BASIC MICRO

TECHNOLOGY AT WORK

B0262 - BasicATOM Lab Board
Data Sheet

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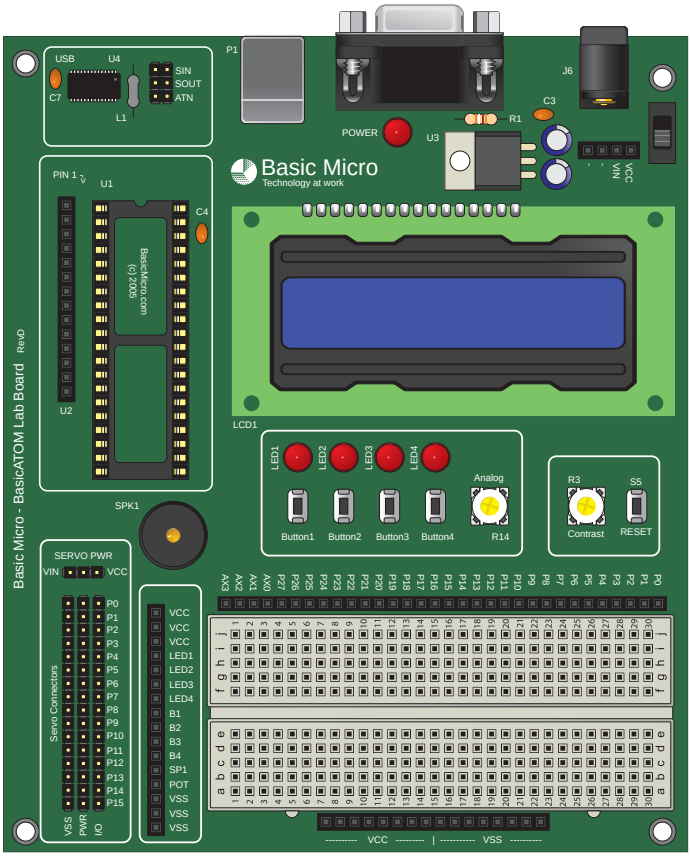
Feature Overview:

- Includes 16x2 LCD Display
- Solderless Prototyping Board
- 2.1mm Power Connector
- USB Connector Using FTDI
- All ATOM Module Compatible
- Basic Stamp Compatible
- Power Status LED
- 4 LED Indicator Lights
- 4 Tactile Switches
- 1 User Potentiometer
- Built-In Speaker
- 16 Servo or I/O Connectors



Basic Description

The BasicATOM Lab Board is designed to be a full experimentation center for BasicATOM, BasicATOM Pro or Basic Stamp modules. The 16x2 LCD allows users to easily integrate display technology with their BASIC code. The Lab Board includes a solderless breadboard area for the construction of auxiliary circuitry, as well as built-in tactile buttons, LED indicators, Potentiometer and a bank of headers capable of controlling up 16 servos.

USB and RS232

Programming the installed module can be done by using the on board USB connection or DB9 RS232 connector.

Compatible

The BasicATOM Lab Board is compatible with all BasicATOM, BasicATOM Pro and Basic Stamp 2 modules.

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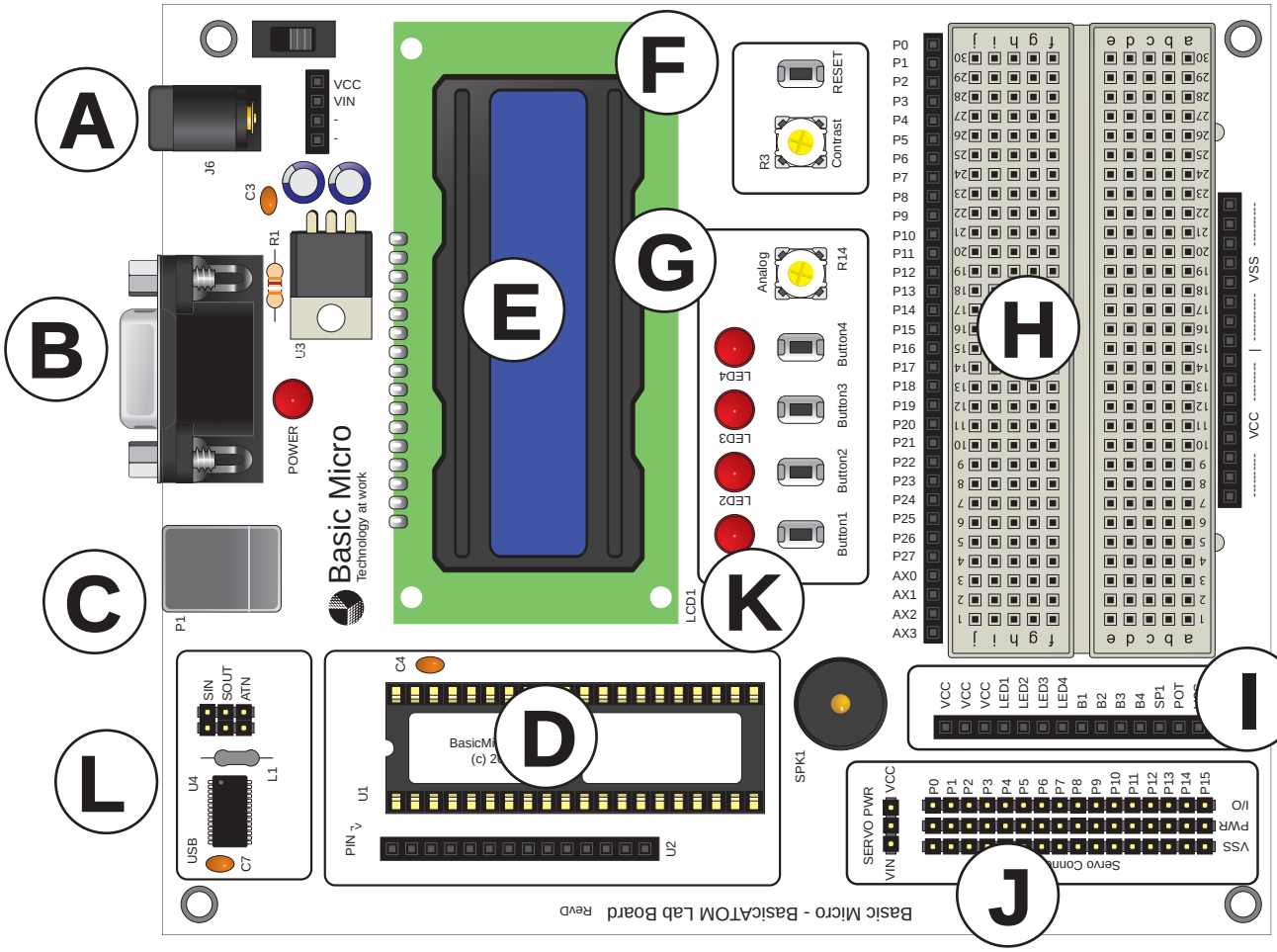
Hardware Overview:



A: 2.1mm Power Jack Center Positive, 6 to 9VDC
B: DB9 RS232 connector. RS232 and USB connected to module SIN and SOUT pins. (Remove jumpers at JP7 to use RS232 (DB9).
C: USB connector. (FTDI) USB chip. RS232 and USB connected to module SIN and SOUT pins.
D: 14, 24, 28, 40 Pin BasicATOM or BasicATOM Pro module socket.
E: 16x2 Character LCD display. HD44780 based.
F: LCD contrast control potentiometer and master RESET button for BasicATOM or BasicATOM Pro.
G: 4 LEDs, 4 Tactile Switches, 1 Potentiometer. User accessible though header shown in I.
H: Solderless Breadboard.
I: Peripherals header to access LED 1-4, Tactile Switches 1-4, Potentiometer and Piezo Speaker.
J: Servo or I/O male headers. Male headers can be connected directly to a Servo motor or used for GPIO (General Purpose I/O). **Note:** Power to headers can be set to regulated 5vdc or VIN by Servo Pwr header (VIN is direct power in from 2.1mm connector). Headers are connected to P0 - P15 from top of board to bottom.
K: Piezo speaker.
L: FTDI. JP7 jumpers can be removed to disconnect the FTDI from circuit. Or can be used to access the FTDI for your own configuration using jumper wires.

NOTE:
Remove jumpers at JP7 to use RS232 (DB9).

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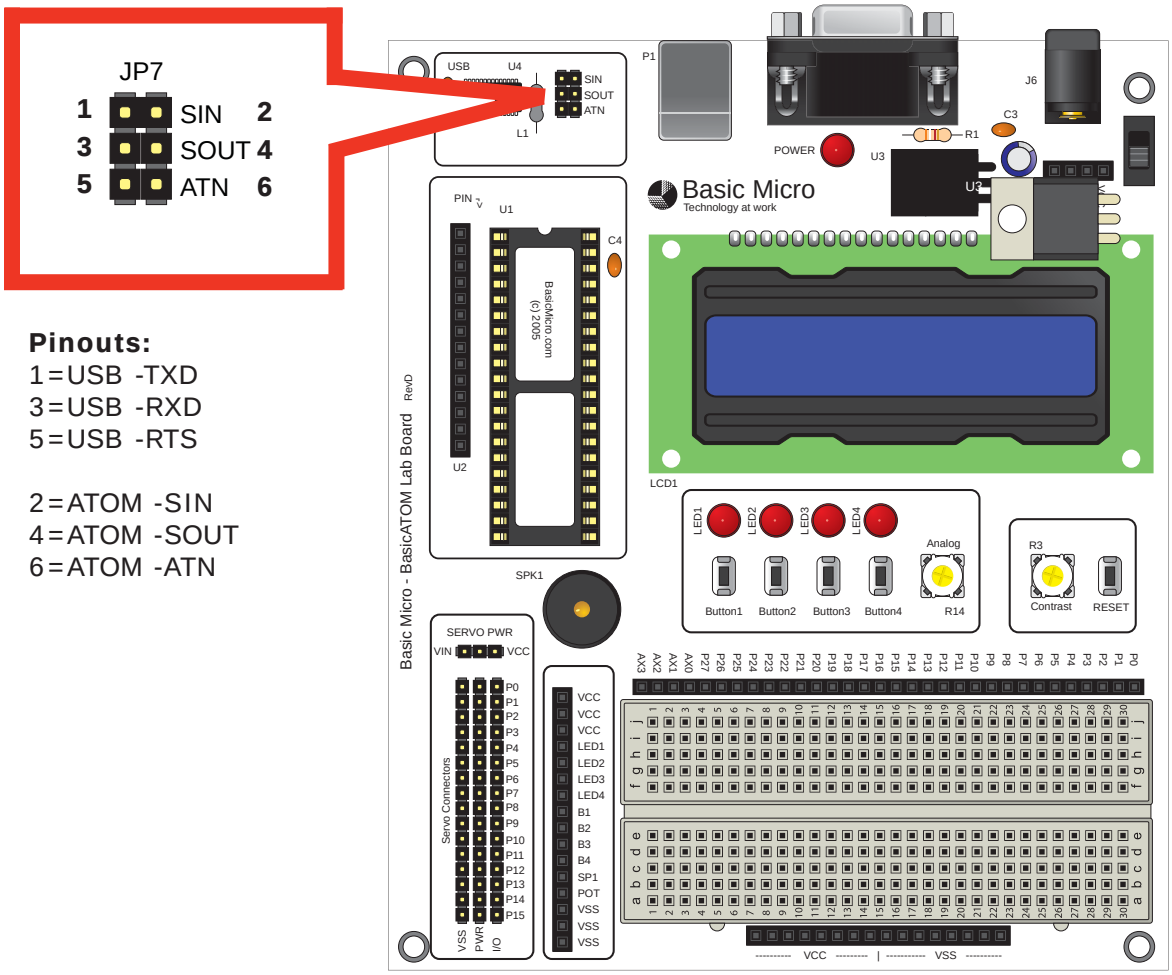
JP6 Jumpers

The jumpers on JP6 should be installed if using USB to program the ATOM module in the on board socket. To program the ATOM modules using RS232 (DB9) the JP7 jumpers should be removed. You must remove any cables connected to the DB9 connector when using USB to program the ATOM.



Pinouts:

1=USB -TXD
3=USB -RXD
5=USB -RTS

2=ATOM -SIN
4=ATOM -SOUT
6=ATOM -ATN

USB Access

The on board USB can be used in your circuit if using the RS232 (DB9) connector to program the ATOM module. TXD, RXD and RTS are available on JP7. Using male to female jumpers, which are included in most Basic Micro development kits JP7 USB side pins 1,3 and 5 can be jumpered to the solderless bread board area.

RS232

The on board RS232 (DB9) connector is hard wired to the ATOM modules SIN, SOUT and ATN pins. You must remove any cables connected to the DB9 connector when using the USB to program the ATOM module.

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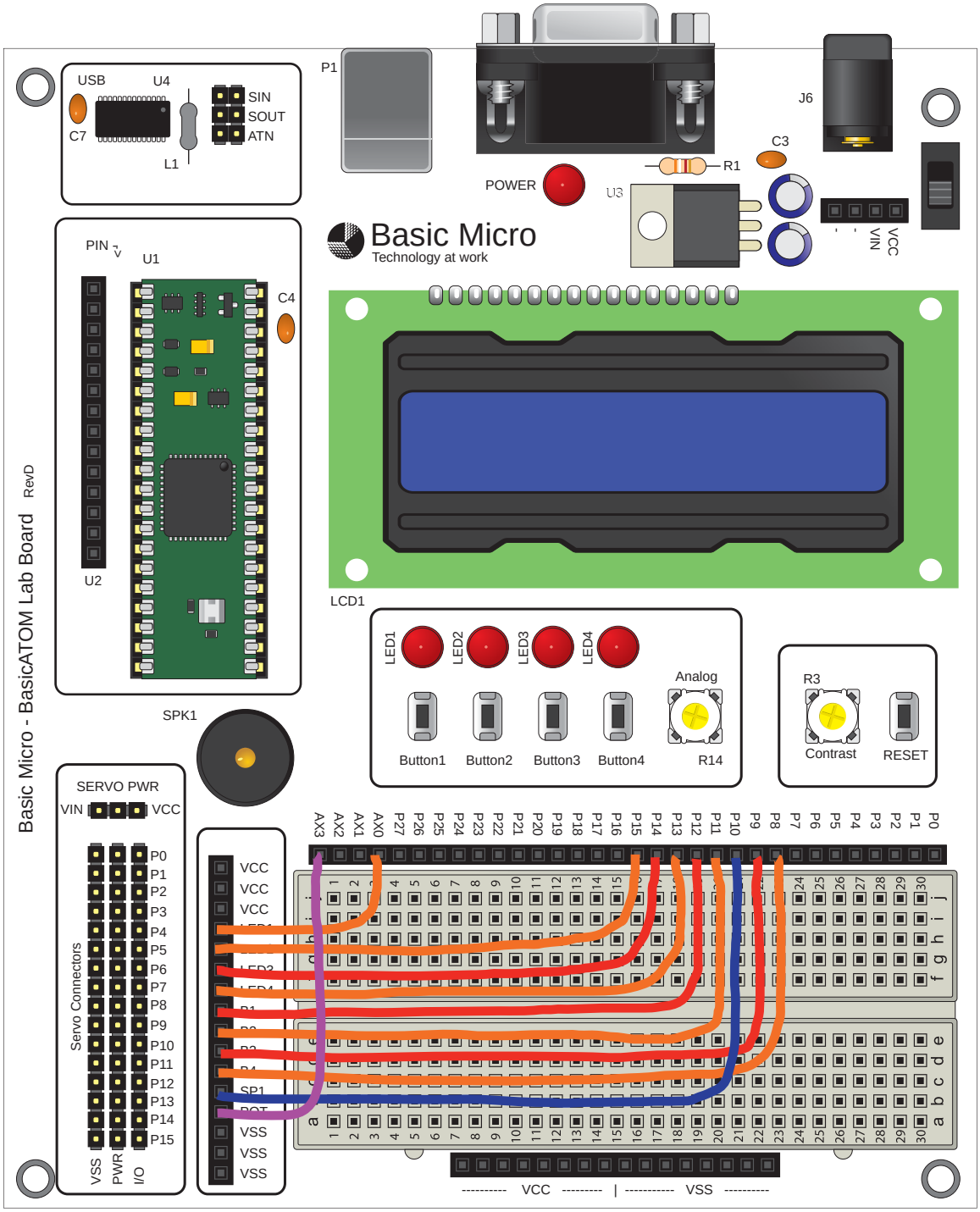
Lab Board Demo

The LCD is pre-wired for easy setup. Control lines (RS, E and R/W) are tied to P0 - P2. The LCD is setup in 4bit mode. Data lines (DB4 - DB7) are tied to P4 - P7. The demo program will print “Hello World” to the LCD screen. You can adjust the potentiometer at R14 and the analog value will display on the screen. Pressing the tactile switche will illuminate a LED. Wire the Lab Board as shown below.



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BasicATOM 40 Demo

Coding for each module is slightly different and demo programs are provided for each module with comments. Wire the Lab Board as shown with a BasicATOM 40 installed. You can download code from download section of the Basicmicro.com website.

```
;%CONFIG% BASICATOM40 $1312d00 $0 $0 $0  $0  $0  $0  $0  $0  $0  $0  $0  $0  $0  $0  $0  $0  $0  $0
;Atom28 P16:P19 are on LabBoard AX0:AX3

;Wiring
;AX3 to POT
;AX0 to led1
;P15 to led2
;P14 to led3
;P13 to led4
;p12 to button 1
;p11 to button 2
;p10 to buzzer/speaker
;p9 to button3
;p8 to button4

;Setup LCD
lcdinit  p0\p1\p2,outb
lcdwrite p0\p1\p2,outb,[CLEARLCD,HOMELCD,SCR,TWOLINE,"Hello World"]

;Set pins to known state
low AX0
low p15
low p14
low p13
high p3

;Setup 32 bit variable
temp var long
cnt var long
cnt=0

;Start program main loop
main
        ;Read analog pin and display value to LCD
        cnt=cnt+1
        adin AX3,temp
        lcdwrite p0\p1\p2,outb,[SCRRAM+40,dec4 temp\4]

        ;Send analog reading to terminal window set to 9600 baud
        serout S_OUT,i9600,[dec temp,13]

        ;Copy state of button to LED on/off
        out28=in12      ;P28 is AX0
        out15=in11
        out14=in9
        out13=in8

        ; If button 4 is pressed make sound with buzzer
        out3=in8
        if(in8)then
                low p10
        else
                high p10
        endif

        ; Return to main loop
        goto main
```

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BasicATOM Pro 28 Demo

The following code is setup to run with the BasicATOM Pro 28-M. You can download this code from the Basicmicro.com website.

```
;AtomPro28: P16:P19 are on AX0:AX3 of the Lab Board

;Wiring
;P19/AX3 to POT
;P16/AX0 to LED1
;P15 to LED2
;P14 to LED3
;P13 to LED4
;P12 to Button1
;P11 to Button2
;P10 to Buzzer/Speaker
;P9 to Button3
;P8 to Button4

;Setup LCD
lcdinit  p0\p1\p7\p6\p5\p4,p2
lcdwrite p0\p1\p7\p6\p5\p4,p2,[LCDCLEAR,LCDHOME,SCR,TWOLINE,"Hello World"]

;Set pins to known state
low p16
low p15
low p14
low p13
high p3

;Setup 32 bit variable
temp var long
cnt var long
cnt=0

;Start main program loop
main
        ;Read analog pin and display value to LCD
        cnt=cnt+1
        adin p19,temp
        lcdwrite p0\p1\p7\p6\p5\p4,p2,[SCRRAM+40,dec4 temp\4]

        ;Send analog reading to terminal window set to 9600 baud
        serout S_OUT,i9600,[dec temp,13]

        ;Copy state of button to LED on/off
        out16=in12
        out15=in11
        out14=in9
        out13=in8

        ; If button 4 is pressed stop speaker sound
        ;hpwm command adjust speaker frequency based on
        ;value of POT
        out3=in8
        if(in8)then
                hpwm p10,temp*8,temp*4
        else
                hpwm p10,10000,0

        endif

        ; Return to main loop
        goto main
```

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Driver Installation

You can download the FTDI customized driver from http://www.basicmicro.com. During installation you will be installing 2 parts. One is the device and the second is the port its self. You are required to click “Contiune Anyway” during both installations.

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Electrical Characteristics

Characteristic	Rating	Min	Max
VCC Input	VDC	6	12
Current Draw	mA	30	1000
I/O Voltages	VDC	0	5
Tempature Range	C	-40	+125

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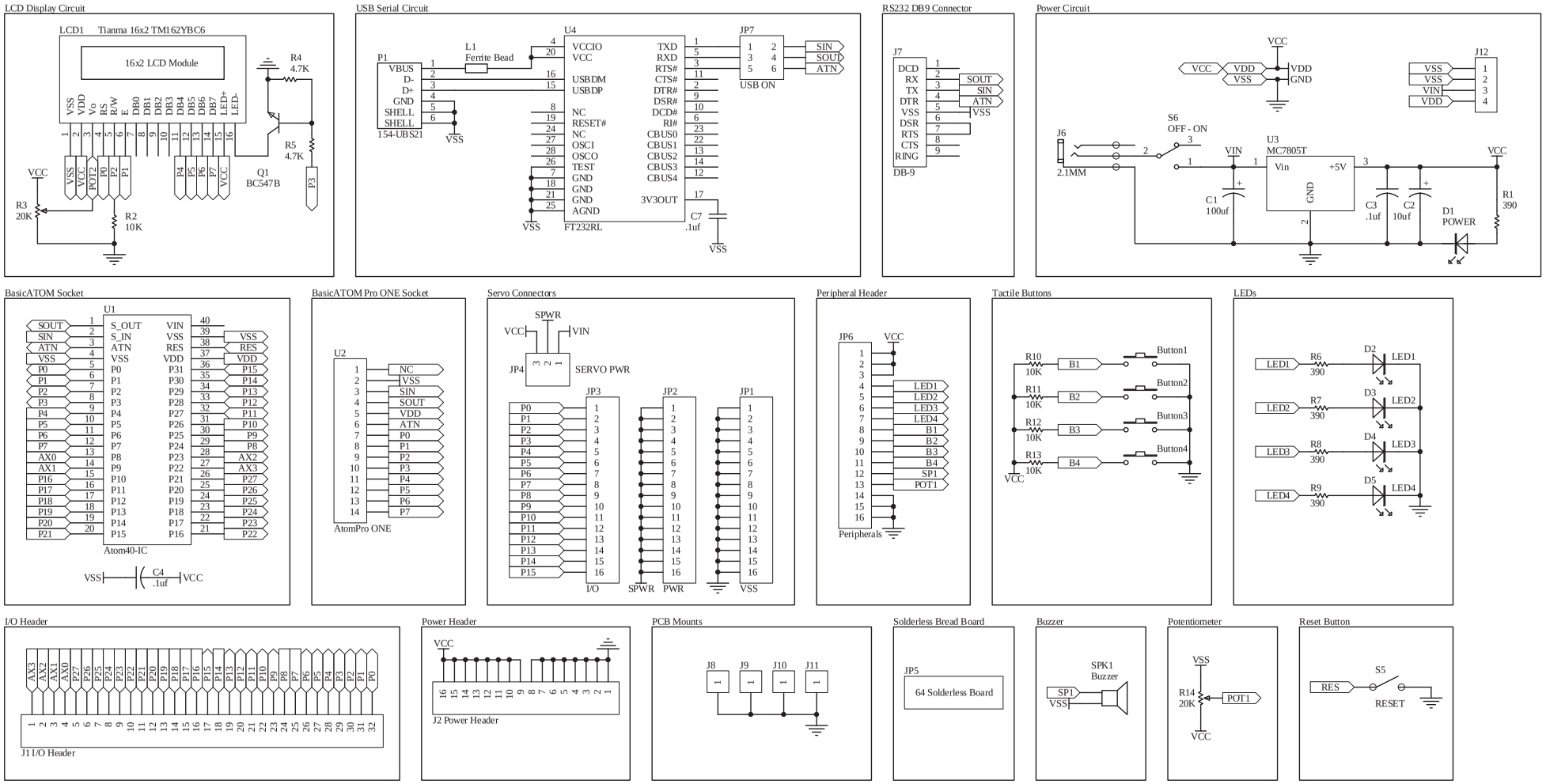
LCD Display Circuit
LCD1 Tianma 16x2 TM162YBC6
16x2 LCD Module
VSS VDD Vo RS R/W E DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7 LED+ LED-
R4 4.7K
R5 4.7K
Q1 BC547B
VCC
R3 20K
R2 10K
VSS VCC POT2 P0 P2 P1 P4 P5 P6 P7 VCC P3
USB Serial Circuit
U4
VCCIO VCC USBDM USBDP NC RESET# NC OSCI OSCO TEST GND GND GND AGND
TXD RXD RTS# CTS# DTR# DSR# DCD# RI# CBUS0 CBUS1 CBUS2 CBUS3 CBUS4 3V3OUT
FT232RL
P1
VBUS D- D+ GND SHELL SHELL
154-UBS21
L1 Ferrite Bead
JP7
SIN SOUT ATN
USB ON
C7 .1uf
RS232 DB9 Connector
J7
DCD RX TX DTR VSS DSR RTS CTS RING
SOUT SIN ATN VSS
DB-9
Power Circuit
VCC VDD VSS VDD GND
J12
VSS VSS VIN VDD
S6 OFF - ON
J6
2.1MM
U3 MC7805T
Vin +5V GND
C1 100uf
C3 .1uf
C2 10uf
D1 POWER
R1 390
BasicATOM Socket
U1
SOUT SIN ATN VSS P0 P1 P2 P3 P4 P5 P6 P7 AX0 AX1 P16 P17 P18 P19 P20 P21
S_OUT S_IN ATN VSS P0 P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15
VIN VSS RES VDD P31 P30 P29 P28 P27 P26 P25 P24 P23 P22 P21 P20 P19 P18 P17 P16
VSS RES VDD P15 P14 P13 P12 P11 P10 P9 P8 AX2 AX3 P27 P26 P25 P24 P23 P22
Atom40-IC
C4 .1uf
BasicATOM Pro ONE Socket
U2
NC VSS SIN SOUT VDD ATN P0 P1 P2 P3 P4 P5 P6 P7
AtomPro ONE
Servo Connectors
SPWR VCC VIN
JP4 SERVO PWR
JP3 JP2 JP1
P0 P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15
I/O SPWR PWR VSS
Peripheral Header
JP6 VCC
LED1 LED2 LED3 LED4 B1 B2 B3 B4 SP1 POT1
Peripherals
Tactile Buttons
R10 10K R11 10K R12 10K R13 10K
B1 B2 B3 B4
Button1 Button2 Button3 Button4
VCC
LEDs
LED1 LED2 LED3 LED4
R6 390 R7 390 R8 390 R9 390
D2 LED1 D3 LED2 D4 LED3 D5 LED4
I/O Header
AX3 AX2 AX1 AX0 P27 P26 P25 P24 P23 P22 P21 P20 P19 P18 P17 P16 P15 P14 P13 P12 P11 P10 P9 P8 P7 P6 P5 P4 P3 P2 P1 P0
J11 I/O Header
Power Header
VCC
J2 Power Header
PCB Mounts
J8 J9 J10 J11
Solderless Bread Board
JP5
64 Solderless Board
Buzzer
SPK1 Buzzer
SP1 VSS
Potentiometer
VSS R14 20K POT1 VCC
Reset Button
S5 RES RESET
Title
BasicATOM Lab Board RevB (c) 2009
Size B
Number
Revision
Date: 1/29/2009
Sheet of
File: E:\PCBDesigns\...\AtomLabBoardRevD.Sch
Drawn By:
Dale Kubin

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A web based discussion board is maintained at http://www.basicmicro.com.

Technical Support

Technical support is made available by sending an email to support@basicmicro.com. All email will be answered within 48 hours. All general syntax and programming questions, unless deemed to be a software issue, will be referred to the on-line discussion forums.

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