# Lenco Lucille LCD initialisation sequence

LCD 10 pin interface : Reset,  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 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

```
. . . . . . . .
. . . # . . . #
. . . . # # # .
. . . . # . # .
. . . . # # # .
. . . # . . . #
. . . . . . . .
. . . . . . . .
```

`48` CGRAM 0x08

```
. . . . # # # .
. . . # . . . #
. . . # . . . #
. . . # . . . #
. . . # . . . #
. . . # # # # #
. . . . . . . .
. . . . . . . .
```

50 CGRAM 0x10
```
....###.
...#...#
...#...#
...#...#
...#####
...#####
........
........
```

58 CGRAM 0x18
```
....###.
...#...#
...#...#
...#####
...#####
...#####
........
........
```

68 CGRAM 0x28
```
........
...#####
...#...#
...#...#
...#...#
...#...#
...#####
........
```

70 CGRAM 0x30
```
........
...#####
...#####
...#####
...#####
...#####
...#####
........
```

78 CGRAM 0x38

```
........
.....#..
....###.
....###.
...#####
...#####
.....#..
........
```

Display startup message

80 DRAM 00 - Position cursor line 1, character 1

20 20 20 57 65 6C 63 6F 6D 65 20 74 6F 20 20 20

" Welcome to "

C0 DRAM 40 - Position cursor line 2, character 1

20 20 20 20 20 52 61 64 69 6F 20 20 20 20 20 20

" Radio "