42LC Calculator, program codes. Two least significant digits have STO, GTO, LBL etc. reference info for the calculator.

For STO, 2001 means STO table entry 1 has the name of the variable.
For LBL, 4005 means Label table entry 5 has the name of the label and Address table entry 5 has the absolute address of the label. For example LBL “ABC” could be stored as 4007, but displays as LBL “ABC”. The absolute address is stored in the Address table (entry 7).

A GTO will use the corresponding label, so 2507 displays as GTO “ABC”, but refers to Address table (entry 7) for the absolute address to go to.

Program start and end are always 5100 and 5200

STO	2000
STO+, STO-, STO*, STO/	2100,2200,2300,2400
GTO	2500
STO ind	2600
RCL	3000
RCL ind	3100
RCL lcl	3200
RCL ind lcl	3300
LBL	4000
LBL lcl	4100
GTO lcl	4200
STO lcl	4500
STO+, STO-, STO*, STO/	4600,4700,4800,4900
STO ind lcl	5300
XEQ	5000
Pgm start	5100

Pgm end	5200
Flags - SF,CF,FS?,FC?,FS?C,FC?C	5400-5900
Tone	6100
FIX	6000
SCI	6500?
DSE	7000
DSE IND	7200
ISG	7100
Alpha	n/a
MVAR	8000
Float number	8100 (explained further below - see “FILE C”)
Number	900000 (explained below - see “FILE C”)

Conditionals 220-225 x?0
Conditionals 226-231 x?y

Keyboard commands (0-39 is unshifted, 40-79 is shifted).
First keyboard row=0 to 9
Second keyboard row=10-19
Third keyboard row=20-29
Fourth keyboard row=30-39

Each row of the following array has 10 items.

```
char cmds[100][20]={"sum+","1/x","Sqrt","LOG","LN","XEQ","7","8","9","/",
"STO","RCL","RLDN","SIN","COS","TAN","4","5","6","x",
"SST","BST","x<>y","CHS","E","BSP","1","2","3","-",
"","EXIT","shift","","","ENTER","0",".","R/S","+",
"sum-","Y^X","X^2","10^X","e^X","GTO","","","","",
"CMPX","%","PI","ASIN","ACOS","ATAN","","","","",
"SST","BST","LASTx","","","","","","","",
"","OFF","","","","ALPHA","INPUT","SHOW","PRGM","VIEW",
"SINH","COSH","TANH","ASINH","ACOSH","ATANH"};
```

Menu commands (codes 100 to approx. 330). Each row in the array below has 12 items. Each row has 2 sets of menus. Related menus have been grouped together when possible.

DEG would be 100, RAD would be 101, etc. Not all commands have been tested in Program mode.

```
char
menuz[230][20]={"deg","rad","grad","","rect","polar","size","quiet","cres","rres","key
","lclb",
"new","inv","det","tran","simq","edit","dot","cross","uvec","dim","index","editn",
"stoij","rclij","stoel","rclel","putm","getm","fix","sci","eng","all","rdx.","rdx,",
"sum+","sum","mean","wmn","sdev","cfit","allsum","linsum","","","sumreg","sumrg?",
"fcstx","fcsty","slope","yint","corr","modl","linf","logf","expf","pwrf","","best",
"a..f","hexm","decm","octm","binm","logic","and","or","xor","not","bit?","rotxy",
">deg",">rad",">hr",">hms",">rec",">pol","ip","fp","rnd","abs","sign","mod",
"sf","cf","fs?","fc?","fs?c","fc?c","comb","perm","n!","gam","ran","seed",
"lbl","rtn","input","view","aview","xeq","x?0","x?y","prom","pse","isg","dse",
"aip","xtoa","agra","pixel","beep","tone","mvar","varm","getk","menu","keyg","keyx",
"x=0?","x!=0","x<0?","x>0?","x<=0?","x>=0?","x=y?","x!=y?","x<y?","x>y?","x<=y?","x>=y
?",
"prsum","prp","prv","prst","pra","prx","prusr","list","adv","prlcd","","delay",
"pon","poff","","man","norm","trace","sum+","1/x","sqrt","log","ln","xeq",
"clsum","clp","clv","clst","cla","clx","clrg","del","clky","cllcd","clmn","clall",
"<-","old","^","v","goto","->","A","B","C","D","E","F",
"llim","ulim","acc","","","integ","mata","matb","matx","","fnrm","mtnum",
"sinh","cosh","tanh","asinh","acosh","atanh","save","load","mtnum","pcount","","",
"aleng","arot","ashf","cpx?","posa","rnrm","r^","","","","",""}; //34
```

File number 00 is loaded on power on, and saved with Shift OFF or auto power off by default. **Note - if you move the top switch to the OFF position, any data is NOT saved. Also, if pressing the Rst (reset) button on top, data is NOT saved.**

FILE A: Stores program lines.

FILE B: Stores 100 alpha named storage variables, 4 regular stack, 4 “complex” side of stack, 4 stack data type (0=number, 1=complex, 2=array), FIX digits, Scientific “flag” (0=no, 1=yes), SCI digits, FONT, BEEP, COLOR, Menu COLOR, program number count, complex mode (0=rec, 1=pol), matrix number (next matrix to use).

FILE C: STO TBL (100 alpha sto names, NULL=$), numbers in programs (100 floating point numbers).

Note - integer numbers from -50,000 to 49,999 are stored within program code 900000.
Program code=900000+number+50000 (there is currently no error checking for numbers outside this range, so for larger numbers, like 50,000 enter as 5.0e04

Examples: 0 would be 950000, 100 would be 950100, -1 would be 949999,
-1000 would be 949000

Note: local storage variables under current implementation do not appear on alpha variables, but are shared between programs, so to avoid a conflict, do not use the same STO 00 to STO 99, expecting them to be local to each program, and among programs that rely on each other, unless you are sharing them. Local variables are not stored when calculator is powered off, currently.

FILE D: LBL TBL (100 alpha labels, NULL=$), and 100 address table entries (whenever a global alpha LBL is used, the absolute address is stored in address table). Note: local label addresses are not stored when calculator is powered off, currently. To rescan addresses for local labels, in normal mode, GTO the program using local labels, enter PRGM mode, and exit PRGM mode. When you exit PRGM mode, local labels (00 to 99) are rescanned and stored in the local address table.

FILE E: ten 10x10 matrices are stored, then 10 matrix row sizes and 10 matrix col sizes.

Burning firmware:

This 42LC firmware may be used for non-commercial personal or educational purposes. No warranties are made on the use of the firmware. It is up to the user to verify the accuracy or precision of this calculator implementation.

Go to Github riker2072 42LC repository.

Get 42LC.ino.bin, 42LC.ino.bootloader.bin and 42LC.ino.partitions.bin files.

Get Windows ESP32 flash download tool at:
https://www.espressif.com/en/support/download/other-tools

Click on … to select 42LC.ino.bin file directory location. In the @ box, put 0x10000 Click on … to select 42LC.ino.bootloader.bin file directory location. In the @ box, put 0x0000 Click on … to select 42LC.ino.partitions.bin file directory location. In the @ box, put 0x8000

SPI speed is 40MHz, SPI mode is DIO. Check mark in the box labeled “DoNotChgBin”. My port settings are COM4, baud 115200. Connect the M5 Cardputer to your PC using a USB C cable. Click on START to burn the firmware.

File for black and white overlays are also on Github.