

DATA SHEET

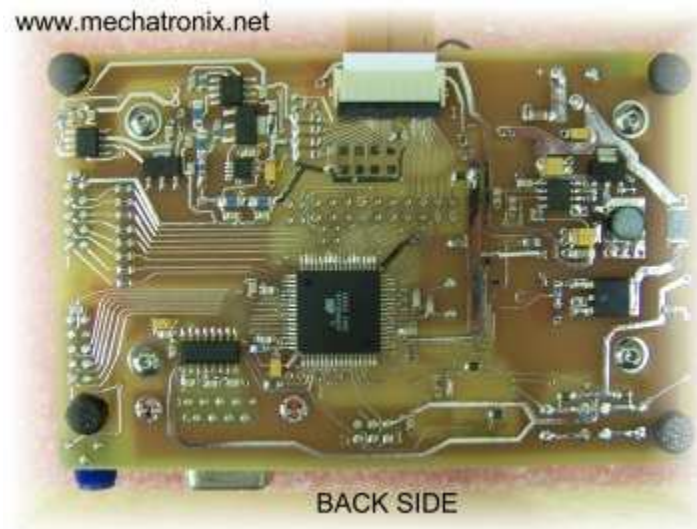


Microcontroller and Graphics LCD Demonstrator Board MX0306

Product Specification Rev A
Mechatronix, LLC
www.mechatronix.net

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Mechatronics, LLC
Microcontroller and Graphics LCD Demonstrator Board
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This project uses an Atmel ATMEGA128 as the microcontroller. It controls an Optrex 128X64 Graphics LCD display, F-51852GNFQJ-LB-ABN. Both Atmel and Optrex are registered trademarks.

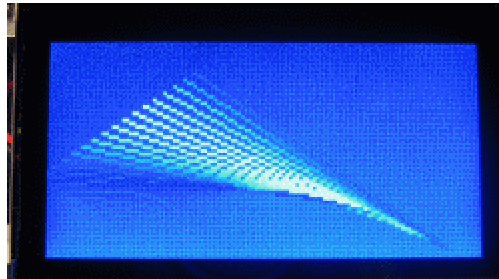
Demonstrator Board Feature List

1. Source code examples for LCD control are provided and written in C
2. An Optrex graphics LCD display with white segments and blue background is provided
3. RS232 interface with charge pump power supply included
4. DB9 connector type allows easy mating to other connectors that require flush mounting. NO jack screws protruding
5. Blue and White menu select switches with "tactile feel"
6. Red reset switch for easy identification
7. Regulated wall adapter included
8. PCB pads for optional breakout connector to allow direct connection to the cable of the LCD for monitoring or for driving the lcd signals. This breakout connector can be used for logic analyzer access.
9. Padout for LCD power supply components when using the LCD's internal power supply.
10. A potentiometer with a knob to drive a variable voltage into one of the A/D inputs on the microprocessor to allow for a user controlled analog control of contrast or control of a signal to be displayed on the LCD.
11. Pinout on two 10 pin I/O connectors for the microprocessor which are identical to Atmel's own eval kits
12. Extremely low profile back side of pcb made possible by use of low-height SMT components

13. Red LED connected to the microprocessor which is included for user indication of their own choice
14. User and microprocessor controllable LCD bias with microprocessor storage of LCD bias setting
15. Microprocessor controllable LED backlight which is hooked to a spare PWM output which would allow for custom BL intensity (pwm feature not implemented but available)
16. The ratioed LCD power supplies are provided external to the display to prevent contrast changes across the display when using the internal power supplies.
17. External crystal provided for the Atmel microprocessor in order to provide an accurate and stable time clock
18. The LCD is mounted to the pcb by four standoffs which allows for easy mechanical assembly to project boxes and to other circuit boards
19. A 2.1mm power jack is used which helps prevent the supply from being connected in reverse polarity
20. Has been tested with both Optrex models F-515X and F-518X graphic LCDs having different backlight colors.
21. PCB pads provided for both LCD X/7 and X/9 power divider options.
22. PCB can be configured for either parallel or serial control of the LCD.
23. Larger size easy to use rotary backlock LCD connector. Allows easy replacement of displays to try different models.
24. Controller is shipped with a CD that also includes key data sheets of electrical components on the Demonstrator board.
25. Optional 4 X 4 keypad available
26. Optional 5 way navigational switch including push to select

Screens available on the demonstrator board.

1. Dancing Lines (such as with screen savers)
2. 5X8 landscape font
3. 8X8 checkerboard squares
4. 4X4 checkerboard squares
5. 2X2 checkerboard squares
6. 1X1 (single pixel) checkerboard squares
7. 2 Orbiting pixels about a stationary pixel
8. Splash screen with company name and project description



Picture of the dancing lines as it moves on the display.

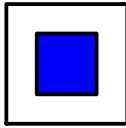
Description of software files available on the CD:

default<folder>
 dep<folder>
 OptrexAVR.o.d – compiler output file (Not readable)
 Makefile
 OptrexAVR.eep – compiler output file (Not readable)
 OptrexAVR.elf –
 OptrexAVR.hex – is the programming file to be loaded into the ATMEGA128 using AVR studio
 OptrexAVR.lss – compiler output file (Not readable)
 OptrexAVR.map – Memory mapping file
 OptrexAVR.o – compiler output file (Not readable)
 font.h – 5x8 font
 globals.h – global variable declarations, defines, and AVR includes
 graphics.c – high level graphic routines such as line_dance, orbit, etc.
 graphics.h – header file for graphics.c
 initialize.c – initialize AVR ports, timers, interrupts, ADC, etc.
 initialize.h – header file for initialize.c
 lcd.c – basic graphic routines used to write to the display
 lcd.h – header file for lcd.c
 OptrexAVR.aps – AVR Studio workspace
 OptrexAVR.c – top level code contains “main”

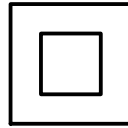
Controls available on the LCD demonstrator board

Tactile Switches and other I/O

These 2 toggle switches scroll through the 8 example screens.

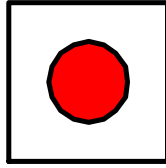


Toggle
Screens
Left



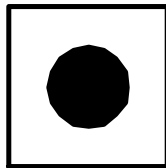
Toggle
Screens
Right

Reset switch for LCD and Atmel micro.



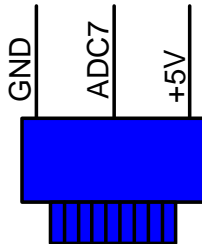
Reset

Contrast adjust switch for LCD. By pressing the switch multiple times, the negative LCD voltage continually decreases. The voltage will roll-over and start over again at a maximum value.

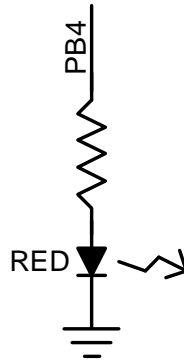


LCD
contrast
adjust

Potentiometer to Atmel A/D



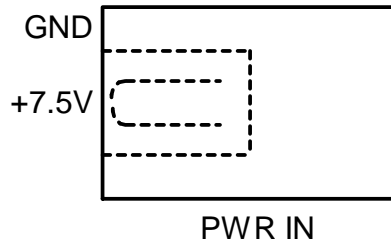
Atmel to red LED, user selectable use



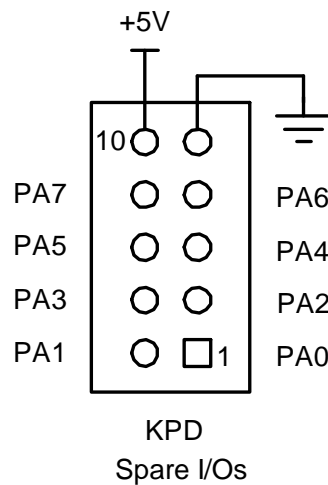
Pinout of connectors available on the demo board:

LCD side connectors:

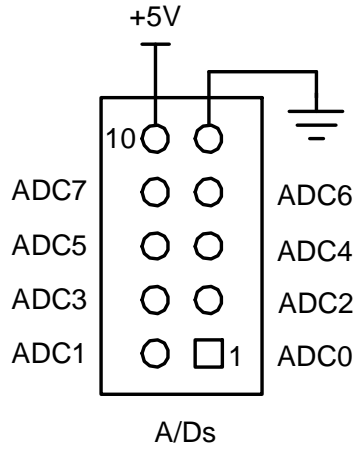
7.5VDC Power connector – 2.1mm



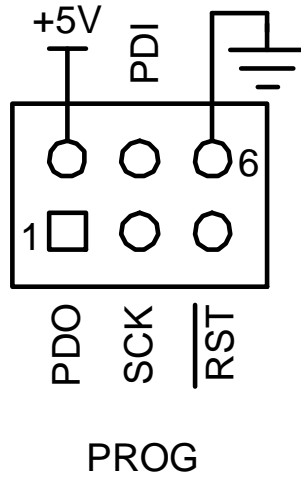
KPD (Keypad connector) – to Atmel – 10 pin



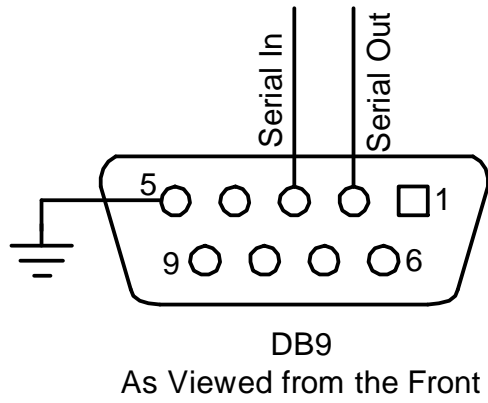
A/Ds (A/Ds connector) – to Atmel – 10 pin



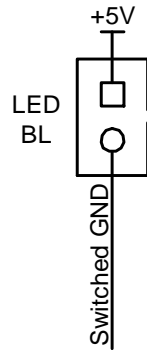
Programming connector – to Atmel – 6 pin



Serial port connector – DB9

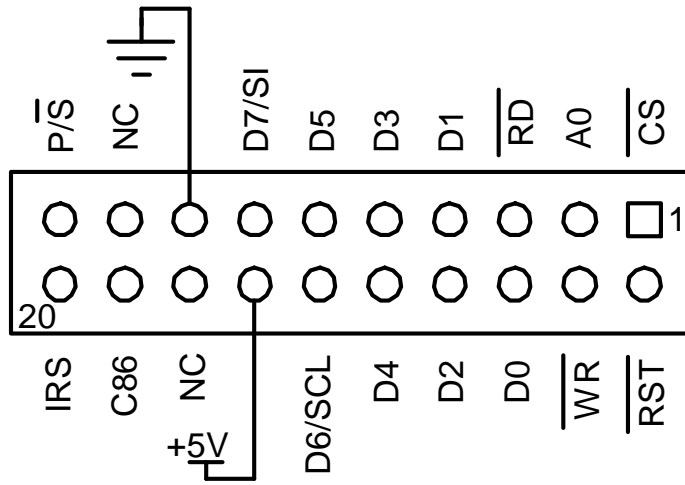


The LCD's LED BackLight Power connector



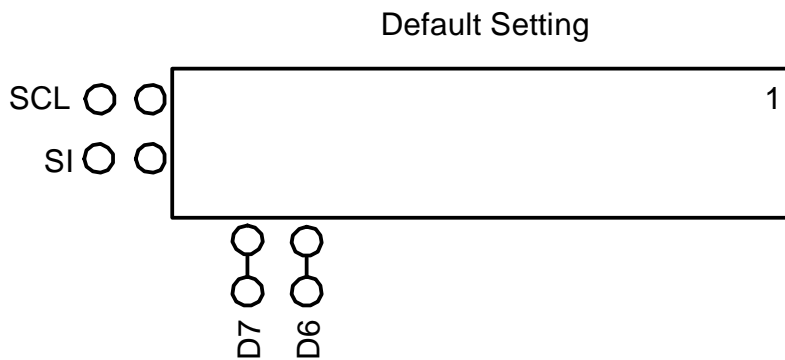
Component side connectors

LCD breakout connector – not populated



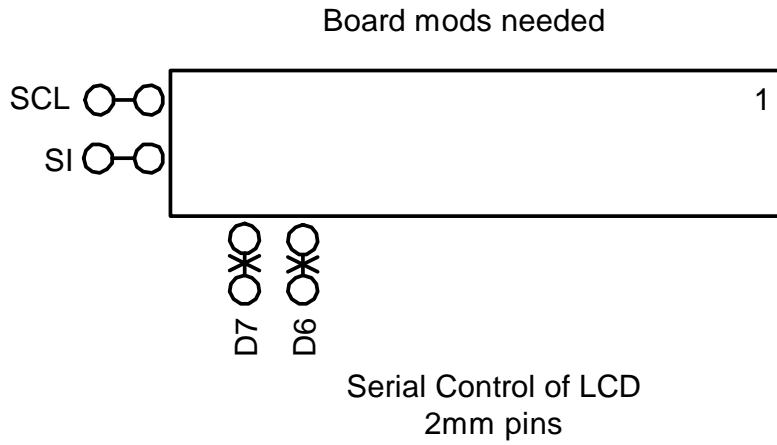
0.1" LCD Breakout Connector

2mm pads used for changing LCD control serial/parallel. Parallel control following. Parallel control is default setting.



Parallel Control of LCD
2mm pins

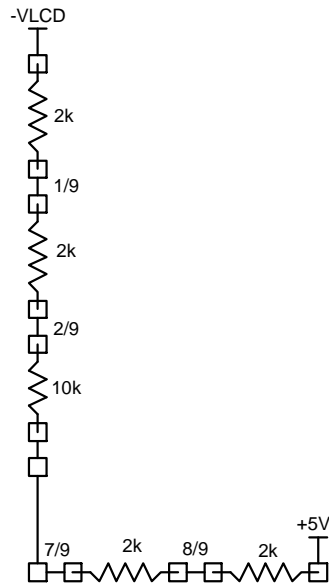
Setup for serial control of LCD following.



Alternate pc board setups.

Used for external control of LCD bias. The ratioed voltages are buffered and driven to LCD.

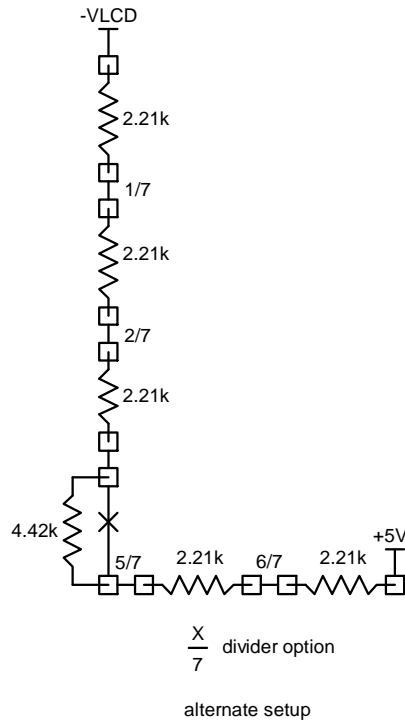
LCD bias - X/9 divider option



$\frac{X}{9}$ divider option

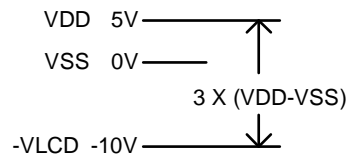
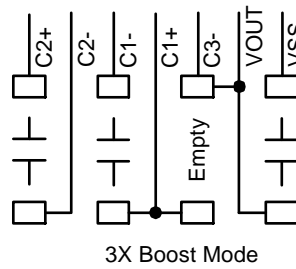
standard setup

LCD bias – X/7 divider option – board mod required



Internal boost converter (power supply) for LCD – 3X boost mode, all pads are empty as default.

SMD pads near LCD connector

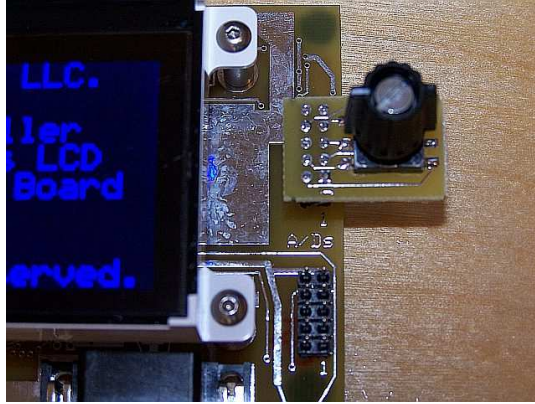


Complete Schematic
will be provided
with each
purchased system.

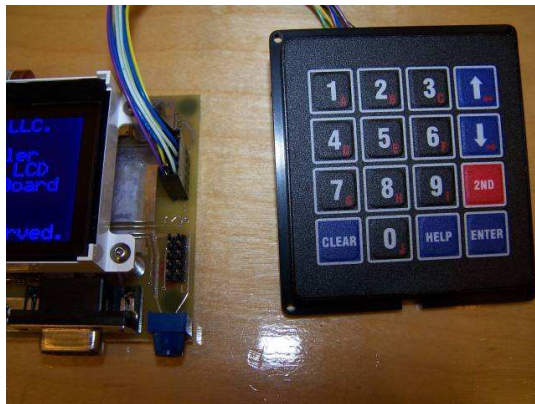
Accessories which may be added to the LCD controller

Both options plug into the keypad 10 pin connector

5 way switch with push to select:



4X4 keypad:



Please contact mechatronix.net if either of these options is desired.