CL01 Intelligent Controller User Manual

Revision A

CL01
Intelligent Controller Version 1.4



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TABLE OF CONTENTS

Table of Contents 2

1. General Controller Features 3

2. Compatible Logic Boards.....3

3. Operational Overview.....4

4. Operational Details.....7

5. Communication Protocol.....11

6. Hardware 19

7. Key Terms & Definitions.....24

8. Firmware problems 24

1. General Controller Features

The CL01 Version 1.2 controls two OLED (64x48) SmartSwitches or two OLED (52x36) SmartDisplays. The firmware can be customized based on customer requirements. Below are current features:

- Controls two OLED (64x48) SmartSwitches or two OLED (52x36) SmartDisplays
- Serial communication via RS232 (57.6K, 1 start bit, 8 bit , 1 stop bit)
- On board microSD Flash that can hold up to 65,536 images
- Optional audio feedback while switch is pressed.
- Program responses to switch-actions events and timer-expire events.
- User programmable for images, attributes and set-ups.
- Command the controller to display images in real time.
- Direct communication from host to the OLED modules.
- Set the type of activity reports from the controller to host.
- Brightness settings to extend OLED life.
- Reports switch activity and timer expiration via serial port.
- Stand alone operation or real time control by host.

2. Compatible Logic Boards

The following is a list of compatible Logic Boards and switches.

- IS-L02L1 Logic Board for two OLED (64x48) SmartSwitches
- IS-L02P1 Logic Board for two OLED (52x36) SmartDisplays

3. Operational Overview

Power-up Sequence:
Upon power up, the controller checks the position of the Mode Select Switch and adjusts the image size accordingly. The "Switch" position will show the full image while the "Display" position will display only the middle 52 pixels of the top 36 lines of the image.

OLED Brightness Adjustment Mode:
The controller will then allow the brightness of the two OLED modules to be adjusted. Press the left hand switch to make both OLED modules dimmer. Press the right hand switch to make both OLED modules brighter. The brightness can be one of 16 levels between 0 and F where F is the maximum brightness. At the F level the OLED has a rated life of 15,000 hours. The dimmer the level is set the longer the life of the OLED.

Main Operational Mode:
After a few seconds of user inactivity the controller will move into the main operations mode where the switch on the left displays the image at the user's first preset address. The right hand switch will display the image at the user's second preset address. The controller will then respond to a switch actuation or a timer expiration as set by the attributes.

Addresses:
The controller associates one address to the left switch and one address to the right switch. Each switch will display the image at their associated addresses. The addresses are in hexadecimal. The controller handles the addresses as a group of addresses with associated images and attributes within user defined loops. Each loop has a starter address and an ending address. The function of the attributes for each address is to tell the controller where to point to next either when the switch associated with that particular address is pressed or when a timer expires. There are three types of attributes:

- Attributes SW1 and SW2 are the Action Addresses. In the starting address the Action Addresses tell the controller what addresses to point to when the switch associated with that particular address is pressed. In the ending address the Action Addresses tell the controller what addresses to point to when the loop has ended.
- The end address, EP1, sets the ending address for the loop.
- T1 and T2 are timers that are multiplied together to set the length of time to stay at one address before moving to the next address within the loop.

The only addresses that need attributes within the loop are the first and last addresses.
Illustration 1 shows the starting and ending addresses for "Switch A" which is associated with address 0001H. Switch A could be the left or right switch.

Illustration 1, Start and Ending Addresses for Switch A						
		Actions Addresses				
	Address	SW1	SW2	EP1	T1	T2
…	…	…	…	…	…	…
Start Image	0001	Left switch's future address when switch A is pressed.	Right switch's future address when switch A is pressed.	Ending Address (0003)	milli-seconds	milli-seconds
…	…	…	…	…	…	…
Ending Image	0003	Left switch's future address when end of loop	Right switch's future address when end of loop	Don't care	Don't care	Don't care
…	…	…	…	…	…	…

Illustration 2 shows a simple loop where images at addresses 0041H through 0057H are shown in sequence for two seconds each and will loop continuously until the switch associated with that particular address is pressed or the loop ends. When that switch is pressed the controller will set the left hand switch to address 0001H and the right hand switch to address 006AH. If the loop ends before the switch is pressed the left switch will go to address 0059H and the right switch will go to address 005AH.

Illustration 2, Simple Image Loop						
		Actions Addresses				
	Address	SW1	SW2	EP1	T1	T2
…	…	…	…	…	…	…
Start Image	0041	0001	006A	0057	7D	14
Next Image	0042	0000	0000	0000	00	00
…	…	…	…	…	…	…
Next Image	0056	0000	0000	0000	00	00
Ending Image	0057	0059	005A	0000	00	00
…	…	…	…	…	…	…

If SW1 and/or SW2 for the ending addresses are 0000H the loop will start again. Loops can overlap where, for instance, the left switch starts at address 0001H and ends at 0005H while the right switch starts at 0002H and ends at 0006H. The two loops will not interfere with each other.

Timers Operation:

Each switch has an independent timer; timer1 and timer2. Each timer value is the product of the two user defined variables T1 and T2 of the attributes. The formula for the timer value in millisecond is:

The timer value in ms= (T1)x(T2)

Each of these variables can have a value between 01H to FFH (1 to 255). The timer for a given switch will be disabled if the T1 value is set to zero. For T2 the zero value is defined as 256. Pressing either switch will reset the timers for both switches. Holding down either switch will prevent both timers from running. The

controller takes 35ms to send a image to each OLED for a maximum of 28 images per second on one OLED.

Attribute Block:

An attribute is handled as a block of 8 bytes.

Byte	Description
1	High byte of action address for OLEDModule #1.
2	Low byte of action address for OLEDModule #1.
3	High byte of action address for OLEDModule #2.
4	Low byte of action address for OLEDModule #2.
5	High byte of end address.
6	Low byte of end address.
7	Timer B
8	Timer A

Image Block:

An image is handled as a block of 6144 bytes. Each pixel requires two bytes in the 565 format as shown below.



The current version of the controller can only handle 64x48 format images. The OLED switches show the full image while the OLED displays will only show the middle 52 pixels of the top 36 lines of the image. The image is handled from top left to bottom right as shown below.

Byte	Description
1-128	First line of image
129-256	Second line of image
•	
•	
•	
5889-6016	47th line of image
6017-6144	48th line of image

4. Operational Details

Power-Up Sequence (Steps 1,2,3)
Upon power-up or reset, controller performs the following steps:

Step 1: Check the status of Mode Select Switch for mode of operation. Initialize according to selected mode.

Step 2: Display dim and bright on the two switches and allow for adjustments of the brightness. There are 16 brightness levels (0 to F). When the internal timer is expired, the controller proceeds to Step 3. Every time a switch is pressed, the timer gets reset. If a switch is held depressed the timer does not run. Switch activity are not reported to host.

Step 3: Transmit 11H to host via RS232. Check the microSD for set up value. If set up values are programmed, get the start address for switch 1, start address for switch 2 and the flag byte. If the set up values are not programmed use the default values: start address for switch 1 = current address for switch 1 = 0001H, start address for switch 2 = current address for switch 2 = 0010H and flag byte = 80H.

Step 4:

A. If attributes for start address of switch 1 are programmed, get the attribute for switch 1.
B. If attributes for start address of switch 1 are not programmed, use the default: Switch 1 Action address for switch 1 = 0000H, switch 1 action address for switch 2 = 0000H, end address for switch 1 = 0010H Timer2 for switch 1=00H timer1 for switch 1= 0AH.
C. If attributes for start address of switch 2 are programmed, get the attribute for switch 2.
D. If attributes for start address of switch 2 are not programmed, use the default: Switch 2 action address for switch 1 = 0000H, switch 2 action address for switch 2 = 0000H, end address for switch 2 = 0020H Timer2 for switch 2=00H timer1 for switch 2= 0DH,

Step 5: Send the pictures from microSD to OLED module according to start addresses.

Main Operational Mode

Step 6:

A. If the switch 1 is pressed, process it. (see details below)
B. If the switch 2 is pressed, process it. (see details below)
C. If the timer for switch 1 is expired, process it. (see details below)
D. If the timer for switch 2 is expired, process it. (see details below)
E. If the switch 1 is released: Transmit B1H to host if flag is enabled.
F. If the switch 2 is released: Transmit B2H to host if flag is enabled.
G. If there is update flag for switch 1 is set, process it.

H. If there is update flag for switch 2 is set, process it.
I. Checks the host communication buffer for data. If there is data, process them. (For detail see **Communication Protocol**)
J. Go to step 6 A.

Detailed Explanation of Operation Step 6

Step 6A: If switch 1 is pressed then:

1. Transmit 81H to host if flag is enabled.

2. If switch 1 action address for switch 1 is not equal zero and the attribute for the location is programmed then:
   a. Start address for switch 1 = switch 1 action address for switch 1.
   b. Current address for switch 1 = switch 1 action address for switch 1.
   c. Get the attributes and put the values for switch 1 action address for switch 1, switch 1 action address for switch 2, end address for switch 1 and timers for switch 1.
   d. Set update flag for switch 1.

3. If switch 1 action address for switch 1 is equal zero or the attribute for the location is not programmed then take no action.

4. If switch 1 action address for switch 2 is not equal zero and the attribute for the location is programmed then:
   a. Start address for switch 2 = switch 1 action address for switch 2.
   b. Current address for switch 2 = switch 1 action address for switch 2.
   c. Get the attributes and put the values for switch 2 action address for switch 1, switch 2 action address for switch 2, end address for switch 2 and timers for switch 2.
   d. Set update flag for switch 2.

5. If switch 1 action address for switch 2 is equal zero or the attribute for the location is not programmed then take no action.

Step 6B: If switch 2 is pressed then:

1. Transmit 82H to host if flag is enabled.

2. If switch 2 action address for switch 1 is not equal zero and the attribute for the location is programmed then:
   a. Start address for switch 1 = switch 2 action address for switch 1.
   b. Current address for switch 1 = switch 2 action address for switch 1.
   c. Get the attributes and put the values for switch 1 action address for switch 1, switch 1 action address for switch 2, end address for switch 1 and timers for switch 1.
   d. Set update flag for switch 1.

3. If switch 2 action address for switch 1 is equal zero or the attribute for the location is not programmed then take no action.

4. If switch 2 action address for switch 2 is not equal zero and the attribute for the location is programmed then:
   e. Start address for switch 2 = switch 2 action address for switch 2.
   f. Current address for switch 2 = switch 2 action address for switch 2.
   g. Get the attributes and put the values for switch 2 action address for switch 1, switch 2 action address for switch 2, end address for switch 2 and timers for switch 2.
   h. Set update flag for switch 2.

5. If switch 2 action address for switch 2 is equal zero or the attribute for the location is not programmed then take no action.

Step 6C: If timer for switch 1 expires then:

1. Transmit 83H to host if flag is enabled.

2. Increment current address for switch 1.

3. If current address for switch 1 is not equal ((end address for switch 1) +1) then:
   i. Transmit FDH and current address for switch 1 to host if flag is enabled.
   j. Set update flag for switch 1.

4. If current address for switch 1 is equal ((end address for switch 1) +1) then:
   k. Read the Attributes for end address location.
      i. If end location action address for switch 1 is equal zero then put current address = start address and set update flag for switch 1.
      ii. If end location action address for switch 1 is not equal zero then:
         1. Start address for switch 1 = end address action address for switch 1.
         2. Current address for switch 1 = end address action address for switch 1.
         3. Get the attributes and put the values for switch 1 action address for switch 1, switch 1 action address for switch 2, end address for switch 1 and timers for switch 1.
         4. Set update flag for switch 1.
      iii. If end location action address for switch 2 is equal zero then take no action.
      iv. If end location action address for switch 2 is not equal zero then:
         1. Start address for switch 2 = end address action address for switch 2.
         2. Current address for switch 2 = end address action address for switch 2.
         3. Get the attributes and put the values for switch 2 action address for switch1, switch 2 action address for switch 2, end address for switch 2 and timers for switch 2.
         4. Set update flag for switch 2.

Step 6D: If timer for switch 2 is expired then:

1. Transmit 84H to host if flag is enabled.

2. Increment current address for switch 2.

3. If current address for switch 2 is not equal ((end address for switch 2) +1) then:
   l. Transmit FEH and current address for switch 2 to host if flag is enabled.
   m. Set update flag for switch 2.
4. If current address for switch 2 is equal ((end address for switch 2) +1) then:
   n. Read the attributes for end address location for switch 2.
   o. If end location action address for switch 2 is equal zero then put current address for switch 2 = start address for switch 2 and set update flag for switch 2.
   p. If end location action address for switch 2 is not equal zero then:
      i. Start address for switch 2 = end address action address for switch 2.
      ii. Current address for switch 2 = end address action address for switch 2.
      iii. Get the attributes and put the values for switch 2 action address for switch 1, switch 2 action address for switch 2, end address for switch 2 and timers for switch 2.
      iv. Set update flag for switch 2.
   q. If end location action address for switch 1 is equal zero then take no action.
   r. If end location action address for switch 1 is not equal zero then:
      i. Start address for switch 1 = end location action address for switch 1.
      ii. Current address for switch 1 = end location action address for switch 1.
      iii. Get the attributes and put the values for switch 1 action address for switch 1, switch 1 action address for switch 2, end address for switch 1 and timers for switch 1.
      iv. Set update flag for switch 1.

Step 6E: If the switch 1 is released: Transmit B1H to host if flag is enabled.

Step 6F: If the switch 2 is released: Transmit B2H to host if flag is enabled.

Step 6G: If update flag for switch 1 is set then:

1. Clear the switch 1 update flag.
2. Transmit FDH and current address for switch 1 to host if flag is enabled.
3. Send the picture from microSD to OLED module 1 according to current address for switch 1.

Step 6H: If update flag for switch 2 is set then:

1. Clear the switch 2 update flag.
2. Transmit FEH and current address for switch 2 to host if flag is enabled.

Send the picture from microSD to OLED module 2 according to current address for switch 2.

Step 6I: Checks the host communication buffer for data. If there is data, process them. (For detail see **Communication Protocol**)

Step 6J: Go to step **6A**.

5. Communication Protocol

The controller communicates with the host by serial communication via RS232 (57.6K, 1 start bit, 8 bit, 1 stop bit). The controller receives the data via an interrupt routine that places the data on the circular receive buffer. If there is a communication problem between microcontroller and the microSD flash, the controller will transmit 6FH to host for each communication failure. When the controller detects data in the circular receive buffer, at Step 6I, it reads one byte and executes the following:

A. If the byte is a command, the controller transmits a 61H and executes the subroutine for the command and upon completion of command the controller transmits 79H. All of the commands are explained in detail in this section.
B. If the byte is not a command, it is ignored.

When the controller executes a subroutine and expects additional information:

A. A timer is set. If the expected data byte is not received in 64ms, the controller transmits 6CH 6EH and terminates the routine.
B. If the byte value is not acceptable (invalid range, option, etc.), the controller transmits 6EH and terminates the routine.

Commands are one byte in the range of 20H to 2FH and 01H and are transmitted in hex format. The proper format for all command options and data is specified for each command.

Commands to the controller

Command to reboot the controller

The command reboots the controller to power-up state.

command format: **24H**
transmit format: (xxH)

Command to check communication

The command is used to check if the controller is on-line.

command format: **01H**
transmit format: (xxH)

The controller transmits back 61H to the host.

Command to download setup data

The command downloads an attribute block to the EEPROM location.

command format:	**2AH**	[00H]	[00H]	[55H]	[flag]	[address1]	[address2]	[reserved]
transmit format:	(xxH)	(xxAH)	(xxAH)	(xxAH)	(xxAH)	(xxAH)	(xxAH)	(xxAH)

[flag] is one byte sent in ASCII HEX format. (Detail below)
[address 1] is two bytes with value of 0001H to FFFFH sent in ASCII HEX format. This is the address for the image that switch 1 displays upon power up/reboot.
[address 2] is two bytes with value of 0001H to FFFFH sent in ASCII HEX format. This is the address for the image that switch 2 displays upon power up/reboot.
[reserved] is two bytes sent in ASCII HEX format. This is for future use. Customer could use the last byte for storing the data version.

This set up data can be read using the attribute upload command.

The controller disables the timers and switch execution upon receiving this command. However, the switches are still scanned and reported. They are enabled upon reboot/power up or by command from host.

Flag Byte Default value=80H

Bit	Enable Value	Flag	Controller action when flag is set
B0	0	Buzzer	Beeper sound for switch press
B1	0	61H flag	61H is transmitted in response to command.
B2	0	79H flag	79H is transmitted upon completion of command.
B3	0	Switch release report flag	Switch release are reported
B4	0	6EH flag	6CH/6EH is transmitted if there is any error during communication to host.
B5	0	Timers expire report flag	Timers expiration are reported
B6	0	Switch press report flag	Switch presses are reported
B7	0	Address change report flag	Newest address is reported for each switch

Example: **2A30303030 3535 3830 30303031 30303146 30303030** sets all the flags on, points left switch to address 0001H and right switch to address 001FH. The flag takes affect when the controller is reset.

Command to download an image

This command downloads an image from the host to the EEPROM location.

command format:	**28H**	[address]	[image]
transmit format:	(xxH)	(xxAH)	(xxAH)

[address] is two bytes with value of 0001H to FFFFH sent as ASCII HEX format.
[image] is 6144 bytes transmit in ASCII HEX format.

The controller disables the timers and switch execution upon receiving this command. However, the switches are still scanned and reported. They are enabled upon reboot/power up or by command from host.

Command to upload an image

This command uploads an image from the microSD location to the host.

command format: **29H** [address]
transmit format: (xxH) (xxAH)

[address] is two bytes with value of 0001H to FFFFH sent as ASCII HEX format.

The controller transmits back the image (6144 bytes) in HEX format.

The controller disables the timers and switch execution upon receiving this command. However, the switches are still scanned and reported. They are enabled upon reboot/power up or by command from host.

Command to download attribute block

This command downloads an attribute block from the host to the EEPROM location.

command format: **2AH** [address] [attribute block]
transmit format: (xxH) (xxAH) (xxAH)

[address] is two bytes with value of 0001H to FFFFH sent as ASCII HEX format.
[attribute block] is eight bytes transmit in ASCII HEX format.

The address and attribute block are saved at this address. When the controller reads the attribute block it compares the requested address to the saved address and if they do not match controller knows that the attribute block is not programmed and ignores it.
The controller disables the timers and switch execution upon receiving this command. However, the switches are still scanned and reported. They are enabled upon reboot/power up or by command from host.

Command to upload an attribute block

This command uploads an attribute block from the EEPROM location to the host.

command format: **2BH** [address]
transmit format: (xxH) (xxAH)

[address] is two bytes with value of 0001H to FFFFH sent as ASCII HEX format.

The controller transmits back the saved address and [Attribute block] in hex format.

The controller disables the timers and switch execution upon receiving this command. However, the switches are still scanned and reported. They are enabled upon reboot/power up or by command from host.

Command to display image on left switch at the requested address

This command displays an image on left switch at the requested address.

command format:	**2EH**	31H	[address]
transmit format:	(xxH)	(xxH)	(xxAH)

[address] is two bytes with value of 0001H to FFFFH sent as ASCII HEX format.

Example: 2E 31 30303445 displays the image stored at address 004EH.

Command to display image on right switch at the requested address

This command displays an image on left switch at the requested address.

command format:	**2EH**	32H	[address]
transmit format:	(xxH)	(xxH)	(xxAH)

[address] is two bytes with value of 0001H to FFFFH sent as ASCII HEX format.

Example: 2E 32 30313034 displays the image stored at address 0104H.

Command to increment address on left switch

This command displays an image on left switch at the address+1.

command format:	**2EH**	33H
transmit format:	(xxH)	(xxH)

Example: Start at address 00A1H. Send 2E 33 and the left switch displays the image stored at address 00A2H. Send 2E 33 again and the left switch displays the image stored at address 00A3H.

Command to increment address on right switch

This command displays an image on right switch at the address+1.

command format:	**2EH**	34H
transmit format:	(xxH)	(xxH)

Example: Start at address 0F09H. Send 2E 34 and the right switch displays the image stored at address 0F0AH. Send 2E 34 again and the right switch displays the image stored at address 0F0BH.

Command to decrement address on left switch

This command displays an image on left switch at the address-1.

command format:	**2EH**	35H
transmit format:	(xxH)	(xxH)

Example: Start at address 1004H. Send 2E 35 and the left switch displays the image stored at address 1003H. Send 2E 35 again and the left switch displays the image stored at address 1002H.

Command to decrement address on right switch

This command displays an image on right switch at the address-1.

command format:	**2EH**	36H
transmit format:	(xxH)	(xxH)

Example: Start at address 2345H. Send 2E 36 and the right switch displays the image stored at address 2344H. Send 2E 36 again and the right switch displays the image stored at address 2343H.

Command to query controller for mode, controller, and firmware version

This command queries the controller for the mode as set by the Mode Select Switch, the controller name, and the firmware version installed.

command format:	**26H**	52H	58H
transmit format:	(xxH)	(xxH)	(xxH)

Example: The command is sent. The controller responds with the following:

61	34	43 4C 30 31	12	79
61H	[mode]	[Controller name]	[version]	79H

[mode] one byte. 33H indicating OLED module mode or 34H indicating OLED display mode.
[Controller name] 4 bytes. 43H 4CH 30H 31H (CL01)
[version] one byte. 12H (version 1.2)

Command to query controller for firmware version

This command queries the controller for the firmware version installed.

command format:	**26H**	15H
transmit format:	(xxH)	(xxH)

Example: The command is sent. The controller responds with the following:

61	12
61H	[version]

[version] one byte. 12H (version 1.2)
Note: version 1.2 does not send 79H. It will be corrected in the next version.

Command for temporarily setting the timers

This command sets both the left and right switch timers.

command format:	**26H**	51H	55H	[left timer]	[right timer]
transmit format:	(xxH)	(xxH)	(xxH)	(xxH)	(xxH)

[left timer] timer for left switch. Two bytes send in HEX format.
[right timer] timer for right switch. Two bytes send in HEX format.
The command sets the timers with the given values and activates them. If either switch is pressed or the timers expire the values are lost. These values are over written by the values stored on the microSD flash in the current address.
This command is useful for determining the best values for animations or movies.

Command to disable the timers and switch execution

This command disables the timers and switch execution.

command format:	**26H**	51H	5AH
transmit format:	(xxH)	(xxH)	(xxH)

The controller disables the timers and switch execution upon receiving this command. However, the switches are still scanned and reported. They are enabled upon reboot/power up or by command from host.

Command to enable the timers and switch execution

This command enables the timers and switch execution.

command format:	**26H**	51H	65H
transmit format:	(xxH)	(xxH)	(xxH)

The controller enables the timers and switch execution upon receiving this command.

Command to turn the switch display off

This command turns off the OLED module display.

command format:	**26H**	51H	69H
transmit format:	(xxH)	(xxH)	(xxH)

Command to turn the switch display on

This command turns on the OLED module display.

command format:	**26H**	51H	66H
transmit format:	(xxH)	(xxH)	(xxH)

Command to dim switch display

This command dims the OLED module display.

command format:	**26H**	51H	71H
transmit format:	(xxH)	(xxH)	(xxH)

Command to turn the OLED voltage off

This command turns off the 16V supply to the OLED module.

command format:	**26H**	51H	74H
transmit format:	(xxH)	(xxH)	(xxH)

Command to turn the OLED voltage on

This command turns on the 16V supply to the OLED module.

command format:	**26H**	51H	75H
transmit format:	(xxH)	(xxH)	(xxH)

Note: This command should only be used when the OLED displays are in the off mode.

Commands to download information directly to OLED modules

Note: Care must be taken using these commands. The OLED modules could get damaged if they are initialized with a value exceeding the specifications. Please check the OLED modules data sheet and application notes before using commands.

Command to download data directly to OLED modules

This command downloads data directly from the host to the OLED module.

command format:	**2FH**	53H	[number]	[data]
transmit format:	(xxH)	(xxH)	(xxAH)	(xxAH)

[number] is one byte sent in ASCII HEX format (01H to 80H). This is the number of data bytes (1 to 128 bytes).
[data] is 1 to 128 bytes sent in ASCII HEX format.

The controller sends the [data] to both OLED modules as data.

Command to download a command directly to OLED modules

This command downloads a command from the host to the OLED module.

command format:	**2FH**	47H	[number]	[data]
transmit format:	(xxH)	(xxH)	(xxAH)	(xxAH)

[number] is one byte sent in ASCII HEX format (01H to 80H). This is the number of data bytes (1 to 128 bytes).
[data] is 1 to 128 bytes sent in ASCII HEX format.

The controller sends the [data] to both OLED modules as a command.

Command to download a command directly to OLED modules (special)

This command turns off the OLED module, downloads a command from the host to the OLED module, and turns it back on.

command format:	**2FH**	49H	[number]	[data]
transmit format:	(xxH)	(xxH)	(xxAH)	(xxAH)

[number] is one byte sent in ASCII HEX format (01H to 80H). This is the number of data bytes (1 to 128 bytes).
[data] is 1 to 128 bytes sent in ASCII HEX format.

The controller turns off the OLED display switches, sends the [data] to both switches as a command and then turns on the OLED display switches.

6. Hardware

Controls Overview



The **Mode Select Switch** has two settings; "Switch" is for the OLED (64x48) switches and "Display" is for the OLED (52x36) displays.
The **Connector** is for the installation of the Logic Boards onto the controller. One pin is keyed to reduce miss mates.

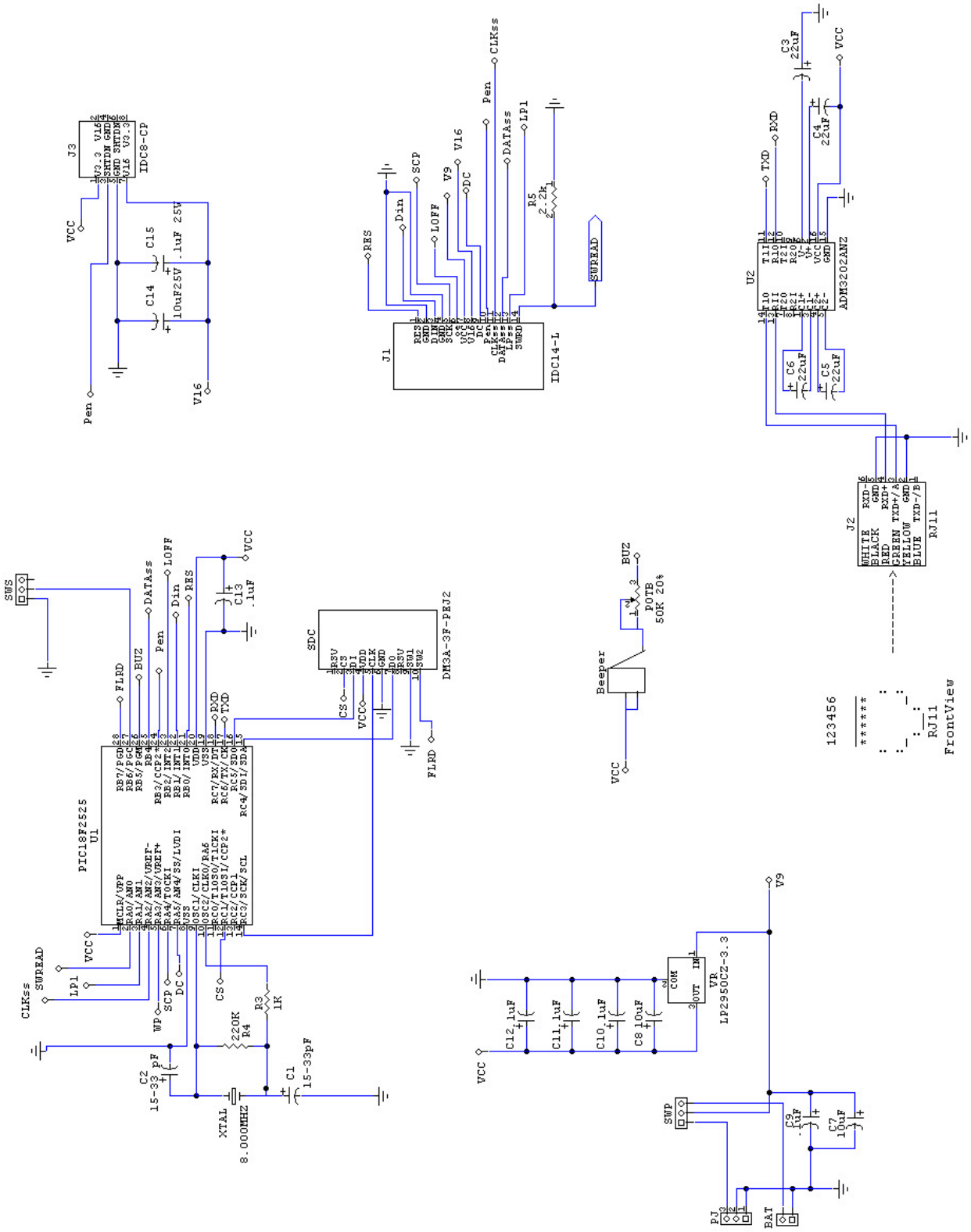
Note: Improper installation of the Logic Boards could damage either/both the Logic Board and controller.

The **Batt/PWR switch** has three positions: battery, off, line power.
Buzzer Volume adjusts the volume of the buzzer that activates when a button is pushed.
The **9V DC Power** jack mates with a 2.5mm cylinder power connector. Center positive.
The **RS232 Connector** links the controller to the host.

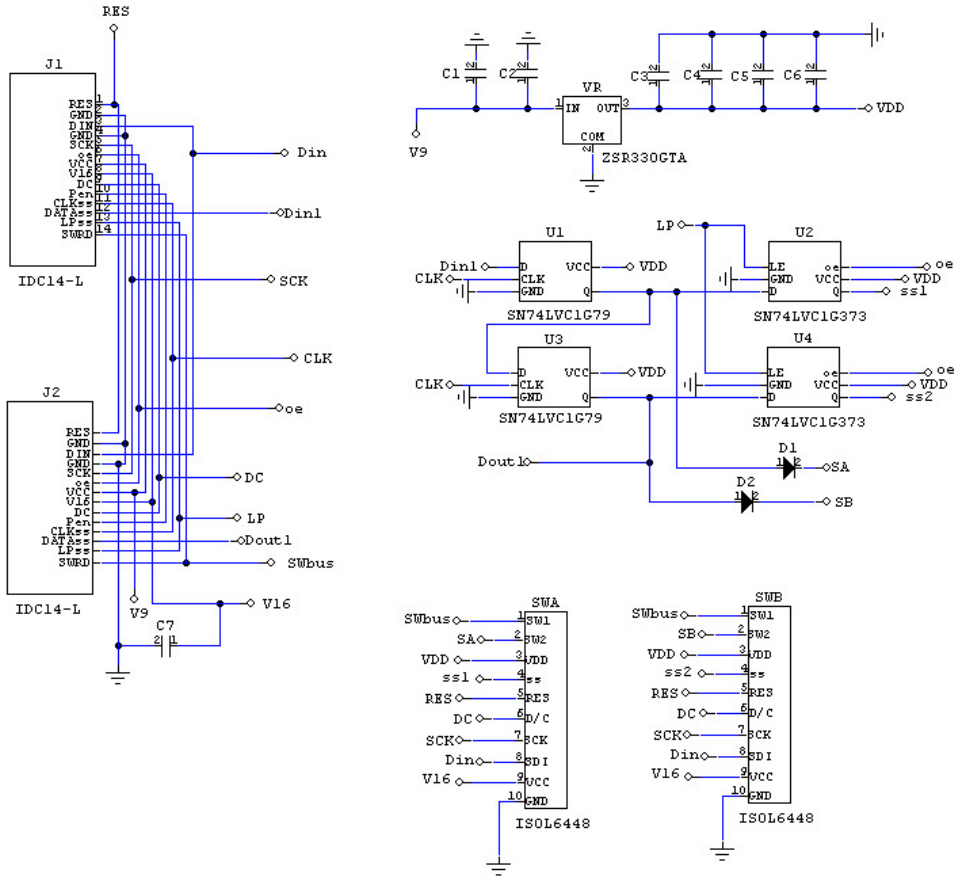
	1	2	3	4	5	6
RS232		GND	TX	RX	GND	

Note: To turn off the controller, press both switches at the same time until the switches are off then turn off the Batt/PWR switch. This step must be followed to comply with OLED power off requirement.

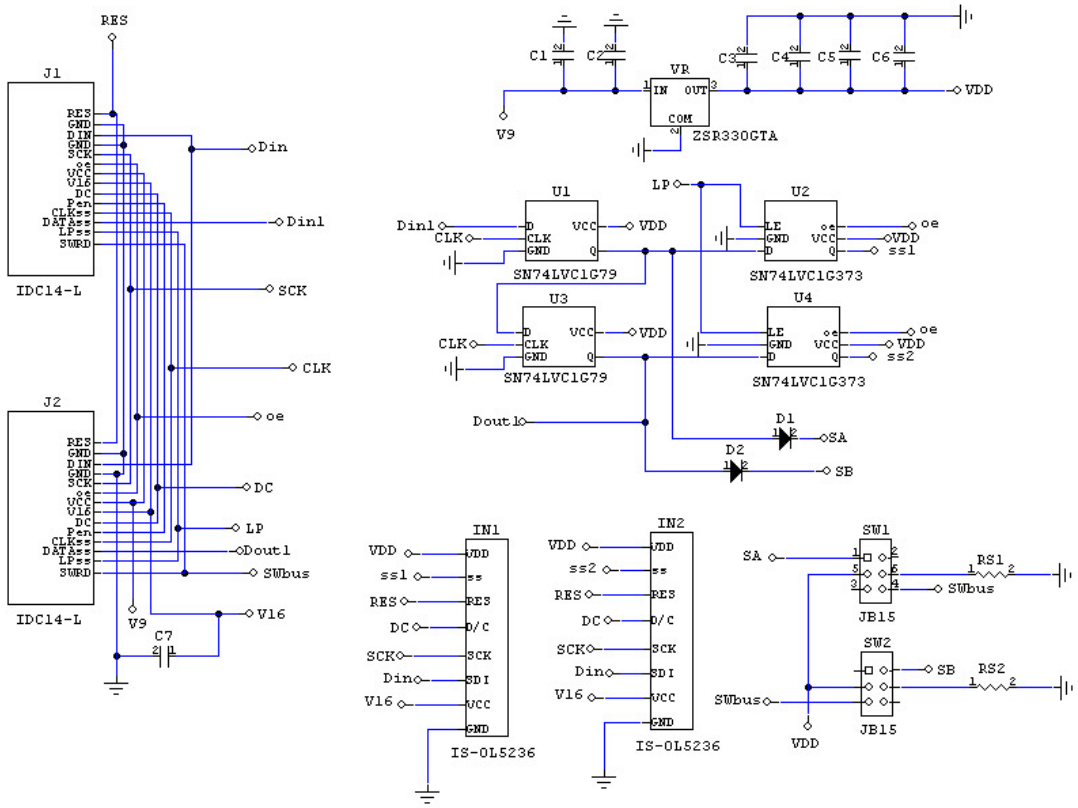
Controller Schematic



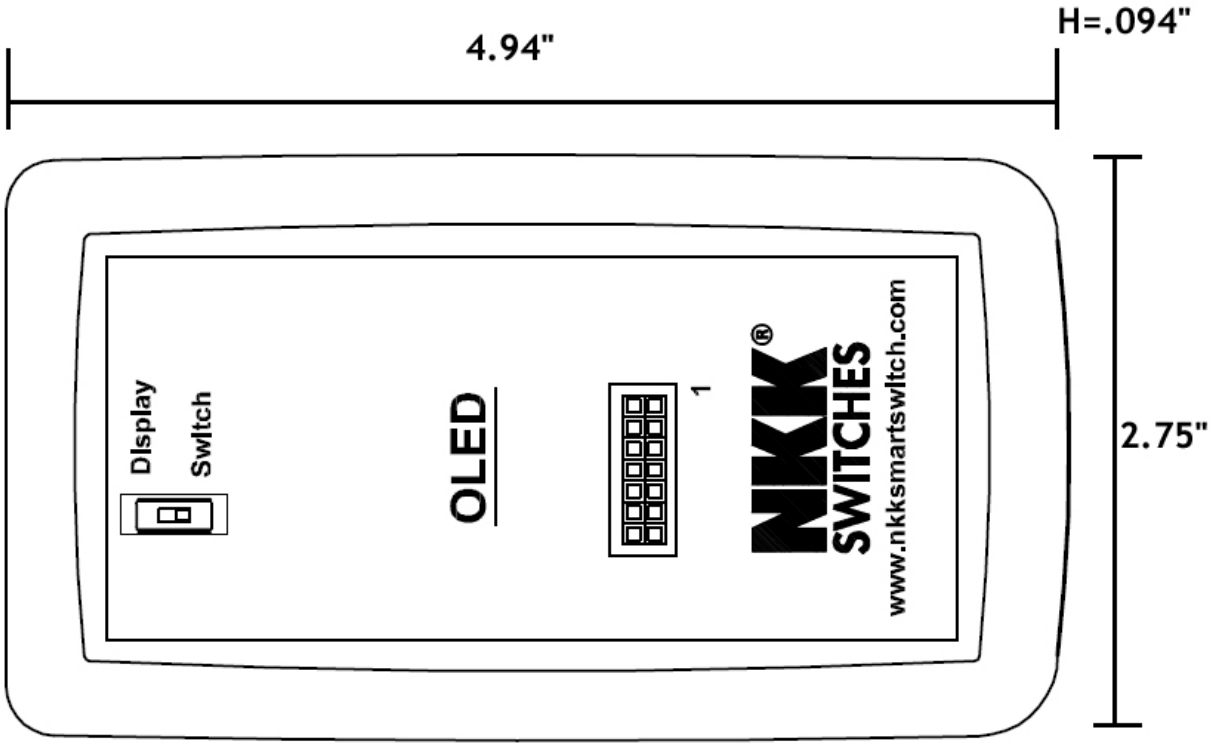
Two OLED SmartSwitch logic board



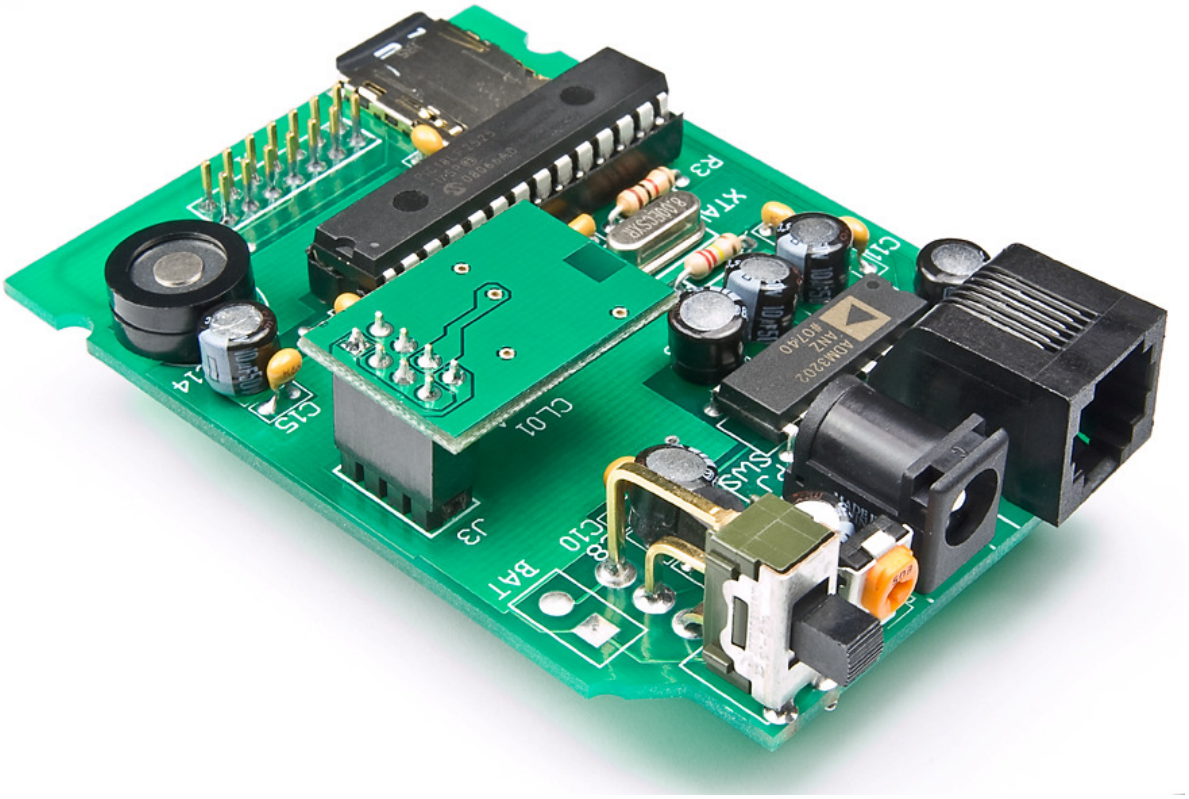
Two OLED SmartDisplay logic board



Container size



Board photo



7. Key Terms & Definitions

OLED module — NKK Switches' OLED SmartSwitches and SmartDisplays.

Host — Any computer, terminal, or other device that can communicate over the RS232 line.

Byte — An eight bit hex value ranging from 00H to FFH (Decimal 0 to 255). The bit format of a byte is: (B7 B6 B5 B4 B3 B2 B1 B0) where B7 is most significant and bit B0 is least significant bit.

Nibble/Hex digit — A four bit value ranging from 0H to FH. A byte consists of two nibbles.

ASCII — A byte value representing a symbol.

Communication Format — There are two formats to transmit a byte:

1. **Hex format** - A hex byte is transmitted without any change to it. [**xxH**] will be used to denote this.

   All commands and some data are sent by using this format.

2. **ASCII HEX format** - Each nibble of the byte is converted to ASCII code and sent as a byte. [**xxAH**] will be used to denote this.

   For example, the hex byte 5AH is transmitted in two bytes, **35H** and **41H**. The ASCII value for **5** is **35H** and the ASCII value for **A** is **41H**.

   All addresses and most data are sent using this format.

Address — A two byte value ranging from 0001H to FFFFH representing the 65536 memory locations for pictures and attributes on microSD flash.

8. Firmware issues

The problems found in the most current version are listed below and get resolved in the following version.

Version V1.4 — No firmware issues at this time.

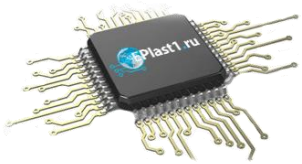
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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