-readme.txt

41CL ROM Files Package

Download	rom_files_*yymmdd*.zip
Latest - From	www.systemyde.com/hp41/files.html
Archives - From	www.systemyde.com/hp41/archive.html
To	PC host software folder

HELP DISPLAY

```
java -jar clupdate-1.1.0.jar
or
java -jar clupdate-1.1.0.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-1.1.0.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.
...........: For v5 board ...
...........:    mem_ref_v5.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, mem_ref_v5.txt and *.ROM files)
Windows ex.: zip file: java -jar clupdate-1.1.0.jar --validate c:\clupdate\rom_files_YYMMDD.zip
Linux   ex.:   folder: java -jar clupdate-1.1.0.jar --validate ~/tmp/rom_files_YYMMDD
macOS   ex.: zip file: java -jar clupdate-1.1.0.jar --validate rom_files_YYMMDD.zip
--------------------------------------------------------------------------------------------------------------------------------
...
...
...
```

PC Input | PC Output

ROM FILES VALIDATION

HEALTHY FILE

```
java -jar clupdate-1.1.0.jar --validate rom_files_180928.zip
```

```
================================================================================================================================================
CSV filename: rom_files_180928.zip/mem_ref_v2.txt
================================================================================================================================================
------------------------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 0 / Missing files: 0
------------------------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================================
CSV filename: rom_files_180928.zip/mem_ref.txt
================================================================================================================================================
------------------------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 0 / Missing files: 0
------------------------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================================
CSV filename: rom_files_180928.zip/mem_ref_v5.txt
================================================================================================================================================
------------------------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 0 / Missing files: 0
------------------------------------------------------------------------------------------------------------------------------------------------

------------------------------------------------------------------------------------------------------------------------------------------------
Legend: FNF = File not found / C#F = YCRC:CSV != YCRC:FLDB / C#c = YCRC:CSV != YCRC:calc / F#c = YCRC:FLDB != YCRC:calc
------------------------------------------------------------------------------------------------------------------------------------------------
```

PC Input PC Output

ROM FILES VALIDATION

UNHEALTHY FILE

```
java -jar clupdate-1.1.0.jar --validate rom_files_180928
```

```
================================================================================================================================================
CSV filename: rom_files_180928/mem_ref_v2.txt
================================================================================================================================================
Page;  Tst; YCRC:CSV;   YCRC:FLDB;  YCRC:calc;  FileName;      FileDate;   Revision;   ID;    XROM; Description
0x0EB; C#F; 0xCD086ECD; 0x215AC3F6; 0x215AC3F6; CHEMENG.ROM;   2013-01-20; 2018-09-10; CENG;    12; Chemical Engineering Solutions
------------------------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 1 / Missing files: 0
------------------------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================================
CSV filename: rom_files_180928/mem_ref.txt
================================================================================================================================================
Page;  Tst; YCRC:CSV;   YCRC:FLDB;  YCRC:calc;  FileName;      FileDate;   Revision;   ID;    XROM; Description
0x12F; C#F; 0xCD086ECD; 0x215AC3F6; 0x215AC3F6; CHEMENG.ROM;   2013-01-20; 2018-05-14; CENG;    12; Chemical Engineering Solutions
0x162; C#c; 0x6CC7FA4F; 0x6CC7FA4F; 0xD64D4CD2; ADVTGMTH.ROM;  2018-06-23; 2018-06-28; ADVG;    12; Advantage Math
------------------------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 2 / Missing files: 0
------------------------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================================
CSV filename: rom_files_180928/mem_ref_v5.txt
================================================================================================================================================
Page;  Tst; YCRC:CSV;   YCRC:FLDB;  YCRC:calc;  FileName;      FileDate;   Revision;   ID;    XROM; Description
0x12F; C#F; 0xCD086ECD; 0x215AC3F6; 0x215AC3F6; CHEMENG.ROM;   2013-01-20; 2018-05-14; CENG;    12; Chemical Engineering Solutions
0x162; C#c; 0x6CC7FA4F; 0x6CC7FA4F; 0xD64D4CD2; ADVTGMTH.ROM;  2018-06-23; 2018-06-28; ADVG;    12; Advantage Math
0x263; FNF; 0x3FF6E27C; 0x3FF6E27C; 0xFFFFFFFF; FISHSTOK.ROM;  F.NotFound; 2018-09-25; FSTK;    16; Fish Stock Calculations
------------------------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 2 / Missing files: 1
------------------------------------------------------------------------------------------------------------------------------------------------

------------------------------------------------------------------------------------------------------------------------------------------------
Legend: FNF = File not found / C#F = YCRC:CSV != YCRC:FLDB / C#c = YCRC:CSV != YCRC:calc / F#c = YCRC:FLDB != YCRC:calc
------------------------------------------------------------------------------------------------------------------------------------------------
```

PC Input PC Output

ROM FILES LIST

```
java -jar clupdate-1.1.0.jar --list rom_files_180928.zip
```

```
================================================================================================================================
CSV filename: rom_files_180928.zip/mem_ref_v2.txt
================================================================================================================================
Page;  Tst; YCRC:CSV;   YCRC:FLDB;  YCRC:calc;  FileName;      FileDate;   Revision;   ID;    XROM; Description
0x000; ;    0xC67CA32B; 0xC67CA32B; 0xC67CA32B; NUT0-N.ROM;    2015-10-13; ;           OS41;   N/A; HP Operating System Rev N, pg 0
0x001; ;    0x8BF110D6; 0x8BF110D6; 0x8BF110D6; NUT1-F.ROM;    2015-10-13; ;           OS41;   N/A; HP Operating System, Rev F, pg
...
0x0FE; ;    0xC5A58BDE; 0xC5A58BDE; 0xC5A58BDE; PK_MATH.ROM;   2015-04-12; 2018-05-14; PKP2;    14; Poul Kaarups Math & Physics ROM, pg 1
0x0FF; ;    0x64F9C986; 0x64F9C986; 0x64F9C986; PK_PHYS.ROM;   2015-04-12; 2018-05-14; PKP2;    15; Poul Kaarups Math & Physics ROM, pg 2
--------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 0 / Missing files: 0
--------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================
CSV filename: rom_files_180928.zip/mem_ref.txt
================================================================================================================================
Page;  Tst; YCRC:CSV;   YCRC:FLDB;  YCRC:calc;  FileName;      FileDate;   Revision;   ID;    XROM; Description
0x000; ;    0xC67CA32B; 0xC67CA32B; 0xC67CA32B; NUT0-N.ROM;    2015-10-13; ;           OS41;   N/A; HP Operating System Rev N, pg 0
0x001; ;    0x8BF110D6; 0x8BF110D6; 0x8BF110D6; NUT1-F.ROM;    2015-10-13; ;           OS41;   N/A; HP Operating System, Rev F, pg 1
...
0x1FE; ;    0x53D36BD2; 0x53D36BD2; 0x53D36BD2; ALL_FF.ROM;    2017-02-25; ;           ;          ; empty
0x1FF; ;    0x53D36BD2; 0x53D36BD2; 0x53D36BD2; ALL_FF.ROM;    2017-02-25; ;           ;          ; empty
--------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 0 / Missing files: 0
--------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================
CSV filename: rom_files_180928.zip/mem_ref_v5.txt
================================================================================================================================
Page;  Tst; YCRC:CSV;   YCRC:FLDB;  YCRC:calc;  FileName;      FileDate;   Revision;   ID;    XROM; Description
0x000; ;    0xC67CA32B; 0xC67CA32B; 0xC67CA32B; NUT0-N.ROM;    2015-10-13; ;           OS41;   N/A; HP Operating System Rev N, pg 0
0x001; ;    0x8BF110D6; 0x8BF110D6; 0x8BF110D6; NUT1-F.ROM;    2015-10-13; ;           OS41;   N/A; HP Operating System, Rev F, pg 1
...
0x3FE; ;    0x53D36BD2; 0x53D36BD2; 0x53D36BD2; ALL_FF.ROM;    2017-02-25; ;           ;          ; empty
0x3FF; ;    0x53D36BD2; 0x53D36BD2; 0x53D36BD2; ALL_FF.ROM;    2017-02-25; ;           ;          ; empty
--------------------------------------------------------------------------------------------------------------------------------
Invalid CRC: 0 / Missing files: 0
--------------------------------------------------------------------------------------------------------------------------------

--------------------------------------------------------------------------------------------------------------------------------
Legend: FNF = File not found / C#F = YCRC:CSV != YCRC:FLDB / C#c = YCRC:CSV != YCRC:calc / F#c = YCRC:FLDB != YCRC:calc
--------------------------------------------------------------------------------------------------------------------------------
```

ROM FILES COMPARISON

```
java -jar clupdate-1.1.0.jar --diff rom_files_180925.zip rom_files_180928.zip
```

```
================================================================================================================================
                              [rom_files_180925.zip/mem_ref_v2.txt] vs [rom_files_180928.zip/mem_ref_v2.txt]
================================================================================================================================
FLDB_V2.ROM     [Page:0x0DE ID:FLDB Rev:2018-09-25 YCRC:0x09252018] != FLDB_V2.ROM     [Page:0x0DE ID:FLDB Rev:2018-09-28 YCRC:0x09282018]
SMAT41.ROM      [Page:0x0E0 ID:SM44 Rev:2018-09-10 YCRC:0x1A1213A4] != SMAT41.ROM      [Page:0x0E0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A]
SMAT44.ROM      [Page:0x0E3 ID:SM44 Rev:2018-09-10 YCRC:0x6CBAC9C0] != SMAT44.ROM      [Page:0x0E3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1]
HLMAT41.ROM     [Page:0x0E4 ID:SM44 Rev:2018-09-10 YCRC:0x19795846] != HLMAT41.ROM     [Page:0x0E4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C]
HLMAT42.ROM     [Page:0x0E5 ID:SM44 Rev:2018-09-10 YCRC:0x555C8744] != HLMAT42.ROM     [Page:0x0E5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED]
--------------------------------------------------------------------------------------------------------------------------------
Summary: 5 outdated pages, out of 256 pages, spread over 2 Flash blocks, estimated update time: 00h 07m 04s
--------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================
                                 [rom_files_180925.zip/mem_ref.txt] vs [rom_files_180928.zip/mem_ref.txt]
================================================================================================================================
FLDB.ROM        [Page:0x0DE ID:FLDB Rev:2018-09-25 YCRC:0x09252018] != FLDB.ROM        [Page:0x0DE ID:FLDB Rev:2018-09-28 YCRC:0x09282018]
ADVTGMTH.ROM    [Page:0x162 ID:ADVG Rev:2018-06-24 YCRC:0xD64D4CD2] != ADVTGMTH.ROM    [Page:0x162 ID:ADVG Rev:2018-06-28 YCRC:0x6CC7FA4F]
SMAT41.ROM      [Page:0x1A0 ID:SM44 Rev:2018-09-10 YCRC:0x1A1213A4] != SMAT41.ROM      [Page:0x1A0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A]
SMAT44.ROM      [Page:0x1A3 ID:SM44 Rev:2018-09-10 YCRC:0x6CBAC9C0] != SMAT44.ROM      [Page:0x1A3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1]
HLMAT41.ROM     [Page:0x1A4 ID:SM44 Rev:2018-09-10 YCRC:0x19795846] != HLMAT41.ROM     [Page:0x1A4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C]
HLMAT42.ROM     [Page:0x1A5 ID:SM44 Rev:2018-09-10 YCRC:0x555C8744] != HLMAT42.ROM     [Page:0x1A5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED]
--------------------------------------------------------------------------------------------------------------------------------
Summary: 6 outdated pages, out of 512 pages, spread over 3 Flash blocks, estimated update time: 00h 10m 09s
--------------------------------------------------------------------------------------------------------------------------------

================================================================================================================================
                              [rom_files_180925.zip/mem_ref_v5.txt] vs [rom_files_180928.zip/mem_ref_v5.txt]
================================================================================================================================
FLDB.ROM        [Page:0x0DE ID:FLDB Rev:2018-09-25 YCRC:0x09252018] != FLDB.ROM        [Page:0x0DE ID:FLDB Rev:2018-09-28 YCRC:0x09282018]
ADVTGMTH.ROM    [Page:0x162 ID:ADVG Rev:2018-06-24 YCRC:0xD64D4CD2] != ADVTGMTH.ROM    [Page:0x162 ID:ADVG Rev:2018-06-28 YCRC:0x6CC7FA4F]
SMAT41.ROM      [Page:0x1A0 ID:SM44 Rev:2018-09-10 YCRC:0x1A1213A4] != SMAT41.ROM      [Page:0x1A0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A]
SMAT44.ROM      [Page:0x1A3 ID:SM44 Rev:2018-09-10 YCRC:0x6CBAC9C0] != SMAT44.ROM      [Page:0x1A3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1]
HLMAT41.ROM     [Page:0x1A4 ID:SM44 Rev:2018-09-10 YCRC:0x19795846] != HLMAT41.ROM     [Page:0x1A4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C]
HLMAT42.ROM     [Page:0x1A5 ID:SM44 Rev:2018-09-10 YCRC:0x555C8744] != HLMAT42.ROM     [Page:0x1A5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED]
--------------------------------------------------------------------------------------------------------------------------------
Summary: 6 outdated pages, out of 1024 pages, spread over 3 Flash blocks, estimated update time: 00h 10m 09s
--------------------------------------------------------------------------------------------------------------------------------
```

PC Input | PC Output

ROM IMAGE TRANSFER IMPORT TO 41CL FROM COMPUTER

SERINI		from YFNX module, initialize serial port (needed for YIMP later on)
BAUD 48	BAUD __ BAUD 48	from YFNX module, set transmission rate to 4800 bauds (needed for YIMP later on)
"80F000-0FFF"		physical destination address 0x80F000 and length 0x0FFF in RAM where the ROM image will be loaded
[XEQ][ALPHA]YIMP		from YFNX module, import from serial port the number of bytes to the address specified in alpha partial next function entry, press: [XEQ] [ALPHA] [Y] [I] [M] [P]
		java -jar clupdate-1.1.0.jar --upload UPDAT-3B.ROM /dev/tty.usbserial 4800
		HH:MM:SS --upload [fileName: UPDAT-3B.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS File UPDAT-3B.ROM loading ... done [YCRC=0xF9417D87 Rev:2017-11-06] 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 TRANSFER EXPORT FROM 41CL TO COMPUTER

SERINI		from YFNX module, initialize serial port (needed for YIMP later on)
BAUD 48	BAUD __ BAUD 48	from YFNX module, set transmission rate to 4800 bauds (needed for YIMP later on)
"80F000-0FFF"		physical source address 0x80F000 and length 0x0FFF in RAM where the ROM image is exported from
		java -jar clupdate-1.1.0.jar –download UPDAT-3B-OUT.ROM /dev/tty.usbserial 4800
		HH:MM:SS --download [fileName: UPDAT-3B-OUT.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS Serial /dev/tty.usbserial opened. HH:MM:SS Receiving
YEXP	SENDING	from YFNX module, export to serial port the number of bytes from the address specified in alpha
		2010 2186 2186 1810 = 8192 bytes received HH:MM:SS File UPDAT-3B-OUT.ROM saving ... done [YCRC=0xF9417D87] 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 are 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

PROTOCOL OVERVIEW

Look at the next two slides

auto	manual	serial comm	host SW
CMOPEN	CMOPEN	----- (0x41) -----> <----- (0x42) -----	start
			send_ack
FLCHK?	CDBIMP	----- (0x45) -----> <----- (FLDB) -----	idle
			send_fldb
	FDBCHK?	----- (0x59) ----->	idle
	CDBEXP	----- (0x4D) -----> <----- (0x4E) ----- ----- (CFLDB) ----->	
			send_ack
			recv_cfldb
loop loop	P8CPY		idle
FLUPD	PGIMP	-- (0x53 + page no.) -->> <----- (page) -----	
			send_page
	P8UPD		idle
CMCLOSE	CMCLOSE	----- (0x57) ----->	
		<----- (0x58) -----	send_ack
			done

41CL Byte(s) sent	Response	Action by host machine
"A" (0x41)	"B" (0x42)	Open Communication channel
beta/v2: "C" (0x43)	CFLDB page	Send 1Mx16 CFLDB
v3/v4: "E" (0x45)	CFLDB page	Send 2Mx16 CFLDB
v5: "G" (0x47)	CFLDB page	Send 4Mx16 CFLDB
beta/v2: "K" (0x4B)	"L" (0x4C)	Receive 1Mx16 CFLDB
v3/v4: "M" (0x4D)	"N" (0x4E)	Receive 2Mx16 CFLDB
v5: "O" (0x4F)	"P" (0x50)	Receive 4Mx16 CFLDB
"S" (0x53) + page no.	page	Send specified page
"U" (0x55) + page no.	"V" (0x56)	Receive specified page
"W" (0x57)	"X" (0x58)	Close Communication Channel
"Y" (0x59)	none	stay awake

Manual: 41CL Update Functions, rev. 2017/11/09, Page 35 & 36
File: www.systemyde.com/pdf/cl_update.pdf

PROTOCOL OVERVIEW

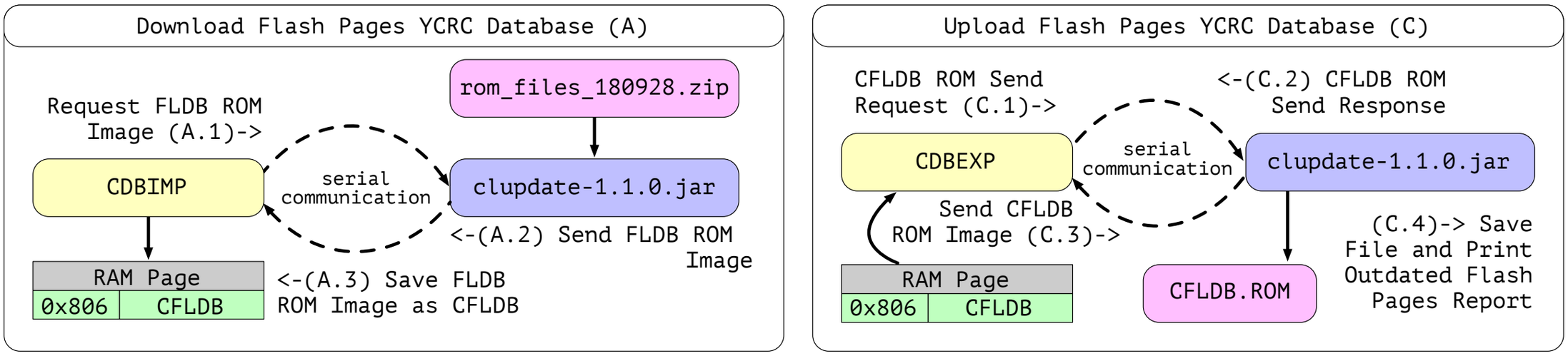
- Open communication channel
- Scan Flash memory for outdated ROM image in specified Flash page range
  - Download new CFLDB ROM image
  - For each Flash page on specified Flash page range
    - YCRC ROM image located in Flash page
    - Compare calculated YCRC value to the stored YCRC value in CFLDB
    - 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

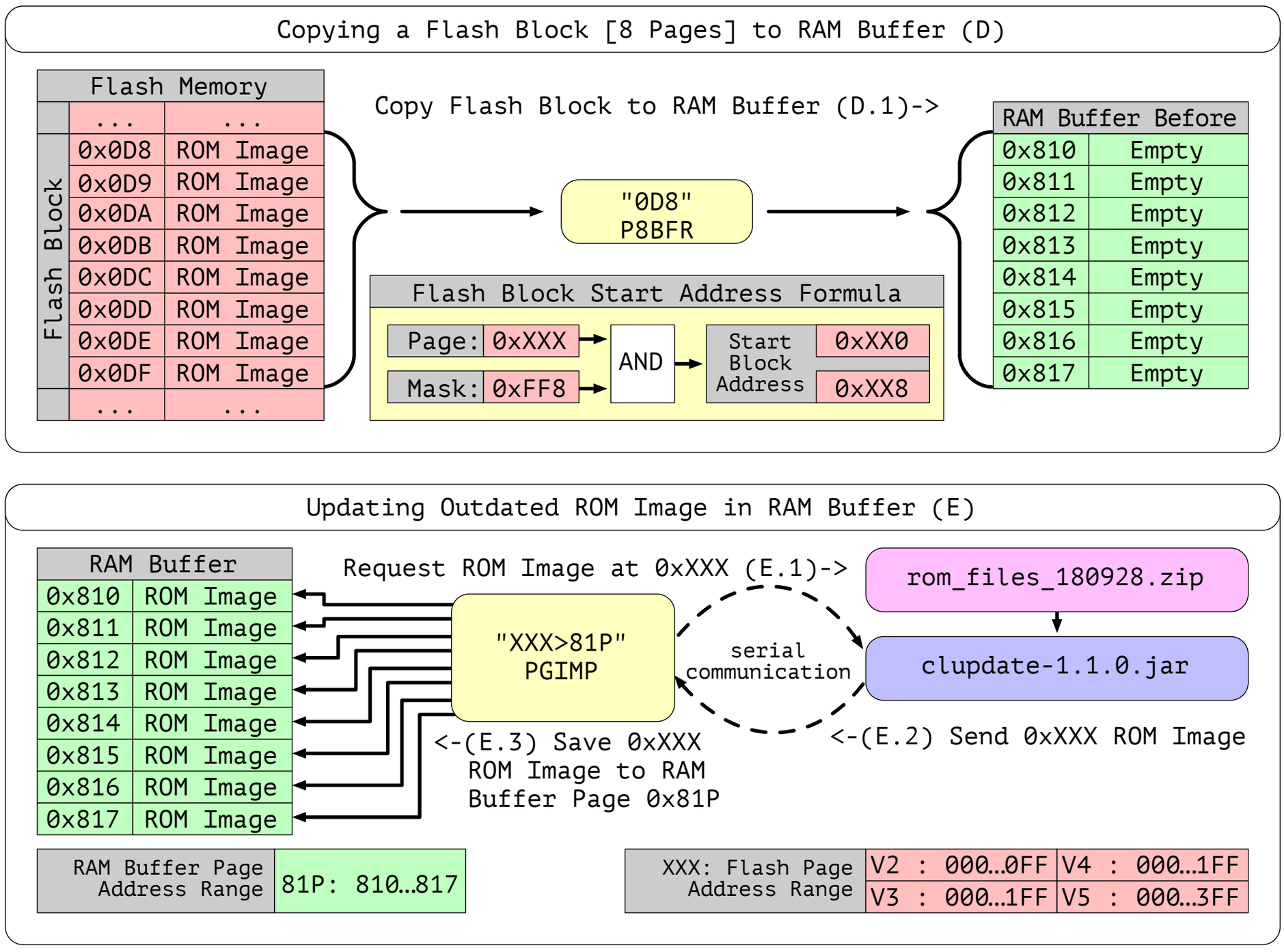
- Update outdated ROM image in Flash within specified Flash page range
  - For each Flash block that has at least one CFLDB invalid ROM image entry within the specified Flash page range
    - Copy Flash block to RAM buffer block
    - For each outdated RAM buffer page in RAM buffer block
      - Download 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

FLASH UPDATE OVERVIEW

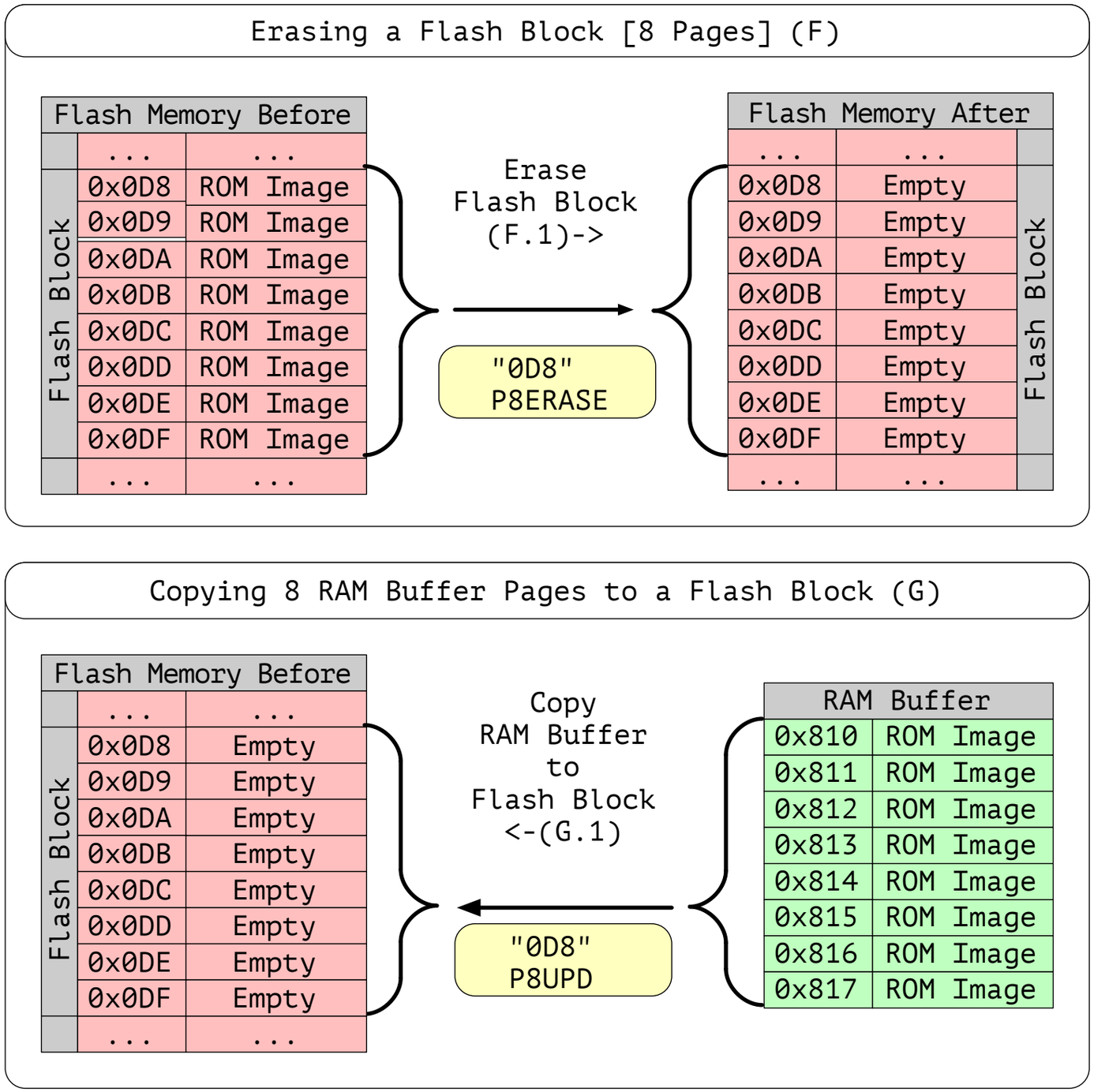
FLCHK?



FLASH UPDATE OVERVIEW



FLASH UPDATE OVERVIEW



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

Flash Block Start Address Formula

Page	Mask
XXX	FF8

AND

Start Block Address

XX0 or XX8

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 SETUP

TARGET CALCULATOR SETUP

NEW PROCEDURE

		This procedure applied to 41CL's that has been updated on or after Sept. 23, 2017 and contains version 3B ("UPDAT 3B") of the update ROM (YUPS) in Flash.
MMUDIS		Disable memory management unit
MMUCLR		Clear memory management unit configuration
"YFNX" PLUG1L		Selecting extreme functions [YFNX] ROM image Plug virtual module to port address 8
"YUPS" PLUG1U		Selecting update functions [YUPS] ROM image Plug virtual module to port address 9
MMUEN		Activate memory management unit
CAT 2	... UPDAT 3B ...	Validating configuration ... CL Update Functions module ...
FDBVER?	09/25/2018	Get FLDB version currently active in your 41CL, referencing the file: rom_files_180925.zip
ON		Deactivate auto-off mode (optional)
CF 26		Deactivate beeper (optional)

CL Input | CL Output | CL Comment | Comment

TARGET CALCULATOR SETUP

OLD PROCEDURE, 1 OF 2

		This procedure applied to 41CL's that do not have version 3B of the update ROM (YUPS) in Flash.
MMUDIS		Disable memory management unit
MMUCLR		Clear memory management unit configuration
"YFNX" PLUG1L		Selecting 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 __ BAUD 48	Set transmission rate to 4800 bauds (needed for YIMP later on)
ON		Deactivate auto-off mode (optional)
CF 26		Deactivate beeper (optional)

CL Input | CL Output | CL Comment | Comment

TARGET CALCULATOR SETUP

OLD PROCEDURE, 2 OF 2

CL Input	CL Output	CL Comment	PC Input	PC Output	Comment
					This procedure applied to 41CL's Flash setup dated before Sept. 23, 2017.
"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-1-1-0.jar --upload UPDAT-3B.ROM /dev/tty.usbserial 4800		
				HH:MM:SS --upload [fileName: UPDAT-3B.ROM] [portName: /dev/tty.usbserial] [baudRate: 4800] HH:MM:SS File UPDAT-3B.ROM loading ... done [YCRC=0xF9417D87 Rev:2017-11-06] 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 F9417D87	Selecting RAM page 0x80F000 Validating CRC of the RAM page Expecting YCRC=0xF9417D87 for UPDAT-3B.ROM			
"-80F 9" PPLUG		Map UPDAT-3B.ROM image at RAM physical address 0x80F000 to port address 9 Activate the virtual module			
CAT 2	... UPDAT 3B ...	Validating configuration ... CL Update Functions module ...			
FDBVER?	09/25/2018	Get FLDB version currently active in your 41CL, referencing the file: rom_files_180925.zip			

TARGET CALCULATOR CLEANUP

AFTER UPDATE

CDBDEL	delete correlated flash database
MMUDIS	disable memory management unit
MMUCLR	clear memory management unit configuration
OFF ON	reactivate auto-off mode

CL Input | CL Comment | PC Output

FLASH UPDATE

UPDATE OVERVIEW

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 : Validate FLDB version in flash

START HOST & OPEN COMMUNICATION

```
java -jar clupdate-1-1-0.jar --update rom_files_180928.zip /dev/tty.usbserial 4800
```

```
HH:MM:SS --update   [fileName: rom_files_180928.zip] [portName: /dev/tty.usbserial] [baudRate: 4800]
HH:MM:SS File       rom_files_180928.zip loading ... done
HH:MM:SS Serial     /dev/tty.usbserial opened at 4800 baud.
HH:MM:SS Waiting    for 41CL commands ...
```

```
CMOPEN
```

```
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

AUTOMATIC FLASH PAGES INVALIDATION

This example assume the board has previously been updated to rom_files_180925.zip level.

"*"

We scan the entire flash memory space, which is: - 2MB or 256 ROM images for beta & v2 boards
- 4MB or 512 ROM images for v3 & v4 boards
- 8MB or 1024 ROM images for v5 board

FLCHK?

CDBIMP

IMP 806

```
HH:MM:SS Received   FLDB_2MB_IMPORT_REQUEST(0x43) [Page: 0x0DE] [BoardGeneration: first]
                                                                 [EstimatedFullScan: 00h 43m 18s]
HH:MM:SS File       [FileName: FLDB_V2.ROM] [YCRC:0x09282018] [Rev: 2018-09-29]
HH:MM:SS Sending    8192 = 8192 bytes sent
```

FDBCHK?

CRC 000
...
CRC 0FF

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

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  2184 2186 2186 1636 = 8192 bytes received
HH:MM:SS File       CFLDB_V2.ROM saved
HH:MM:SS Report     Outdated ROM images [BoardGeneration: first]
HH:MM:SS Report     FLDB_V2.ROM     [Page:0x0DE ID:FLDB Rev:2018-09-28 YCRC:0x09282018]
HH:MM:SS Report     SMAT41.ROM      [Page:0x0E0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A]
HH:MM:SS Report     SMAT44.ROM      [Page:0x0E3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1]
HH:MM:SS Report     HLMAT41.ROM     [Page:0x0E4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C]
HH:MM:SS Report     HLMAT42.ROM     [Page:0x0E5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED]
HH:MM:SS Report     5 outdated pages, out of 256 pages, spread over 2 Flash blocks,
                                                        estimated update time: 00h 07m 04s
```

CL Internal Low Level Functions Calls | CL Input | CL Output | CL Comment | PC Output | Comment

UPDATE OUTDATED PAGES

"*"			Update all outdated Flash pages marked in CFLDB located at physical RAM page 0x806000
FLUDP	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:2018-09-28 YCRC:0x09282018] 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
	P8BFR	CPY 0E0 ... CPY 0E7	Copying Flash page 0x0E0000 to RAM page 0x810000 ... Copying Flash page 0x0E7000 to RAM page 0x817000
	PGIMP	IMP 810	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E0] HH:MM:SS Image SMAT41.ROM [Page:0x0E0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A] HH:MM:SS Sending 8192 = 8192 bytes sent
	PGIMP	IMP 813	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E3] HH:MM:SS Image SMAT44.ROM [Page:0x0E3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1] HH:MM:SS Sending 8192 = 8192 bytes sent
	PGIMP	IMP 814	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E4] HH:MM:SS Image HLMAT41.ROM [Page:0x0E4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C] HH:MM:SS Sending 8192 = 8192 bytes sent
	PGIMP	IMP 815	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E5] HH:MM:SS Image HLMAT42.ROM [Page:0x0E5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED] HH:MM:SS Sending 8192 = 8192 bytes sent
	P8ERASE	ERS 0E0	Erasing the Flash block starting at physical address 0x0E0000 and ending at 0x0E7FFF
	P8UPD	WR 0E0 ... WR 0E7	Copying RAM page 0x810000 to flash page 0x0E0000 ... Copying RAM page 0x817000 to flash page 0x0E7000
		UPD DONE	Flash update has been completed successfully

CL Internal Low Level Functions Calls | CL Input | CL Output | CL Comment | PC Output

CLOSE COMMUNICATION & VALIDATION

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
FDBVER?	09/28/2018	Get FLDB version currently active in your 41CL, referencing the file: rom_files_180928.zip	
		At this point your 41CL should be up-to-date to the rom_files_180928 level.	

CL Input | CL Comment | PC Output | Comment

MANUAL FLASH UPDATE

UPDATE OVERVIEW

PC : Figure out which files has changed since last update

PC : Run host software in update (slave) mode

CL : Open communication channel

CL : Download a new CFLDB file

CL : Manually tag outdated Flash pages in CFLDB file

CL : Upload modified CFLDB file

CL : Update Flash with updated and/or new images

CL : Close communication channel

CL : Validate FLDB version in flash

OUTDATED FILES LIST

FDBVER?

09/25/2018

Flash Database Version from the update ROM, tell us that we have a board that has previously been updated with files from rom_files_180925.zip

The next action will show what has changed between 2018/09/25 and 2018/09/28

```
java -jar clupdate-1.1.0.jar --diff rom_files_180925.zip rom_files_180928.zip
```

```
================================================================================================================================
                              [rom_files_180925.zip/mem_ref_v2.txt] vs [rom_files_180928.zip/mem_ref_v2.txt]
================================================================================================================================
FLDB_V2.ROM     [Page:0x0DE ID:FLDB Rev:2018-09-25 YCRC:0x09252018] != FLDB_V2.ROM     [Page:0x0DE ID:FLDB Rev:2018-09-28 YCRC:0x09282018]
SMAT41.ROM      [Page:0x0E0 ID:SM44 Rev:2018-09-10 YCRC:0x1A1213A4] != SMAT41.ROM      [Page:0x0E0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A]
SMAT44.ROM      [Page:0x0E3 ID:SM44 Rev:2018-09-10 YCRC:0x6CBAC9C0] != SMAT44.ROM      [Page:0x0E3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1]
HLMAT41.ROM     [Page:0x0E4 ID:SM44 Rev:2018-09-10 YCRC:0x19795846] != HLMAT41.ROM     [Page:0x0E4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C]
HLMAT42.ROM     [Page:0x0E5 ID:SM44 Rev:2018-09-10 YCRC:0x555C8744] != HLMAT42.ROM     [Page:0x0E5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED]
--------------------------------------------------------------------------------------------------------------------------------
Summary: 5 outdated pages, out of 256 pages, spread over 2 Flash blocks, estimated update time: 00h 07m 04s
--------------------------------------------------------------------------------------------------------------------------------
```

The above report reveals that five ROM images have changed between these two rom files releases. The summary line show you the number of outdated pages in how many Flash blocs and an estimate on how much time it will take to do the update.

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

```
java -jar clupdate-1-1-0.jar --update rom_files_180928.zip /dev/tty.usbserial 4800
```

```
HH:MM:SS --update   [fileName: rom_files_180928.zip] [portName: /dev/tty.usbserial] [baudRate: 4800]
HH:MM:SS File       rom_files_180928.zip loading ... done
HH:MM:SS Serial     /dev/tty.usbserial opened at 4800 baud.
HH:MM:SS Waiting    for 41CL commands ...
```

```
CMOPEN
```

```
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

MANUAL FLASH PAGES INVALIDATION

		The previous report reveals that five ROM images have changed between these two dates. Five flash pages: 0x0DE, 0x0E0, 0x0E3, 0x0E4 & 0x0E5 located in Two flash blocks: 0x0D8...0x0DF & 0x0E0...0x0E7
CDBIMP	IMP 806	HH:MM:SS Received FLDB_2MB_IMPORT_REQUEST(0x43) [Page: 0x0DE] [BoardGeneration: first] [EstimatedFullScan: 00h 43m 18s] HH:MM:SS File [FileName: FLDB_V2.ROM] [YCRC:0x09282018] [Rev: 2018-09-29] HH:MM:SS Sending 8192 = 8192 bytes sent
"0DE" PGINV		Manually invalidating Flash page 0x0DE (FLDB.ROM) After PGINV is successfully executed, alpha contains the previous address plus one –> “0DF”
"0E0" PGINV		Manually invalidating Flash page 0x0E0 (SMAT41.ROM) After PGINV is successfully executed, alpha contains the previous address plus one –> “0E1”
"0E3” PGINV		Manually invalidating Flash page 0x0E3 (SMAT41.ROM) After PGINV is successfully executed, alpha contains the previous address plus one –> “0E4”
PGINV		Manually invalidating Flash page 0x0E4 (HLMAT41.ROM) After PGINV is successfully executed, alpha contains the previous address plus one –> “0E5”
PGINV		Manually invalidating Flash page 0x0E5 (HLMAT42.ROM) After PGINV is successfully executed, alpha contains the previous address plus one –> “0E6”
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 2184 2186 2186 1636 = 8192 bytes received HH:MM:SS File CFLDB_V2.ROM saved HH:MM:SS Report Outdated ROM images [BoardGeneration: first] HH:MM:SS Report FLDB_V2.ROM [Page:0x0DE ID:FLDB Rev:2018-09-28 YCRC:0x09282018] HH:MM:SS Report SMAT41.ROM [Page:0x0E0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A] HH:MM:SS Report SMAT44.ROM [Page:0x0E3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1] HH:MM:SS Report HLMAT41.ROM [Page:0x0E4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C] HH:MM:SS Report HLMAT42.ROM [Page:0x0E5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED] HH:MM:SS Report 5 outdated pages, out of 256 pages, spread over 2 Flash blocks, estimated update time: 00h 07m 04s

CL Input | CL Output | CL Comment | PC Output | Comment

UPDATE OUTDATED PAGES

"*"			Update all outdated Flash pages marked in CFLDB located at physical RAM page 0x806000
FLUDP	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:2018-09-28 YCRC:0x09282018] 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
	P8BFR	CPY 0E0 ... CPY 0E7	Copying Flash page 0x0E0000 to RAM page 0x810000 ... Copying Flash page 0x0E7000 to RAM page 0x817000
	PGIMP	IMP 810	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E0] HH:MM:SS Image SMAT41.ROM [Page:0x0E0 ID:SM44 Rev:2018-09-28 YCRC:0x3EA4E28A] HH:MM:SS Sending 8192 = 8192 bytes sent
	PGIMP	IMP 813	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E3] HH:MM:SS Image SMAT44.ROM [Page:0x0E3 ID:SM44 Rev:2018-09-28 YCRC:0x02336FF1] HH:MM:SS Sending 8192 = 8192 bytes sent
	PGIMP	IMP 814	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E4] HH:MM:SS Image HLMAT41.ROM [Page:0x0E4 ID:SM44 Rev:2018-09-28 YCRC:0xB2046B7C] HH:MM:SS Sending 8192 = 8192 bytes sent
	PGIMP	IMP 815	HH:MM:SS Received PAGE_IMPORT_REQUEST(0x53) [Page:0x0E5] HH:MM:SS Image HLMAT42.ROM [Page:0x0E5 ID:SM44 Rev:2018-09-28 YCRC:0x4D56A1ED] HH:MM:SS Sending 8192 = 8192 bytes sent
	P8ERASE	ERS 0E0	Erasing the Flash block starting at physical address 0x0E0000 and ending at 0x0E7FFF
	P8UPD	WR 0E0 ... WR 0E7	Copying RAM page 0x810000 to flash page 0x0E0000 ... Copying RAM page 0x817000 to flash page 0x0E7000
		UPD DONE	Flash update has been completed successfully

CL Internal Low Level Functions Calls | CL Input | CL Output | CL Comment | PC Output

CLOSE COMMUNICATION & VALIDATION

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
FDBVER?	09/28/2018	Get FLDB version currently active in your 41CL, referencing the file: rom_files_180928.zip	
		At this point your 41CL should be up-to-date to the rom_files_180928 level.	

CL Input | CL Comment | PC Output | Comment

CLOSING TOPICS

UPCOMING FEATURES

administrative

user's manual (yes, finally, I am more than late on this one)

publishing source code under an open source licence

migrating to OpenJDK 11

clupdate v1.2.0

new option [--update2] will allow you to specify a CFLDB folder as input giving you the possibility to specify a custom CFLDB.ROM and CFLDB_V2.ROM files

clupdate v1.3.0

will introduce a configuration file for storing default serial port, speed, etc.

clupdate v1.4.0

new option [--diff2] will allow you to make a CFLDB's from two distribution files duplicating the functionality of the FDBCHK? function with the effect of reducing the update time by half.

clupdate v1.5.0

new option [--build] will create FLDB & IMDB files from a csv file allowing you to create your own custom ROM mapping.

QUESTIONS & ANSWERS

41CL FLASH UPDATE

Allschwil 2018

By Sylvain Côté