Lenco Lucille LCD initialisation sequence

v1.4 10 Feb 2021

LCD 10 pin interface : RST, RS, CS, SCL, SDA, GND, VDD, CAP, CAP, VLCD

RST	Reset, hardware reset.
RS	Register select, select data or command register.
CS	Chip select, active low, transitions on the falling edge of SCL. Held low for duration of a byte, or continuously for the duration of a byte sequence.
SCL	Clock, 17uS (21uS between clock pulses), only present during CS period.
SDA	Data, write clocked on rising edge of SCL. Sent most-significant-bit first, 8 bit words, 135uS delay between bytes.
GND	0V
VDD	+3.3V, LCD logic power supply.
CAP, VLCD	LCD power, generated higher supply voltage

From the instruction codes sent, it appears to have a Sitronix ST7032 compatible controller.

LCD initialisation:

```
39 1c 5d 7c 6a 38 0c 06 01 01
40 00 11 0e 0a 0e 11 00 00 48 0e 11 11 11 1f 00 00 50 0e 11 11 11 1f 1f
00 00 58 0e 11 11 1f 1f 1f 00 00 60 0e 11 1f 1f 1f 1f 00 00 68 00 1f 11 11
11 11 1f 00 70 00 1f 1f 1f 1f 1f 1f 00 78 00 04 0e 0e 1f 1f 04 00 80
20 20 20 57 65 6c 63 6f 6d 65 20 74 6f 20 20 20 c0 20 20 20 20 20 52 61 64
69 6f 20 20 20 20 20 20
```

Initial code, each byte written with a single pulse to the CS line, 1.5mS between writes

39	Function set - Turn ON extended instruction set, 8 bit, 2 lines, 5x8 font
1C	Extended instruction - Internal OSC frequency 183Hz frame rate, 1/4 Bias
5D	Extended instruction - Power/ICON control/Contrast set ICON display ON, Booster circuit ON, Contrast set (high nibble) = 01
7C	Extended instruction - Contrast set(low nibble) = C0
6A	Extended instruction - Follower control Turn ON internal follower circuit 1.5 follower ratio

(should be 200mS delay for power to stabilise)

38	Function set - Turn OFF extended instruction set, 8 bit, 2 lines, 5x8 font
0C	Display on, cursor off, blink off
06	Entry mode increment, shift
01	Clear display, set cursor address 0

3mS delay then writes a single byte

01	Clear display, set cursor address 0

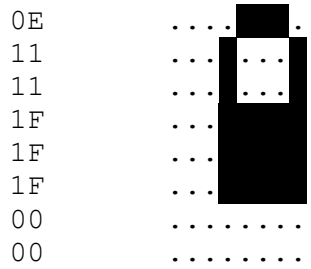
Second initialisation sequence after 3mS, 136uS between bytes
The following bytes are each written during a CS pulse duration
Write to character generator (characters 0, through 7 are written)

40	CGRAM 0x00
00	.....
11	...#...#
0E	....###.
0A	....#.#.
0E	....###.
11	...#...#
00	.....
00	.....

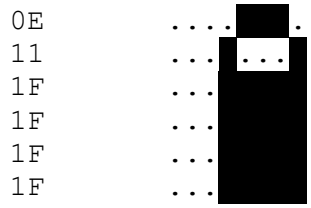
48	CGRAM 0x08
0E	....###.
11	...#...#
22	...#...#
11	...#...#
11	...#...#
1F	...#####
00	.....
00	.....

50	CGRAM 0x10
0E	....###.
11	...#...#
11	...#...#
11	...#...#
1F	...#####
1F	...#####
00	.....
00	.....

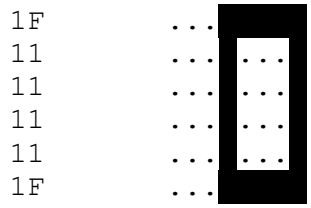
58 CGRAM 0x18



60 CGRAM 0x20

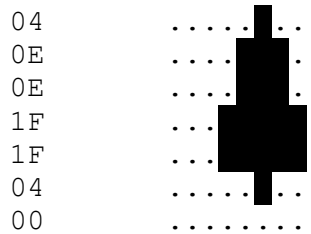


68 CGRAM 0x28



70 CGRAM 0x30

78 CGRAM 0x38



Display startup message

```
  80        DRAM 00 - Position cursor line 1, character 1
"   Welcome to    "
  20
  20
  20
  57        W
  65        e
  6C        l
  63        c
  6F        o
  6D        m
  65        e
  20
  74        t
  6F        o
  20
  20
  20



  C0        DRAM 40 - Position cursor line 2, character 1
"     Radio       "
  20
  20
  20
  20
  20
  52        R
  61        a
  64        d
  69        i
  6F        o
  20
  20
  20
  20
  20
  20
```