

# AXE133Y SERIAL OLED

AXE132	Serial Driver Kit	(no display supplied)
AXE133Y	Serial OLED Kit	(16x2 yellow on black OLED display)
AXE133	Serial LCD Kit	(16x2 budget grey LCD display)
AXE134Y	Serial OLED Kit	(20x4 yellow on black OLED display)

## Introduction:

The serial OLED/LCD module allows PICAXE microcontroller projects to visually display user instructions or sensor readings. All commands are transmitted serially via a single microcontroller pin using the `serout` command. e.g. to print the text 'Hello' the command is simply:

```
serout B.7,N2400,("Hello")
```

## Key Features:

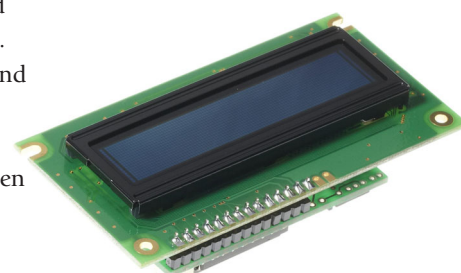
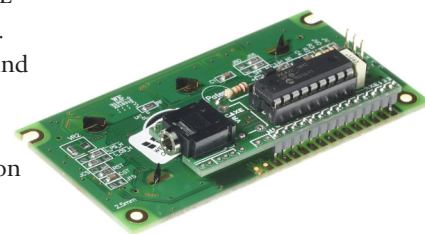
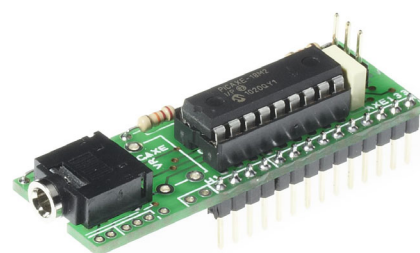
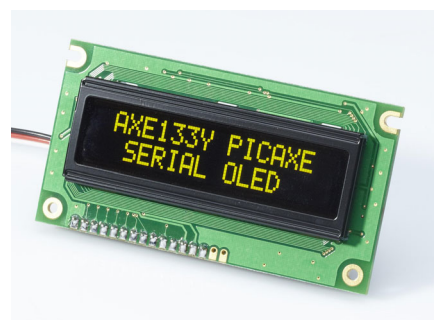
1. 16x2 or 20x4 OLED or LCD Alphanumeric Display
2. Simple serial connection to PICAXE microcontroller (baud 2400,N,8,1).
3. Open source firmware based upon a PICAXE-18M2 microcontroller, with option to re-program and store up to 16 pre-defined messages.

## Kit Contents:

PCB	1	AXE133 PCB
Display	1	16x2 OLED or 16x2 LCD or 20x4 OLED
IC1	1	PICAXE-18M2 preprogrammed with AXE133 firmware
IC1	1	18 pin IC socket
R1	1	22k resistor (red red orange gold)
R2,3	2	10k resistor (brown black red gold)
C1	1	100nF capacitor
CON1	1	3.5mm download socket
H1,2	2	10 pin header (snap to length as required)
VR1	1	10k preset (not required for OLED kits - LCD Contrast)

## Kit Assembly:

1. Solder the 2x10k and 1x22k resistors onto the PCB (values are marked on the PCB).
2. Solder the capacitor C1 and 18 pin IC socket IC1 into position. Insert the PICAXE-18M2 microcontroller into the socket, ensuring pin 1 is furthest from the capacitor.
3. 'Click' the 3.5mm socket into position CON1, ensure it is lying flat on the PCB and then solder into position. The two 'pairs' of pins are connected, so do not worry about solder bridges on those two pairs of joints.
4. *LCD kits only (not required for OLED kits)* - Solder the 10k preset resistor in position VR1. This is used to adjust the contrast of the LCD display.
5. Snap one ten way header into a 4 way and 3 way section. Solder the 3 pin section on the top of the PCB in position H2.
8. **NOTE HEADER HI IS FITTED UNDERNEATH THE BOARD.** Use the 10 way and 4 way headers to create the OLED/LCD header H1. Note this connector is soldered underneath the board (so that the solder joints are on the top side of the board).
9. Double check all solder joints on the PCB to ensure they are correctly soldered and trimmed short. It is not possible to adjust them once the OLED/LCD has been fitted, so carefully check then now.
10. Place the OLED/LCD display onto header H1, maintaining a few mm gap between the solder joints and the back of the LCD. Solder one header pin in place, adjust clearance as required by reheating this pin, then solder all the other pins.



For the full datasheet please see: [www.picaxe.com/docs/axe133.pdf](http://www.picaxe.com/docs/axe133.pdf)

## Input / Output / Power Connections

### Main Header H2 (IN, V+,0V)

The main header provides connection for the power supply (4.5V or 5V DC on V+). The pin marked IN connects directly to the controlling PICAXE output pin. Do not connect via a Darlington driver buffered output on a project board - always connect directly to the PICAXE pin. This H2 header has been designed to be compatible with the popular 'servo extension lead' cables.

### Secondary Header H3

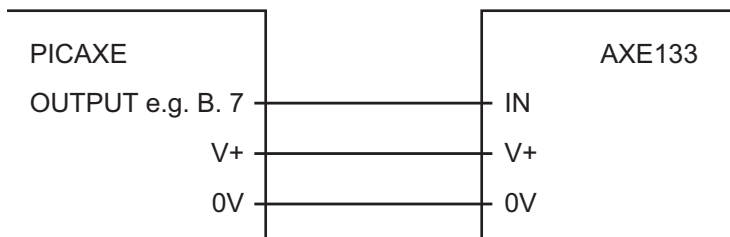
This header provides connection points to the unused i/o pins (C.0, C.1, C.2) and power. These may be used as general purpose outputs, or any other purpose by reprogramming the AXE133 firmware. in the PICAXE-18M2 chip.

### 3.5mm PICAXE Programming Connector CON1

This PICAXE programming connector allows the PICAXE-18M2 to be reprogrammed (e.g. to update the AXE133 firmware) . The default AXE133 program is available via the PICAXE website at: [www.picaxe.com/products/AXE133](http://www.picaxe.com/products/AXE133)

## Connecting the Serial OLED/LCD to a PICAXE Microcontroller

The following diagram shows how to connect the Serial OLED/LCD module to the PICAXE system via header H2. Connect directly to the PICAXE output pin.



### PICAXE Test program

```

init: pause 500                ; wait for display to initialise
main: serout B.7,N2400,(254,128) ; move to start of first line
      serout B.7,N2400,("Hello!123") ; output text
      end
  
```

### Displaying Messages

The LCD can display characters and pre-defined messages, and can also accept certain control commands (e.g. clear display or move cursor to new position). Note that the serial LCD module takes approx half a second to initialise and so any data sent during this period will be lost. It is advisable to put a 'pause 500' command at the start of any program to ensure no data is lost when the system is powered up.

## Characters

Characters are normal symbols that can be displayed on the OLED/LCD screen. See Appendix 1 for a table of the common ASCII characters (values 0-252).

```
serout B.7,N2400,("Hello!123") ; output text
```

Characters (0-252) can be described via two methods in the serout command – either by using the ASCII number directly or the character enclosed in speech marks e.g. (65) and ("A") both output the same symbol.

Note that the numbers 253, 254 and 255 are used for special purposes:

253	Message	Next byte is a predefined message (0-15)
254	Control	Next byte is a control command
255	Output	Next byte controls outputs C.0, C.1, C.2

## Message Commands (253)

Predefined messages are all prefixed by the number 253. There are up to 16 (0-15) predefined messages, all stored within the AXE133 firmware program. To reprogram the messages simply reprogram the PICAXE-18M2 chip.

```
serout B.7,N2400,(254,128) ; move to start of first line
serout B.7,N2400,(253,1) ; display predefined message 1
pause 10 ; allow message to update
```

## Control Commands (254)

Control commands are all prefixed by the number 254. They are used to send commands to the Serial LCD Module (e.g. move to line 2, switch cursor off etc.).

```
serout B.7,N2400,(254,192) ; move to start of second line
```

The most common control commands are

254,1	Clear Display (must be followed by a 'pause 30' command)
254,8	Hide Display
254,12	Restore Display
254,14	Turn on Cursor
254,16	Move Cursor Left
254,20	Move Cursor Right
254,128	Move to line 1, position 1
254, y	Move to line 1, position x (where y = 128 + x)
254,192	Move to line 2, position 1
254, y	Move to line 2, position x (where y = 192 + x)

For a table of all available command codes please see the control command table in the OLED/LCD datasheet e.g. [www.picaxe.com/docs/led008.pdf](http://www.picaxe.com/docs/led008.pdf)

## Output Command (255)

Outputs C.2, C.1 and C.0 are all controlled by the lower 3 bits of an output byte, which is prefixed by the number 255.

```
serout B.7,N2400,(255,%00000111) ; all outputs on
pause 1000
serout B.7,N2400,(255,%00000000) ; all outputs off
```

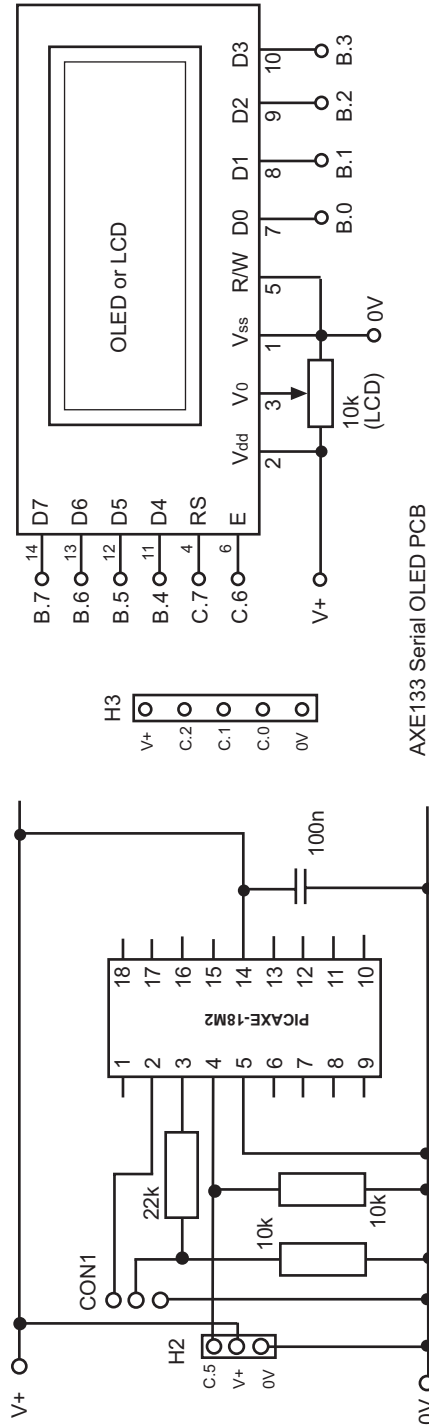
Appendix A - OLED Character Table

WS0010

WESTERN EUROPEAN CHARACTER FONT TABLE I (FT[1:0]=01)

Upper 4bit Lower 4bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL	CG RAM (1)			0	1	2	3	4	5	6	7	8	9	A	B	C
LLLH	CG RAM (2)		!	2	3	4	5	6	7	8	9	A	B	C	D	E
LLHL	CG RAM (3)		"	2	3	4	5	6	7	8	9	A	B	C	D	E
LLHH	CG RAM (4)		#	3	4	5	6	7	8	9	A	B	C	D	E	F
LHLL	CG RAM (5)		\$	4	5	6	7	8	9	A	B	C	D	E	F	G
LHLH	CG RAM (6)		%	5	6	7	8	9	A	B	C	D	E	F	G	H
LHHL	CG RAM (7)		&	6	7	8	9	A	B	C	D	E	F	G	H	I
LHHH	CG RAM (8)		'	7	8	9	A	B	C	D	E	F	G	H	I	J
HLLL	CG RAM (1)		(	8	9	A	B	C	D	E	F	G	H	I	J	K
HLLH	CG RAM (2)		)	9	A	B	C	D	E	F	G	H	I	J	K	L
HLHL	CG RAM (3)		*	A	B	C	D	E	F	G	H	I	J	K	L	M
HLHH	CG RAM (4)		+	B	C	D	E	F	G	H	I	J	K	L	M	N
HHLL	CG RAM (5)		,	C	D	E	F	G	H	I	J	K	L	M	N	O
HHLH	CG RAM (6)		-	D	E	F	G	H	I	J	K	L	M	N	O	P
HHHL	CG RAM (7)		.	E	F	G	H	I	J	K	L	M	N	O	P	Q
HHHH	CG RAM (8)		/	F	G	H	I	J	K	L	M	N	O	P	Q	R

Appendix B - Circuit Diagram



AXE133 Serial OLED PCB