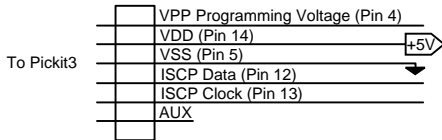


For Reference: In Circuit Serial Programming (ICSP) Connector

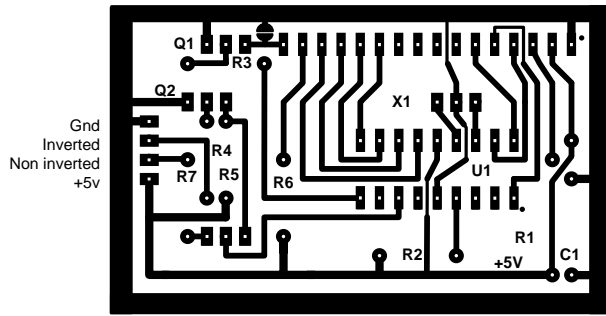


Date:	Revision/Addition/ Note	By:
Aug 12 2017	Initial Drawing,	GSC
Aug 13 2017	Since the spark fun serial backpack did not work for me, kept looking for an equivalent. Found a project that may work at <a href="http://www.robotshop.com/letsmakerobots/serial-lcd-controller?page=2">http://www.robotshop.com/letsmakerobots/serial-lcd-controller?page=2</a> Hobbybotics) Many thanks to Curtis Brooks at hobbybotics for the project.	GSC
Aug 13 2017	The zip folders on the page (LCD-16F628_1_8_2line and LCD-16F628A_2Line and LCD_1_8.hex (4line)) had a Hex file provided. Loaded and worked with an existing project after some software tweaks. The control characters and some LCD mapping changed from the SEETRON serial backpack I was using.	GSC
Aug 13 2017	Software LCD_1_8_2line.hex	GSC
Aug 16 2017	See LCDTest5.pbp for the existing and LCDTest6. PBP for the after examples. Also as I was previously using the Inverted 9600,8,1 command (Serout N9600) I used the inverter on the schematic.	GSC
Aug 16 2017	I have added the ICSP connections for reference. I wont add to my PWB as I prefer to program in my test socket to the Pickit3. If I redesign with surface mount and SOIC Pics this will change.	GSC
Aug 18 2017	Modified the test program PIC I was using. LCDTest8.pbp is the new test program. It now delivers the existing inverted output on one pin (N9600), and non inverted (T9600) output on another. Used to drive four examples of the backpack all at once in different modes.	GSC
Sep 10, 2017	See "LCD Serial Test" drawing for details	GSC
Oct.11, 2017	Equipped LCD display with 16 Pin, Male .1" header. Equipped serial backpack PWB with 16 Pin .1" Female header	GSC

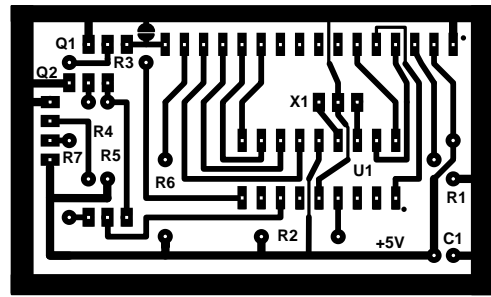


Print Check .5"x.5"

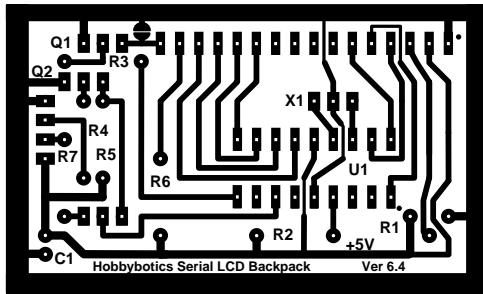
Drawn By: Gerald Crenshaw WD4BIS	Date: Aug. 13, 2017	From the bench of: <b>Amateur Radio Station WD4BIS</b>	Page of 1
Designed By: Gerald Crenshaw WD4BIS	Date: Aug. 13, 2017		Title: <b>Hobbybotics Serial Backpack</b>
Checked By: Janet Crenshaw WB9ZPH	Date: Aug. 13, 2017		



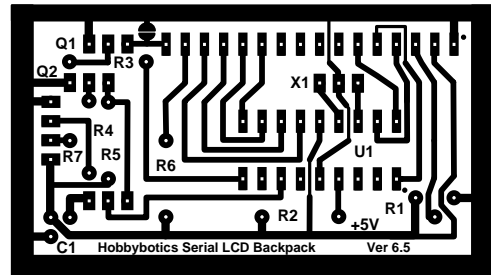
Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.2



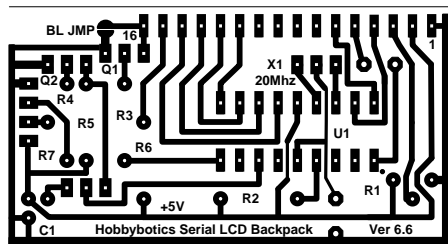
Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.3



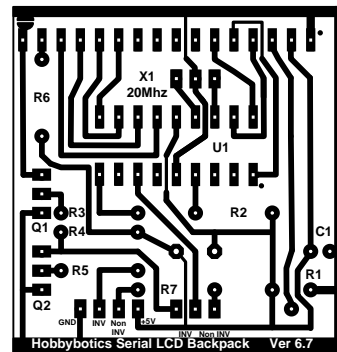
Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.4



Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.5

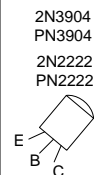


Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.6



Hobbybotics Serial LCD Backpack Ver 6.7

Date:	Revision/Addition/ Note	By:
Aug 14 2017	Initial Drawing, Board size is 1.5"x3"	GSC
Aug 15 2017	Finished version 1 Art, going to flip IC and make another version.	GSC
Aug 16 2017	Finished version 2 Art.	GSC
Aug 18 2017	Found 2 mistakes on Version 5 and three mistakes on version 6.	GSC
Aug 19 2017	Corrected, new version 5.1, and version 6.1	GSC
Aug 20 2017	Printed and populated a Version 1 and 2 board. Although the artwork proved out, I oriented the LCD connector the wrong direction so the backpack extended the wrong way. Starting over with a version 5 Art.	GSC
Aug 23 2017	Version 5 and 6 artwork finished. Printed and etched. Proved out.	GSC
Sept 1 2017	Needed to cut down the overall width. Version 3&4 cut down the width by .4". Size now 2.6"x1.5"	GSC
Sept 1 2017	I prefer to leave the backlight on. Added jumper shorting pads at the collector of Q1 to ground so this can be done with a solder bridge if desired. Now version 5.2 and 6.2.	GSC
Sept 1 2017	Version 6.3, reduced size by .1" height and width.	GSC
Sept 9 2017	Version 6.4, New 10K pots have a different footprint. Rearranged R1, Moved C1 to make room for the new placement of R1 so pot could be adjusted easily.	GSC
Sept 12 2017	Version 6.5, reduced size by .1" height. (1.4"x2.5")	GSC
Jan 9, 2018	Version 6.6, found the extension above the LCD connector caused dimension problems for one application I had. Removed the extension and had to add a couple of jumpers.	GSC
Jan 20, 2018	Version 6.7, had to make a new version for an application with a 4x20 LCD. Reoriented the input connector.	GSC

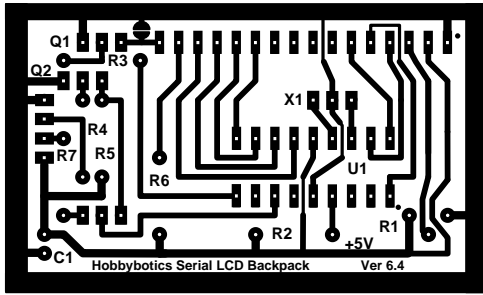


2N3904  
PN3904  
2N2222  
PN2222

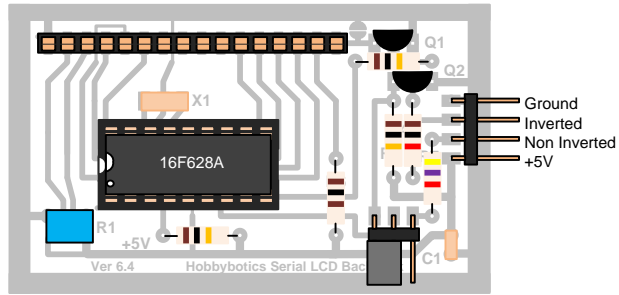
Print  
Check  
.5"x.5"

Drawn By: Gerald Crenshaw WD4BIS	Date: Aug. 14, 2017	From the bench of: Amateur Radio Station WD4BIS	Page 1
Designed By: Gerald Crenshaw WD4BIS	Date: Aug. 14, 2017		of 1
Checked By: Janet Crenshaw WB9ZPH	Date: Aug. 14, 2017	Title: PCB for Hobbytronics Serial backpack	Scale:

Artwork Proved Out

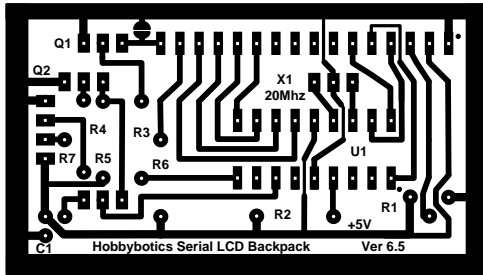


Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.4

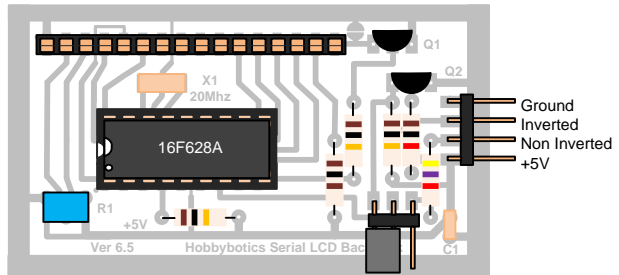


Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.4  
Drill all holes #65  
Inverted Non inverted  
Jumper Selection

Artwork Proved Out

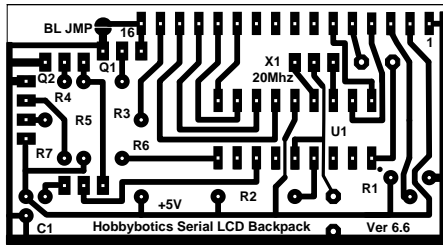


Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.5

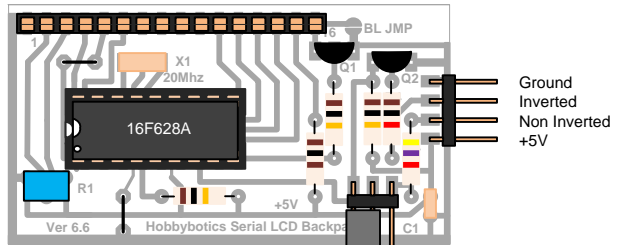


Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.5  
Drill all holes #65  
Inverted Non inverted  
Jumper Selection

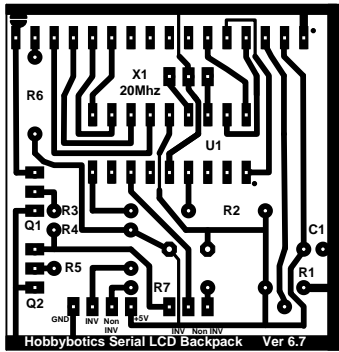
Artwork Unknown



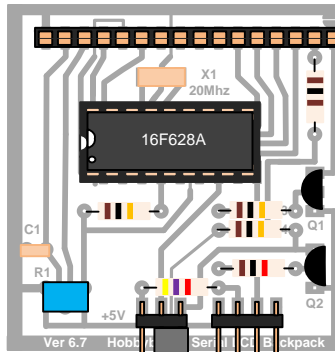
Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.6



Artwork Proved Out



Hobbybotics Serial LCD Backpack WD4BIS Art Ver. 6.7



Non inverted  
Inverted  
+5V  
Non Inverted  
Ground

2N2222  
PN2222

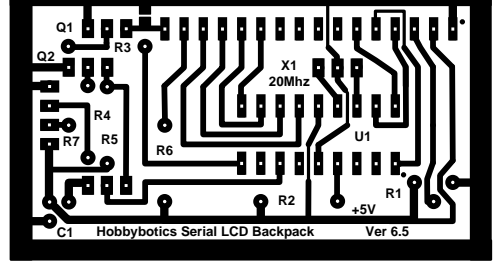
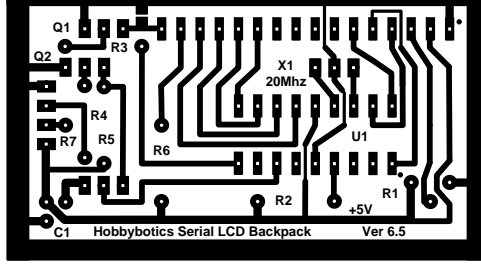
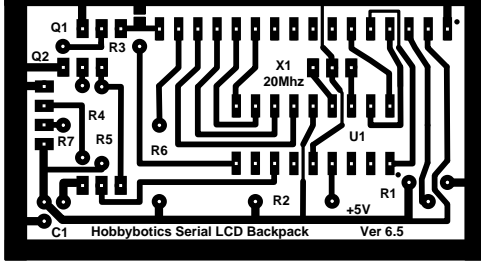
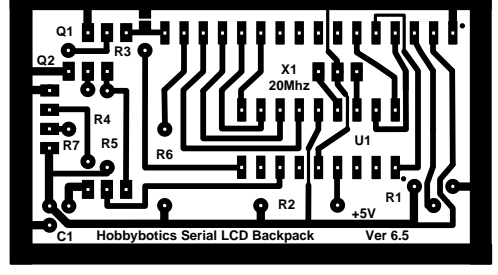
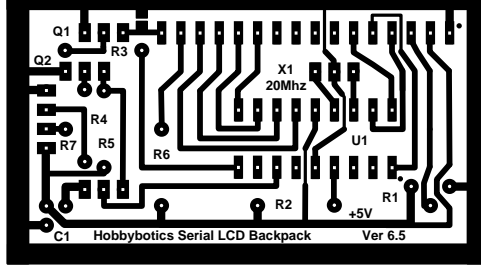
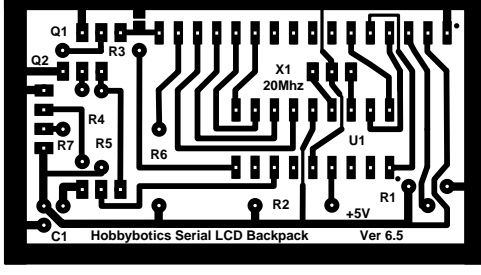
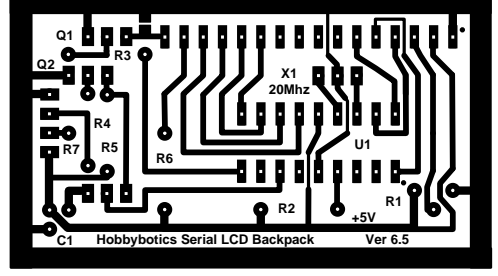
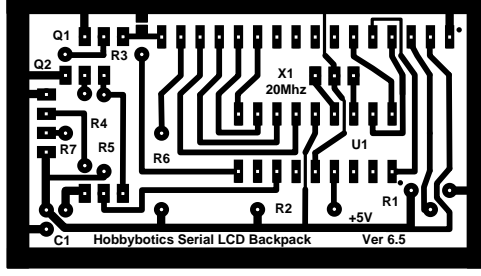
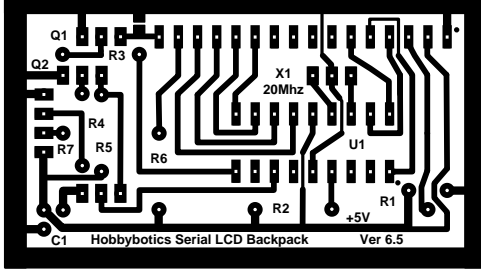
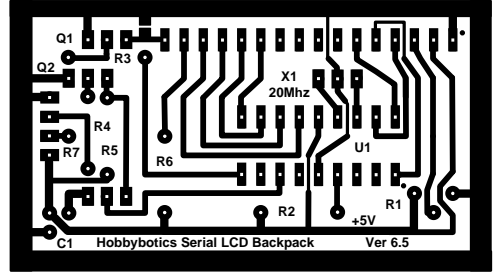
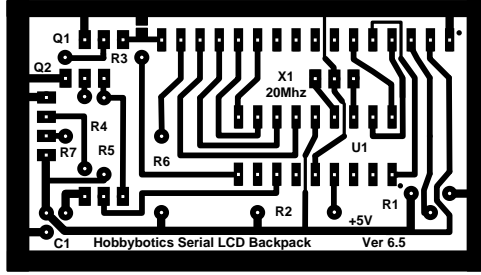
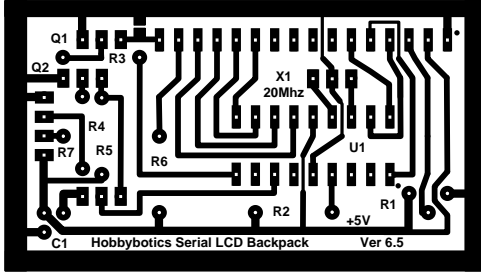
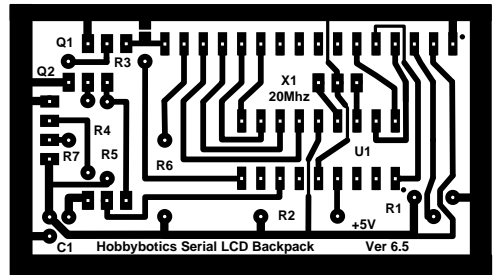
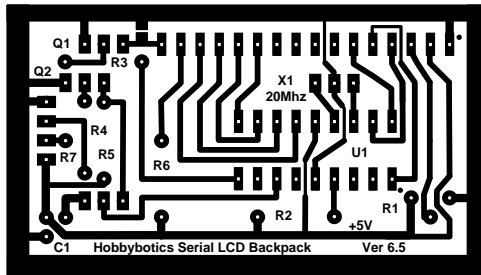
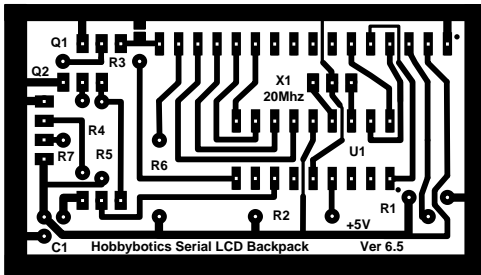


Print  
Check  
.5"x.5"

Date:	Revision/Addition/ Note	By:
Aug 19 2017	Initial Drawing, Component placement for version 5 and 6	GSC
Aug 21 2017	Tried a new sequence of PCB processing today that worked better. After etching. Center punch holes to mark holes so the drill bit wont walk. Remove etch resist with acetone. Tin board with the flux and solder filings process. Clean with acetone to remove flux. Drill per drill schedule. Works best to drill all holes first with the smallest bit then drill larger holes	GSC
Aug 27 2017	Version 6.2 worked better for the backpack after trying both.	GSC
Sept 1 2017	Version 6.3, reduced size by .1" height and width. (1.5"X 2.6")	GSC
Sept 9 2017	Version 6.4, New 10K pots have a different footprint. Rearranged R1, Moved C1 to make room for the new placement of R1 so pot could be adjusted easily. Artwork proved out.	GSC
Sept 12 2017	Version 6.5, reduced size by .1" height. (1.4"X2.5")	GSC
Jan 9 2018	Dropped Version 6.2, added version 6.6.	GSC
Jan 20 2018	Added Version 6.7, sized for a 4x20 LCD. Needed to re-orient the input connector for a project as it extended into other work space.	GSC

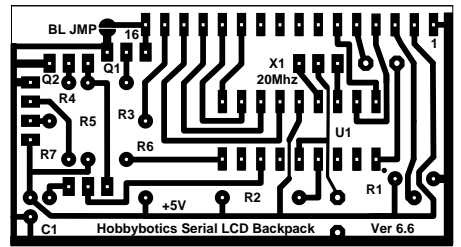
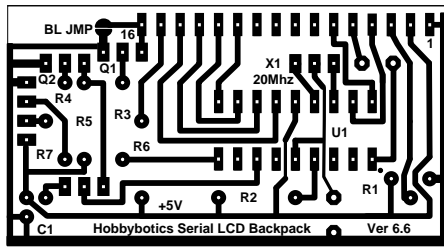
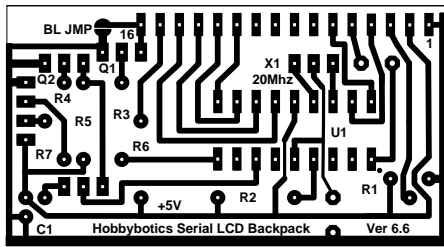
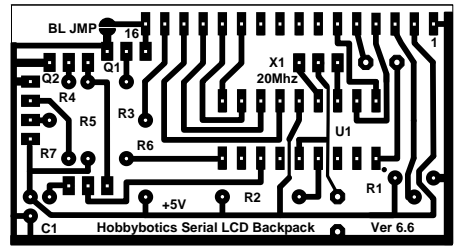
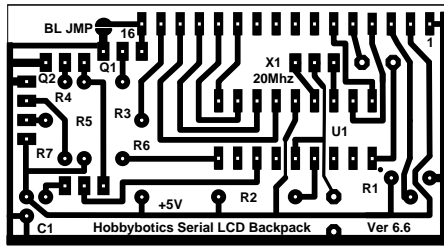
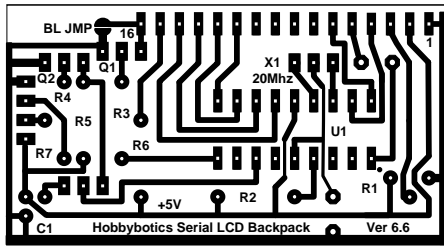
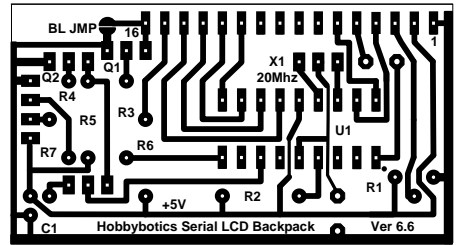
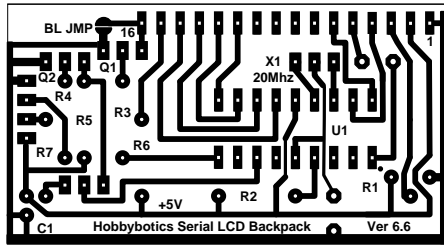
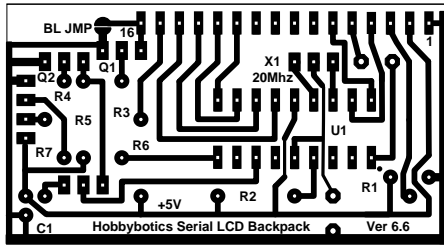
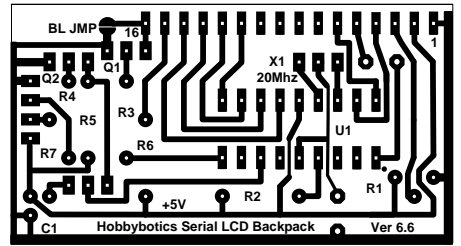
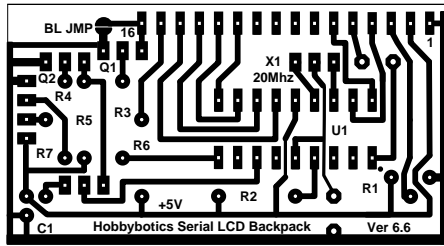
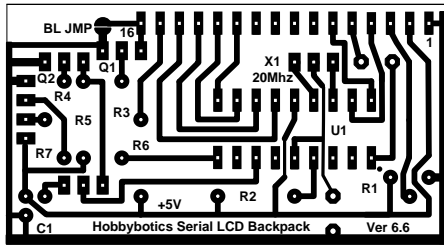
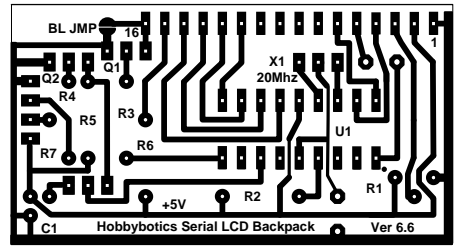
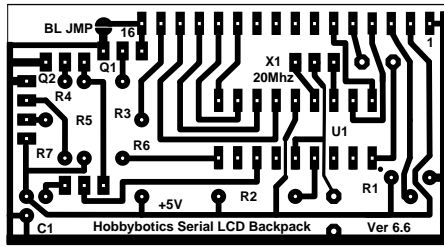
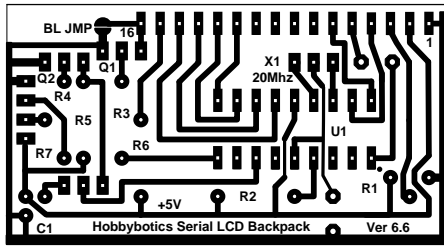
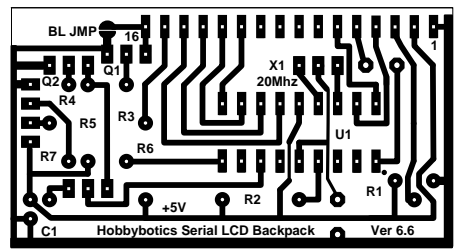
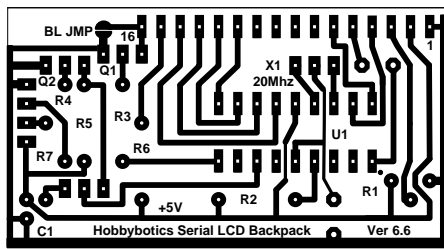
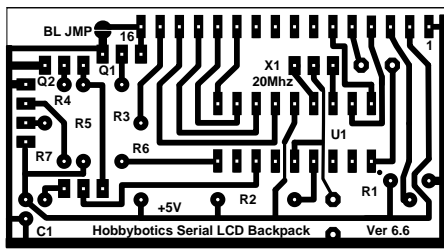
Drawn By: Gerald Crenshaw WD4BIS	Date: Aug. 19, 2017
Designed By: Gerald Crenshaw WD4BIS	Date: Aug. 19, 2017
Checked By: Janet Crenshaw WB9ZPH	Date: Aug. 19, 2017

From the bench of: Amateur Radio Station WD4BIS	Page 1 of 1
Title: Comp. Placement for Hobbytronics Serial backpack	Scale:



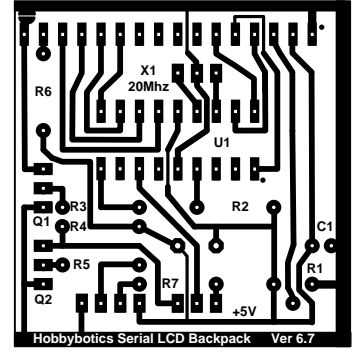
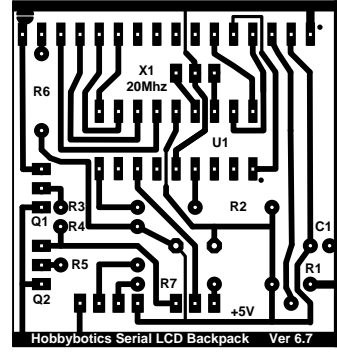
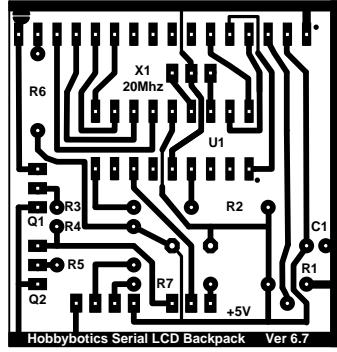
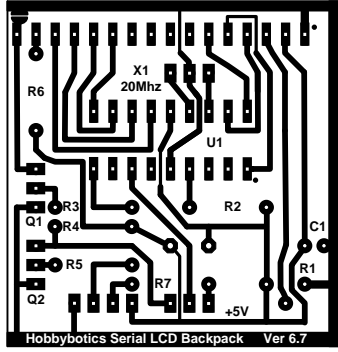
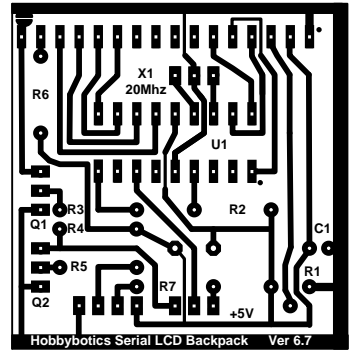
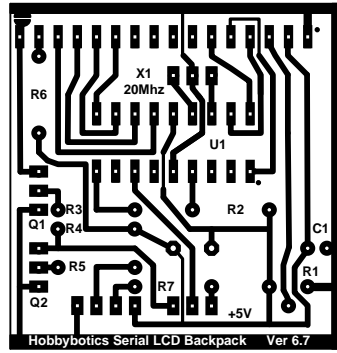
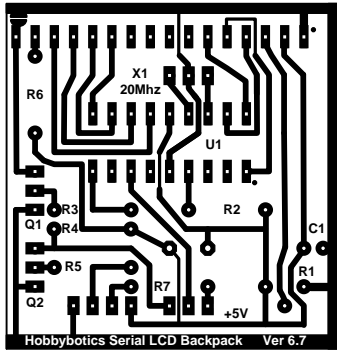
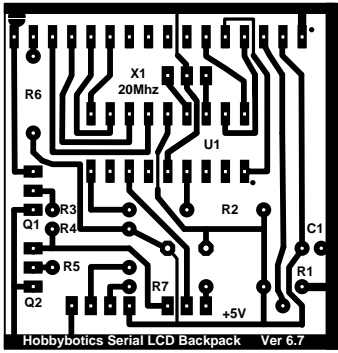
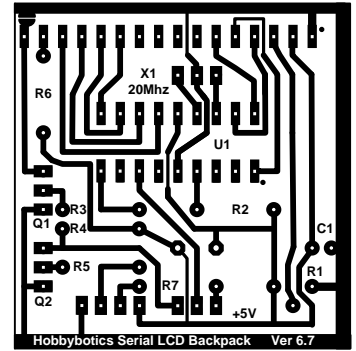
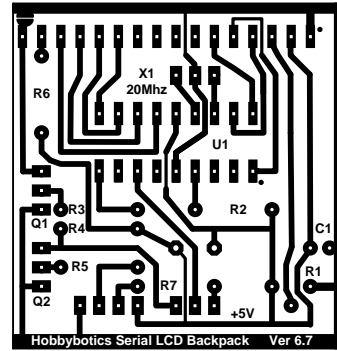
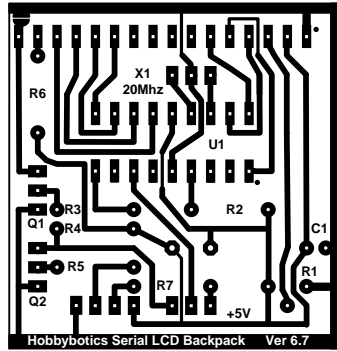
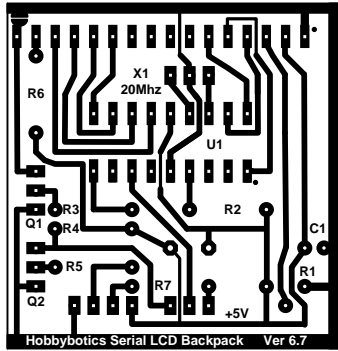
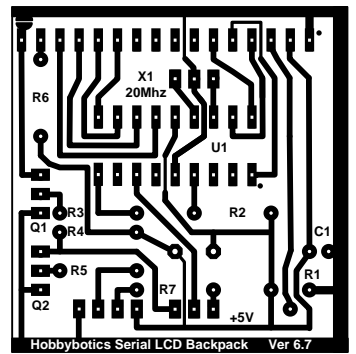
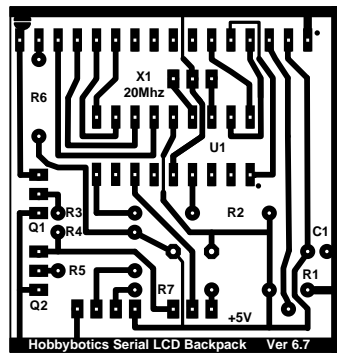
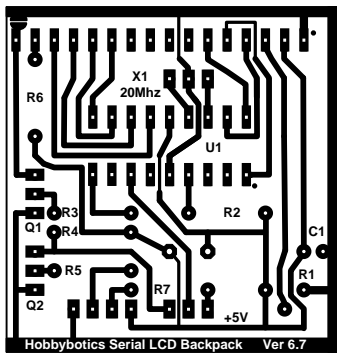
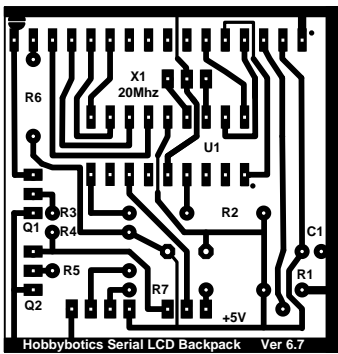
Date:	Revision/Addition/ Note	By:	
Aug 14 2017	Initial Drawing,	GSC	Print to HP Laserjet P3005, Single sheet feed Shiny side up, Staples basic photo stock paper. Properties, Finishing, Mirror Image. Paper/Quality Pro Res 1200 DPI
Aug 18 2017	Board size is 1.6"x3"	GSC	
Aug 20 2017	Versions 1-4 had a disoriented LCD connector. Version 5-6 have this fixed.	GSC	
Aug 22 2017	Versions 5,6 had mistakes. Replaced with version 5.1, 6.1	GSC	Heat press, 400 degrees for 240 seconds. 4 min
Aug 24 2017	Made a jumper addition and some dimensional fixes. version 5.2, 6.2	GSC	
Sep 9 2017	Version 6.4 with new R1 that had a different foot print.	GSC	
Jan 2 2018	Version 6.5, reduced size by .1"	GSC	
Drawn By:	Gerald Crenshaw WD4BIS	Date:	Aug. 14, 2017
Designed By:	Gerald Crenshaw WD4BIS	Date:	Aug. 14, 2017
Checked By:	Janet Crenshaw WB9ZPH	Date:	Aug.14, 2017
From the bench of:			Page 1
Amateur Radio Station WD4BIS			of 1
Title:			Scale:
Group and Dupe for Hobbybotics PCB, Ver. 6.5			

Print Check .5"x.5"



□

<b>Date:</b> Jan 10 2018	<b>Revision/Addition/ Note</b> Initial Drawing,	<b>By:</b> GSC	Print to HP Laserjet P3005, Single sheet feed Shiny side up, Staples basic photo stock paper. Properties, Finishing, Mirror Image. Paper/Quality Pro Res 1200 DPI Heat press, 400 degrees for 240 seconds. 4 min	Print to HP Laserjet P3005, Single sheet feed Blue side up TTF PCB Fab in a box transfer paper Properties, Finishing, Mirror Image. Paper/Quality Pro Res 1200 DPI Heat press, 300 degrees for 60 Seconds gave best results. 325 degrees for 60 Seconds started smearing	<table border="1"> <tr> <td>Print Check .5"x.5"</td> </tr> </table>	Print Check .5"x.5"
Print Check .5"x.5"						
<b>Drawn By:</b> Gerald Crenshaw WD4BIS	<b>Date:</b> Jan.10, 2018	<b>From the bench of:</b> Amateur Radio Station WD4BIS		<b>Page</b> of 1 1		
<b>Designed By:</b> Gerald Crenshaw WD4BIS	<b>Date:</b> Jan.10, 2018	<b>Title:</b> Group and Dupe for Hobbybotics PCB, Ver. 6.6		<b>Scale:</b>		
<b>Checked By:</b> Janet Crenshaw WB9ZPH	<b>Date:</b> Jan.10, 2018					



<b>Date:</b> Jan 20 2018	<b>Revision/Addition/ Note</b> Initial Drawing,	<b>By:</b> GSC
<b>Drawn By:</b> Gerald Crenshaw WD4BIS	<b>Date:</b> Jan.20, 2018	<b>Title:</b> Group and Dupe for Hobbybotics PCB, Ver. 6.7
<b>Designed By:</b> Gerald Crenshaw WD4BIS	<b>Date:</b> Jan.20, 2018	
<b>Checked By:</b> Janet Crenshaw WB9ZPH	<b>Date:</b> Jan.20, 2018	

Print to HP Laserjet P3005, Single sheet feed  
 Shiny side up, Staples basic photo stock paper.  
 Properties, Finishing, Mirror Image.  
 Paper/Quality Pro Res 1200 DPI

Heat press, 400 degrees for 240 seconds. 4 min

Print to HP Laserjet P3005, Single sheet feed  
 Blue side up TTF PCB Fab in a box transfer paper  
 Properties, Finishing, Mirror Image.  
 Paper/Quality Pro Res 1200 DPI  
 Heat press, 300 degrees for 60  
 Seconds gave best results. 325  
 degrees for 60 Seconds started  
 smearing

Print Check .5"x.5"
---------------------------

<b>From the bench of:</b> Amateur Radio Station WD4BIS	<b>Page</b> <b>of</b> <b>1</b> <b>1</b>
<b>Scale:</b>	