QUICK REFERENCE GUIDE TO THE 41CL.
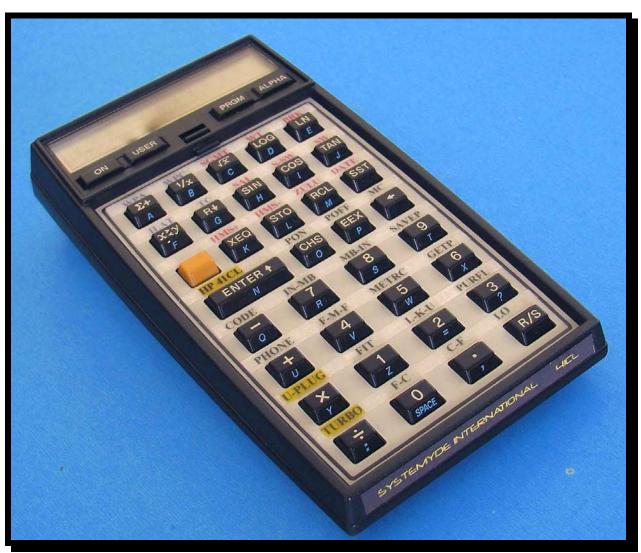
HP 41C tall keys serial number 1933A02070

Introduction:

Short guide as an adjunct to Montes' pdf manuals. These are just keystrokes with minimal explanation. For in depth theory please consult the following manuals found at this link:

http://www.systemyde.com/hp41/

1. **"41 CL Calculator Manual"**
2. **"41 CL Calculator Manual (includes YFNS-1C)"**
3. **"Automatically enabling Turbo Mode"**
4. **"41 CL Beta Test Status"**
5. **"Working with Flash"**

The latest versions of YFNS may be found at:

http://www.systemyde.com/hp41/software.html

SECTION 2: CLONIX EMAIL.

Here is a copy of an email distributed to all about physical hardware updates of YFNS versus the serial port sent on August 10, 2011:

> When using Clonix (or NoVRAM, MLDL2000 or any other hardware-based mechanism) to transfer images to the 41CL, you have to remember that all of these devices are 10-bit devices. That is, they are only capable of transferring 10 bits per word of information in the .ROM file.
>
> This means that they will always drop the special 1x tag bits that might be present in the .ROM file!
>
> So, if you are using real hardware to load .ROM images into the 41CL, you must manually restore any 1x tag bits to the image.
>
> So, for yfnz-1c or yfnc-1e, this means that you MUST still patch the four locations identified in Item #10 on the beta stat.pdf document! Even though the .ROM file is correct, the special 1x tag bits will only be transferred to the 41CL properly when using the serial transfer YIMP.

SECTION 3

Conventions used in this guide:

1. An "asterisk" is an alpha input:
    a. Eg. ALPHA 060>810 ALPHA is equivalent to "060>810"

2. No asterisk is a command:
    a. Eg. XEQ "YMCPY" is equivalent to YMCPY.

3. examples and explanations in black type,

4. key inputs in blue type.

5. follow key inputs exactly

6. routine labels are highlighted:
    a. eg. <mark>LBL SGMT</mark>

7. Caveat by Etienne:
    a. When you create patches run them in RAM before committing them to Flash, especially the YFNS-1x patches back to 060000

8. Assign YMCPY, YPOKE, YFWR, YPEEK to keys for more efficient key presses.

SECTION 4

Special thanks to:

Monte Darlymple	excerpts from his pdf files
Angel Martin	emails and clutils and excerpts
Diego Diaz	clonix
Etienne Victoria	helpful suggestions
Jürgen Keller	creating ROM image files of an HP 41 module

EVERYONE else who sent an email over the last 2 months.

Version 4 23:25, August 10, 2011

All errors in this document are MY FAULT!

Chapter 1:   YFNS-1A manual update (no CLONIX, SERIAL…). YFNS-1A will still be visible in CAT II but the ROM will reflect the updates to YFNS-1C.

QUICK TIP: BY INPUTTING THE FOLLOWING, THE WORD "DONE" IS DISPLAYED AFTER EVERY
EXECUTION OF YMCPY, YFERASE, YFWR HAS COMPLETED. GIVES A NICE HEADS UP THAT THE 16
SECONDS REQUIRED BY YMCPY AND YFWR HAS FINISHED. YFERASE ONLY TAKES A FEW SECONDS.

    1. "DONE"
    2. ASTO ST X

X STACK DISPLAY IS "DONE". WHEN YMCPY IS EXECUTED, WHEN COMPLETE, "DONE" DISPLAYS.

STEP 1:   COPY YFNS_1A TO RAM LOCATION FOR USE DURING YFERASE, YFWR.

1.	TURBO50	ENABLE TURBO 50. IT WILL BE DISABLED FOR THE YFERASE
2.	"060>810"	COMMAND. ONE OF THE REASONS FOR THIS PATCH.
3.	YMCPY	
4.	"061>811"	
5.	YMCPY	
6.	"062>812"	
7.	YMCPY	
8.	"063>813"	
9.	YMCPY	
10.	"064>814"	
11.	YMCPY	
12.	"065>815"	
13.	YMCPY	
14.	"066>816"	
15.	YMCPY	
16.	"067>817"	
17.	YMCPY	

STEP 2:   THE FOLLOWING WILL UPDATE YFNS_1A TO YFNS_1C WITH THE AUTO TURBO MODE ON AT
START. INCLUDED IS THE ROM ID "#15" PATCH FOR USE WITH CLUTILS AND PATCH
FOR TURBO50 1x CORRECTION FOR YFERASE AND YSEC.

	PATCH	DESCRIPTION	41CL BETA TEST STATUS REFERENCE
1.	"812680-005E"	LINES 1 THROUGH 4	ITEM 2
2.	YPOKE		
3.	"812694-005E"		
4.	YPOKE		
5.	"812F51-03B3"	LINES 5 THROUGH 10	ITEM 5
6.	YPOKE		
7.	"812F6A-0343"		
8.	YPOKE		
9.	"812F7A-02C3"		
10.	YPOKE		
11.	"812DFD-0010"	LINES 11 THROUGH 26	ITEM 6
12.	YPOKE		
13.	"812DFE-0110"		
14.	YPOKE		
15.	"812DFF-0010"		
16.	YPOKE		
17.	"812E00-0150"		
18.	YPOKE		
19.	"812E01-0150"		
20.	YPOKE		
21.	"812E08-02AA"		
22.	YPOKE		
23.	"812E31-013C"		
24.	YPOKE		

```
25.     "812E4C-013C"
26.     YPOKE
27.     "812D1B-0110"      LINES 27 THROUGH 46     ITEM 7
28.     YPOKE
29.     "812D51-0010"
30.     YPOKE
31.     "812D52-0110"
32.     YPOKE
33.     "812D53-0010"
34.     YPOKE
35.     "812D54-0150"
36.     YPOKE
37.     "812D55-0150"
38.     YPOKE
39.     "812D5C-02AA"
40.     YPOKE
41.     "812D7E-013C"
42.     YPOKE
43.     "812D88-013C"
44.     YPOKE
45.     "812D97-013C"
46.     YPOKE
47.     "812F1E-0046"      LINES 47 THROUGH 58     ITEM 8
48.     YPOKE
49.     "812F1F-02A6"
50.     YPOKE
51.     "812F3B-0046"
52.     YPOKE
53.     "812F3C-02A6"
54.     YPOKE
55.     "812F6E-0046"
56.     YPOKE
57.     "812F6F-02A6"
58.     YPOKE
59.     "812FEF-0350"      LINES 59 THROUGH 64     ENABLE TURBO50 AT SELECTION OF
60.     YPOKE                                     "ON" (START UP).
61.     "812FF9-03A3"
62.     YPOKE
63.     "812FFA-0000"
64.     YPOKE
65.     "812000-000F"      LINE 65 THROUGH 66      CHANGES ROM ID TO HEX 000F (DEC
66.     YPOKE                                     15) FROM HEX 001F (DEC 31). THIS
67.     "8121F3-326E"                             ALLOWS YFNS_1C TO BE USEABLE
68.     YPOKE                                     WITH CLUTILS.
69.     "8121F4-33FB"
70.     YPOKE"             LINES 67 TO 74         ITEM 10
71.     "812D92-326E"
72.     YPOKE
73.     "812D93-33FB"
74.     YPOKE
```

AT ANYTIME YOU CAN VERIFY THE YPOKE CHANGE BY INPUTING THE FOLLOWING:

```
1.      "812680-AAAA"
2.      YPEEK
3.      THE DISPLAY IN ALPHA SHOULD BE: "812680-005E"
4.      SUBSTITUTE "812680" WITH THE ADDRESS OF YOUR CHOICE.
```

STEP 3: NOW THAT YFNS_1A HAS BEEN PATCHED TO VERSION YFNS_1C INSTRUCT THE CL TO USE THE PATCHED VERSION AND OF COURSE USE IT FROM LOCATION PORT 1 LOWER (PLUG1L).

    1.   "812-RAM"
    2.   PLUG1L

STEP 4: THE NEW YFNS_1C IS IN RAM SO IT IS SAFE TO ERASE THE UNPATCHED VERSION AT LOCATION 060000. THIS WILL TAKE ABOUT 2 SECONDS AT WHICH TIME THE SCREEN MAY BE BLANK.

    1.   TURBOX   REMOVE TURBO50 MODE TO ALLOW THIS VERSION YFERASE
    2.   "060000"   TO FUNCTION.
    3.   YFERASE

AS AN EXERCISE, DO THE FOLLOWING:
    1.   "060000-AAAA"
    2.   YPEEK

THE DISPLAY IN ALPHA SHOULD BE:
    1.   "060000-FFFF"

INDICATING AN ERASED SECTOR AND CONFIRMING THAT YFERASE WORKED.

STEP 5: LET'S COPY THE NEW PATCHED VERSION OF YFNS_1C TO THE ORIGINAL LOCATION.

    1.   TURBO50   ENABLE TURBO50 FOR YFWR
    2.   "810>060"
    3.   YFWR
    4.   "811>061"
    5.   YFWR
    6.   "812>062"
    7.   YFWR
    8.   "813>063"
    9.   YFWR
    10.   "814>064"
    11.   YFWR
    12.   "815>065"
    13.   YFWR
    14.   "816>066"
    15.   YFWR
    16.   "817>067"
    17.   YFWR

STEP 6: POINT THE CL BACK TO THE YFNS_1C FLASHED VERSION AT 060000. THIS WAS THE LOCATION OF THE PATCHED YFNS_1A WHICH IS NOW VERSION YFNS_1C:

    1.   "YFNS"
    2.   PLUG1L

Chapter 2:   backing up calculator state to FLASH routine and restoring calculator state from flash; manual key strokes. No CLUTIL ROM.

STEP 1:

INPUT THE FOLLOWING ROUTINE TO CREATE THE WRITE FROM 800 TO OC9. YCTOF TAKES ABOUT 18
SECONDS TO COMPLETE. YOU WILL HAVE A FROZEN OR BLANK DISPLAY UNTIL THEN. WALK AWAY, DO
NOT INTERFERE WITH THE CALCULATOR UNTIL COMPLETE, ESPECIALLY CONSIDERING LINE 8.

```
  1.     LBL "YCTOF"              Y CALCULATOR TO FLASH
  2.     TURBO50
  3.     "062>812"
  4.     YMCPY
  5.     "812-RAM"                YFNS_1C in RAM so YFWR can be used.
  6.     PLUG1L
  7.     "0C9000"
  8.     YFERASE
  9.     "800>0C9                 COPY CALCULATOR STATE TO USER RAM LOCATION 0C9000
 10.     YFWR
 11.     "YFNS"
 12.     PLUG1l
 13.     END
```

STEP 2:

THE FOLLOWING MANUAL INPUT WILL RESTORE THE CALCULATOR BACK TO ITS ORIGINAL STATE AT
LAST COPY FROM complete "MEMORY LOSS" state or power interupt:

```
  1.     MMUCLR                   BASIC REBOOT STEPS TO ENABLE MMU ETC.
  2.     "YFNS"                   NOTE THE USE OF YFNS AND NOT YFNZ.
  3.     PLUG1L
  4.     MMUEN
  5.     TURBO50
  6.     "0C9>800"                COPY CALC STATE FROM FLASH BACK TO 800.
  7.     YMCPY
```

STEP 3:

CONVENIENT ROUTINE TO RESTORE INSTALLED XROMS USED AFTER THE MANUAL STEPS IN SECTION 2
ABOVE HAVE BEEN COMPLETED. THESE ARE EXAMPLES ONLY:

```
  1.     LBL PG
  2.     "CCDX"
  3.     PLUG1U
  4.     "PPCM"
  5.     PLUG2
  6.     EXT-IL
  7.     PLUG3L
  8.     CLUTILS
  9.     PLUG3U
 10.     RTN
```

ROUTINE TO SET THE CLOCK MODULE:

1.	LBL SGMT	
2.	DATE?	
3.	PROMPT	
4.	SETDATE	MY CLOCK IS SET TO GMT (+7 PST) HOURS FOR
5.	TIME?	LABELING.PROGRAMS WITH DATE AND FOR THE WORLD TIME
6.	PROMPT	PROGRAM WITH CITY AIRPORT IDENTIFIERS.
7.	SETIME	
8.	+-GMT?	
9.	PROMPT	
10.	CHS	
11.	T+X	
12.	"DONE"	
13.	AVIEW	
14.	RTN	

Both routines listed in steps 3 and 4 can be included in the calculator state and therefore will be included in the transfer from the FLASH copy back to the Calculator.   They are only listed as examples, your requirements may be more sophisticated, especially the plug routine and the YCTOF routine (see chapter 5 and 6 for expanded examples).

Chapter 3: **Copying latest YFNZ-1x to the CL with CLONIX.**

USING CLONIX FILES (DIEGO DIAZ) AND YFNZ-1x ROM LOAD THE CURRENT CLUTILS VERSION INTO THE CLONIX MODULE:

- o **PAGE F000.**
- o **BANK 1**
- o **ROM   YFNZ-1x**   WHERE x IS THE LATEST VERSION.

COPY YFNZ-1E IN CLONIX PAGE F000 TO THE 'CL':

1.   **"F-0>820"**   TAKE CLONIX YFNZ-1x AND COPY IT TO RAM AT 820000.
2.   **YMCPY**
3.   REMOVE CLONIX   DON'T FORGET TO REMOVE CLONIX WHEN TRANSFER COMPLETE.

REFER TO INTRODUCTION SECTION 2 "CLONIX EMAIL" FOR AN EXPLANATION ABOUT THE PATCHES THAT FOLLOW. YFERASE AND 'TURBO50 AT START' WILL BE PATCHED HERE. FROM ABOVE THE NEW YFNZ RESIDES AT RAM ADDRESS 820000

	YPOKE PATCH	MODIFICATION
1.	**TURBO50**	ENABLE TURBO50 MANUALLY TO SPEED UP YMCPY.
2.	**"820FF9-03A3"**	TURBO50 AT START.
3.	**"YPOKE**	
4.	**"8201F3-326E"**	LINES 3 THROUGH 10 ALLOW YFERASE AND YSEC TO FUNCTION
5.	**YPOKE**	WHILE IN TURBO50.
6.	**"8201F4-33FB"**	
7.	**YPOKE"**	
8.	**"820D92-326E"**	
9.	**YPOKE**	
10.	**"820D93-33FB"**	
11.	**YPOKE**	

COPY OS AT 060 THROUGH 067 TO RAM 810 THROUGH 817 SO IT CAN BE PATCHED. AGAIN THE WORD "DONE' MAY BE STORED TO THE X STACK TO INDICATE WHEN THE YMCPY AND YFWER ARE COMPLETED (SEE QUICK TIP TOP OF PAGE 6).

1.   **"060>810"**   COPY SECTOR 060000 TO RAM 80000 TO 817000.
2.   **YMCPY**
3.   **"061>811"**
4.   **YMCPY**
5.   **"062>812"** <-------"YFNZ-1x" LOCATED HERE.
6.   **YMCPY**
7.   **"063>813"**
8.   **YMCPY**
9.   **"064>814"**
10.   **YMCPY**
11.   **"065>815"**
12.   **YMCPY**
13.   **"066>816"**
14.   **YMCPY**
15.   **"067>817"**
16.   **YMCPY**

PLACE YFNS AT 812 IN RAM FOR USE OF FLASH FUNCTIONS YFERASE AND YFWR.

    1.   "812-RAM"   PUT YFNZ-1C IN RAM AND PLUG1L TO DIRECT OS TO USE
    2.   PLUG1L   RAM YFNZ-1C

ERASE 32k 060 SECTOR.

    1.   TURBOX   DISABLE TURBO50; REASON FOR THIS PATCH.
    2.   "060000"   ERASE 060000 PREPARING IT FOR YFNZ-1E
    3.   YFERASE
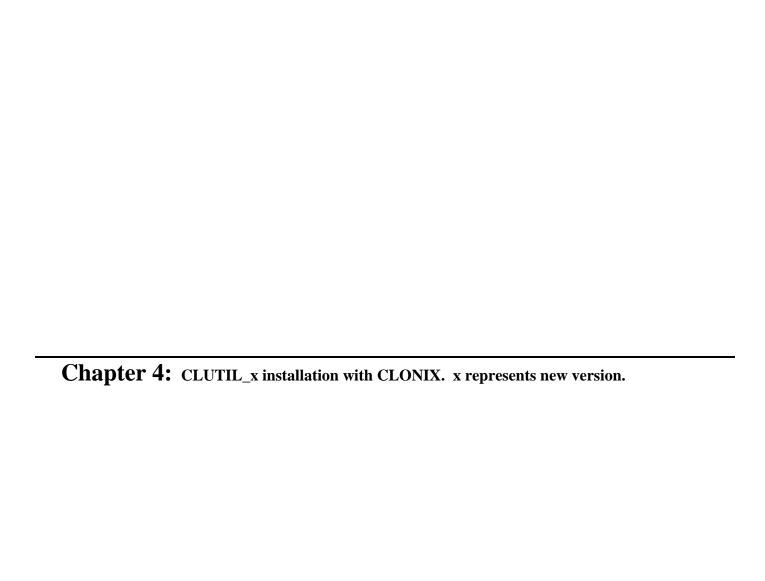
COPY OS BACK TO 060000 THROUGH 067000 WITH NEW YFNZ-1x.

    1.   TURBO50   ENABLE TURBO50 MANUALLY TO SPEED UP YFWR.
    2.   "810>060"
    3.   YFWR
    4.   "811>061"
    5.   YFWR
    6.   "820>062" <-------USING PATCHED YFNZ-1X AT LOCATION 820
    7.   YFWR
    8.   "813>063"
    9.   YFWR
    10.   "814>064"
    11.   YFWR
    12.   "815>065"
    13.   YFWR
    14.   "816>066"
    15.   YFWR
    16.   "817>067"
    17.   YFWR

PLUG PATCHED YFNS BACK TO PORT 1 LOWER.

    1.   "YFNS"
    2.   PLUG1L

Chapter 4: CLUTIL_x installation with CLONIX. x represents new version.

USING CLONIX FILES (DIEGO DIAZ) AND CLUTILS ROM (ANGEL MARTIN) LOAD THE CURRENT CLUTILS VERSION INTO THE CLONIX MODULE:

- o **PAGE F000.**
- o **BANK 1**
- o **ROM   CLUTIL_H**

  - ▪ **ONCE CONFIRMED LOADED, INSERT THE CLONIX INTO THE CL.**
  - ▪ **CAT 2 TO CONFIRM THAT CLUTILS RESIDES IN THE CLONIX.**

STEP 2:

SELECT AN EMPTY USER RAM, IN THIS EXAMPLE LOCATION 807 AND COMPLETE THE FOLLOWING STEPS:

1.   **"F-0>807"**
2.   **YMCPY**

STEP 3:

TURN OFF THE CL AND REMOVE THE CLONIX. TURN ON THE CL AND COMPLETE THE FOLLOWING STEPS:

1.   **"807-RAM"**
2.   **PLUGxx**   WHERE **xx** REPRESENTS A FREE PORT OF YOUR CHOICE **EXCEPT **** PORT 1 LOWER ******.
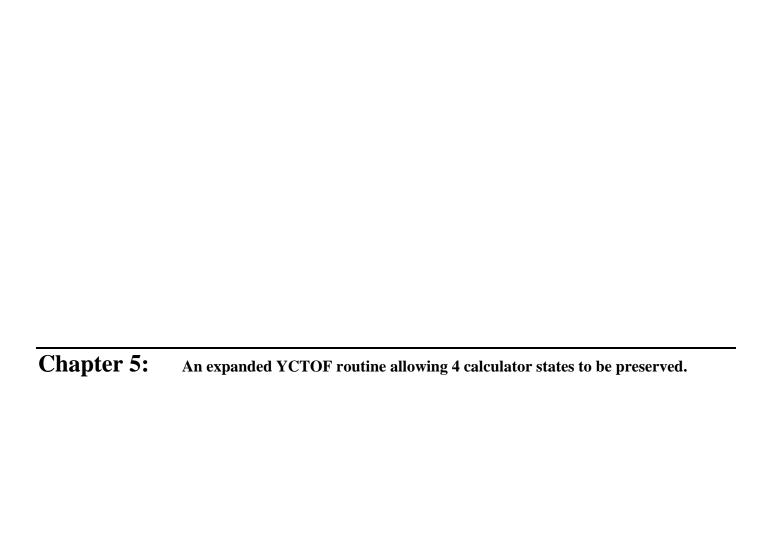

STEP 4:

COPY 807 TO FLASH LOCATION ONLY WHEN SATISFIED THAT COPY IS STABLE.

  - ▪ **0C8000 CAN BE SUBSTITUTED FOR YOUR CHOICE OF USER FLASH.**
  - ▪ **IN THIS EXAMPLE 0C8000 IS USED WITH THE MNEMONIC XXXA:**

1.   **"062>812"**   PLACE YFNS IN RAM TO ALLOW YFWR TO WORK.
2.   **YMCPY**
3.   **"812-RAM"**
4.   **PLUG1L**
5.   **"OC8000"**   ERASE 0C8000
6.   **YFERASE**
7.   **"807>OC8"**   COPY LATEST VERSION OF CLUTILS TO 0C8000.
8.   **YFWR**
9.   **"XXXA"**   IN THIS EXAMPLE XXXA IS CHOSEN (OC8000)
10.   **PLUG1U**   LOCATION YOUR CHOICE
11.   **"YFNS"**
12.   **PLUG1L**

Chapter 5: An expanded YCTOF routine allowing 4 calculator states to be preserved.

NOTES:

1. This routine allows for four calculator states to be backed up.
2. The six letter identifier "NAME?" is prompted for.
3. The desired location is prompted for.
4. An escape is provided if the user changes their mind.
5. "COPYING" is displayed during the routine.

6. **DO NOT INTERUPT THE CALCULATOR DURING THE DISPLAY "COPYING"****

7. "DONE" is displayed when the copy is complete.
8. Pressing the back-arrow key will show the name of the calculator state that was prompted.
9. More states may be added using subroutines.
10. The states may be named and the name is displayed when the backup is restored to the calculator memory by pressing the back-arrow key when the restore sequence of key strokes have been completed.

- **CALCULATOR-STATE is defined as the current unique contents of the 41C register memory including:**
  - i. X-memory,
  - ii. Flags,
  - iii. Key assignments
  - iv. Program registers
  - v. Storage registers, .

- **After testing the calculator for the last several months the back up of MMU to a second address has been proven to be redundant.**

- **Each starting block of USER FLASH is used as the "YFERASE" function erases the entire 4K block, therefore attempting to store two CALCULATOR-STATES in the same block would result in both CALCULATOR-STATES being erased.**

- **To abort the routine at the address prompt press the "C" key. The routine will exit and "DONE" will be displayed immediately.**

- **The routine takes approximately 22 SECONDS to complete. When complete "DONE" is displayed and pressing the back-arrow key will cause the calculator state name to display.**

   DO NOT INTERUPT THE CALCULATOR DURING THE DISPLAY "COPYING"**

LINE	COMMAND	DESCRIPTION
1.	LBL "YCTOF"	CALCULATOR TO FLASH
2.	SF 27	
3.	TURBO50	GO FAST
4.	AON	
5.	"NAME?"	
6.	PROMPT	
7.	ASTO 00	
8.	AOFF	
9.	CLA	
10.	"1: 0C9 2: 0D1"	DISPLAYS CHOICE OF FOUR DIFFERENT LOCATIONS:
11.	AVIEW	0C9000, 0D1000, 0D9000, 0E2000
12.	PSE	
13.	"3: 0D9 4: OE2"	
14.	AVIEW	
15.	GETKEY	USES THE KEYPRESS TO CHOOSE THE CORRECT SUB ROUTINE.
16.	"COPYING"	COPYING IS DISPLAYED UNTIL "DONE" APPEARS SO YOU DON'T
17.	AVIEW	FREAK OUT WHILE IT IS RUNNING!
18.	GTO IND X	USED TO DIRECT THE PROCESS TO THE CORRECT SUB ROUTINE.
19.	LBL 72	IF 1 SELECTED USE ADDRESS STARTING AT 0C9000.
20.	RCL 00	
21.	XEQ 20	
22.	"0C9000"	ERASE THE ADDRESS BLOCK.
23.	YFERASE	
24.	"800>0C9"	COPY THE CALCULATOR-STATE TO THE ADDRESS BLOCK.
25.	YFWR	
26.	GTO 13	
27.	LBL 73	IF 2 SELECTED USE ADDRESS STARTING AT 0D1000.
28.	RCL 00	
29.	XEQ 20	
30.	"0D1000"	ERASE THE ADDRESS BLOCK.
31.	YFERASE	
32.	"800>0D1"	COPY THE CALCULATOR-STATE TO THE ADDRESS BLOCK.
33.	YFWR	
34.	GTO 13	
35.	LBL 74	IF 3 SELECTED USE ADDRESS STARTING AT 0D9000.
36.	RCL 00	
37.	XEQ 20	
38.	"0D9000"	ERASE THE ADDRESS BLOCK.
39.	YFERASE	
40.	"800>0D9"	COPY THE CALCULATOR-STATE TO THE ADDRESS BLOCK.
41.	YFWR	
42.	GTO 13	
43.	LBL 62	IF 4 SELECTED USE ADDRESS STARTING AT 0E2000.
44.	RCL 00	
45.	XEQ 20	
46.	"0E2000"	ERASE THE ADDRESS BLOCK.
47.	YFERASE	
48.	"800>0E2"	COPY THE CALCULATOR-STATE TO THE ADDRESS BLOCK.
49.	YFWR	
50.	GTO 13	
51.	LBL 20	PLACES YFNS IN RAM SO YFERASE AND YFWR ARE AVAILABLE.
52.	062>80C	
53.	YMCPY	
54.	80C-RAM	PLACES YFNS RAM IN TO PORT 1 LOWER.
55.	PLUG1L	
56.	RTN	
57.	LBL 13	PLACES YFNS BACK IN PORT 1 L.
58.	"YFNS"	
59.	PLUGIL	
60.	DONE	DISPLAYS "DONE" TO LET YOU KNOW THE ROUTINE HAS
61.	AVIEW	FINISHED.
62.	END	

```
EXAMPLES:

PALYNOLOGY   "IGCP"      ROUTINES INTO FLASH ADDRESS 0D1000
AVIATION     "AVIATE"    ROUTINES INTO FLASH ADDRESS 0C9000
```

EX. 1 STARTED ROUTINE BUT DECIDED TO ABORT.

COMMAND LINE	DISPLAY	RESULT
XEQ "YCTOF"	NAME?	
IGCP		
	"1: 0C9 2: OD1"	
	"3: OD9 4: OE2"	
"C"	"DONE"	COPY ABORTED.

EX. 2 STORE IGCP CALCULATOR STATE IN FLASH ADDRESS 0D1000.

COMMAND LINE	DISPLAY	RESULT
XEQ "YCTOF"	NAME?	
IGCP		
	"1: 0C9 2: OD1"	
	"3: OD9 4: OE2"	
"2"	"DONE"	BLOOD GLUCOSE ROUTINES AND DATA RESIDE IN FLASH ADDRESS 0C9000
BACK-ARROW	IGCP	

EX. 3 STORE AVIATION CALCULATOR STATE IN FLASH ADDRESS 0C9000.

COMMAND LINE	DISPLAY	RESULT
XEQ "YCTOF"	NAME?	
AVIATE		
	"1: 0C9 2: OD1"	
	"3: OD9 4: OE2"	
"1"	"DONE"	ASTRONOMY/PHYSICS ROUTINES RESIDE IN FLASH ADDRESS 0E2000
BACK-ARROW	AVIATE	

To restore from a MEMORY LOST or power interrupt follow procedures listed in step 2 on page 7. When the restoration is completed after line 7, press the back-arrow to see the six letter identifier of the calculator state. In the above examples either "AVIATE" OR "IGCP" will show.

Chapter 6: An expanded plug/unplug routine offering 4 different plugged XROM conditions. This routine executes a subroutine based on the letter pressed. "U" unplugs all but the PORT 1 Lower containing YFNS.

```
1.    LBL "UPG"          UNPLUG PLUG CALCULATOR
2.    SF 01
3.    XEQ 61             UNPLUG ALL VIRTUAL ROMS
4.    "G, W, Z, U        ANY MNEMONIC YOU WANT (GAME, WORK, ZENROM, UNPLUG)
5.    AVIEW
6.    GETKEY
7.    GTO IND X
8.    LBL 21             KEY 'G' FOR GAMES ROM
9.    "GAME"
10.   PLUG 2
11.   GTO 10             EXIT PROGRAM
12.   LBL 72             KEY 'Z' FOR ZENROM
13.   "ZENR"
14.   PLUG 2
15.   GTO 10
16.   LBL 63             KEY 'W' FOR WORK RELATED ROMS
17.   "AOSX"             CCD-OSX
18.   PLUG1U
19.   "PPCM"             PPC
20.   PLUG2
21.   "EXTI"             EXT-IL
22.   PLUG3L
23.   XXXA               CLUTIL_H
24.   PLUG3U
25.   GTO 10
26.   LBL 61             KEY 'U' FOR UNPLUG ALL BUT PORT 1 LOWER
27.   UPLUG1U
28.   UPLUG2
29.   UPLUG3
30.   UPLUG4
31.   FS?C 01            TEST FLAG FROM LINE 2 FOR RETURN TO KEY SUBROUTINE
32.   RTN
33.   LBL 10
34.   "DONE"             VISUAL CONFIRMATION ROUTINE IS DONE
35.   AVIEW
36.   END
```

```
1.    LBL "UPG"          UNPLUG PLUG CALCULATOR
```

Chapter 7: Creating ROM image files of an HP-41 module. Thanks to Jürgen Keller for this!

Creating ROM image files of an HP-41 module

A. Requirements
- HP-41 with capability to save a 4k page to a mass storage device, e.g.:
  - HP-41CL with CCD/OSX (SAVEROM)
  - HP-41CY (WRTPG)
  - HP-41 with CCD OS/X provided by a Clonix module
  - HP-41 with HEPAX (WRTROM) provided by a NoVRAM etc.
  - Etc.
- HP 82160A HP-IL interface
- Windows PC (drivers required by PIL-Box need to be installed)
- **PIL-Box** device
- **ILPer** program
- **HPDir** program
- **lif2rom** program

B. Preparations
1. Insert the module to dump (and any other modules needed by your setup, e.g. Clonix) into the HP-41.
2. Connect the PIL-Box to the PC, and the HP-41 to the PIL-Box.

C. Dump all pages of the module to a LIF file
0. Run ILPer (select mass storage LIF file, appropriate port and baud rate) and start the PIL-Box interface.
1. Turn on the HP-41.
2. Enter a file name for the page into the ALPHA register.
3. Enter the page number (8-15) into the X register.
4. Execute the SAVEROM function (or WRTPG, WRTROM, ...).
5. Repeat steps 3 to 5 for all pages of the module.
6. Stop the PIL-Box and quit ILPer.

D. Extract all pages of the module from the LIF file and convert them to ROM files
0. Open a command prompt.
1. Run Hpdir -extract <file> <page>, where <file> is the name of the LIF file (as specified in step C1) and <page> is the name of the page (as entered in step C3).
2. Run lif2rom <page>.#e070 <name>.rom.
3. Repeat steps 2 to 3 for all pages of the module.