R-420SP
Assembly Manual

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TABLE OF CONTENT

1 INTRODUCTION

The R-420SP is designed for easy assembly by the hobbyist or prototyping engineer. The components are assembled on the topside of the board as marked. All of the integrated circuits, except the reset switch, are inserted into sockets. The recommended sequence for manual assembly is as follows:

1. Bypass Capacitors (quantity 3)
2. Resistor Network (quantity 1)
3. Sockets (quantity 3)
4. TO92 IC
5. Capacitors (quantity 5)
6. Headers (quantity 4)
7. Optional Headers (quantity 2)

The board may then be tested.

The assembly and test steps are explained in detail in the following pages. Please refer to the board layout for part placement locations. Depending on your experience, the assembly process may take about one hour. It is highly recommended that you read all instructions and become familiar with the parts before starting the assembly process.

We give Mouser part numbers for all components used on this board. Mouser has data sheets on-line for most of their parts so you can cross reference to different manufacturers and suppliers if you wish. In addition Mouser accepts orders for single pieces and small dollar amounts, which you may pay for by credit card. Mouser's web site is www.mouser.com.

2 SOLDERING

Use a low power (about 30 Watts) soldering iron. Heat the component lead and the pad with the iron, and then apply solder to the lead and pad. Solder should be shiny in appearance. Be careful not to deposit too much solder on the joints. The most common problem with board assembly is shorted pins or tracks due to excessive solder. Solder may be removed by solder-removal braid, also known as solder wick. Place the wick over the solder and heat the solder through the wick. The wick will absorb the excess solder. Use a good quality solder, such as Radio Shack's silver bearing solder. Soldering is the most important aspect of assembly. Please be patient and strive for excellence!

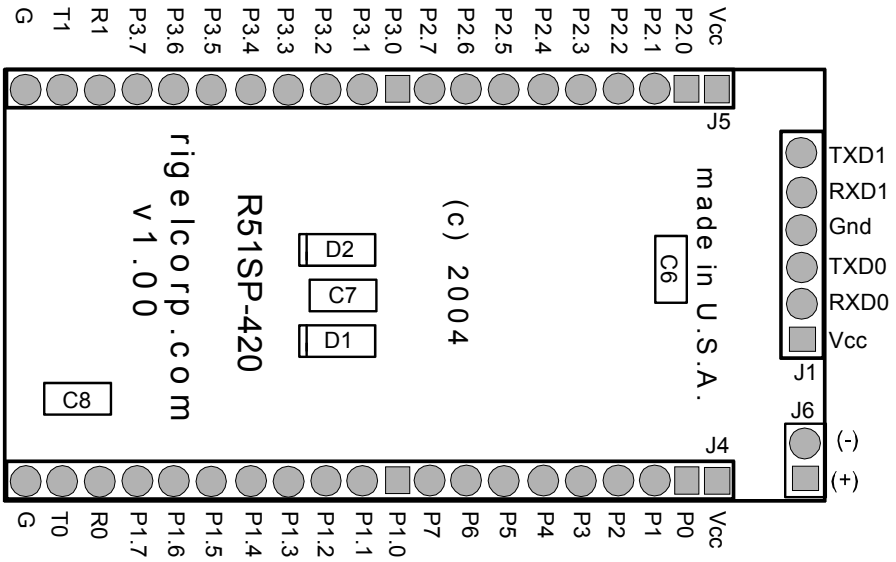
Please note that solder contains lead.
Take the necessary precautions when working with solder.
Work in a well-ventilated area.
Do not inhale the solder vapors.
Wash your hands after soldering.

3 ASSEMBLY STEPS

Familiarize yourself with the board, the components, and the layout. Also refer to the bill of materials at the end of this assembly manual. We recommend you assemble the board in the following order.

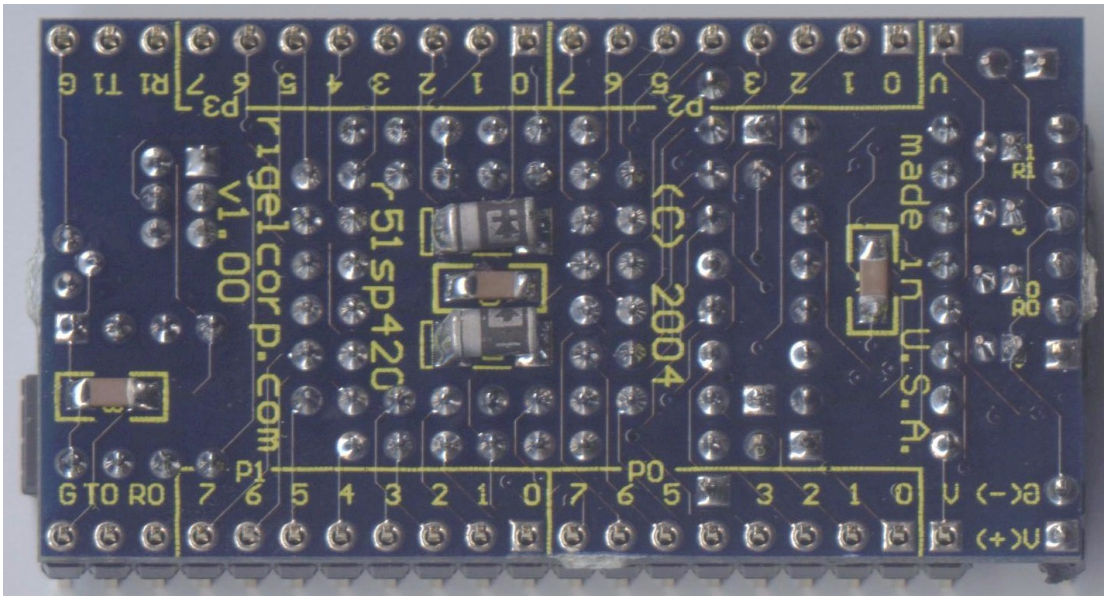
1. Surface mount bypass capacitors and 1N4001 diodes assembled on bottom of board.
2. Resistor network, sockets for U1 and U3 and the IC DS1812, U4, slide switch assembled on top of the board.
3. Capacitors C1-C5, headers J1, J4, J5, J6, and PLCC Socket in U2.

Bottom of the Board

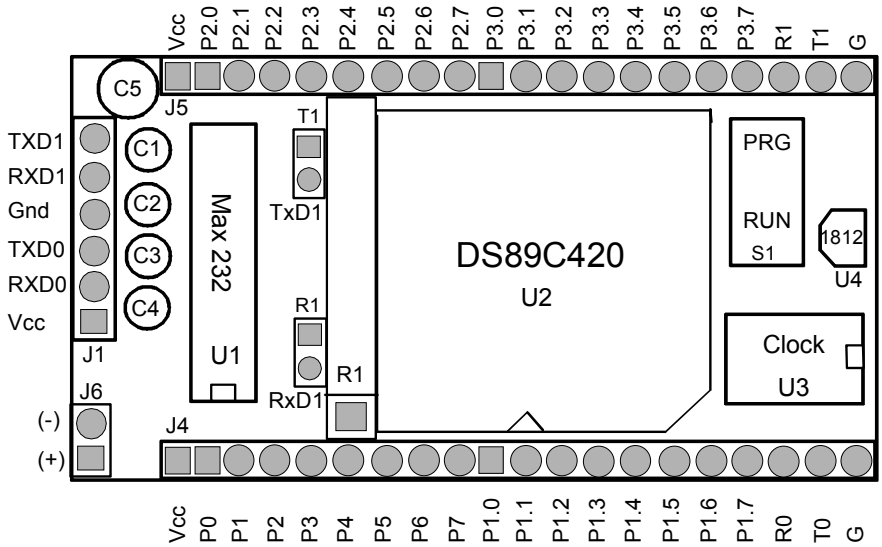


3.1 Bypass Capacitors and 1N4001 Diodes

Capacitors C6-C8 are 10-100 nanofarad (nF) surface mount axial capacitors without polarity. These are located on the bottom of the board. The 1N4001 diodes are polarized with band on one end. Board footprint has line to indicated correct orientation. The board below is assembled correctly.



Top of the Board



3.2 Resistor Network, R1

R1 is a resistor network that contains 9 resistors with a common terminal. The common terminal is marked on the resistor networks with a line or a dot. The R-420SP board uses a square pad to mark where the common terminal is to be inserted. The orientation of this resistor must be correct for the board to work.

3.3 Sockets

Sockets use the same designation as the components they hold. Several different sized sockets are used. U1 uses a 16 pin socket, U2 uses a PLCC sockets, and U3 uses a 8 pin socket. The 16 and 8-pin sockets are Dual In-line Package (DIP) sockets with 300 mils between rows. The DIP sockets all have a notch or mark on one end. This must be matched with the socket pattern silk-screened on the board. When the notch is to the left, and viewed from the top, the lower leftmost pin is pin 1. On the R-420SP board, the pads of pin 1 of the Integrated Circuits (ICs) are square. All other IC pads are circular.

The orientation of the sockets is critical. You will not be able to populated the PLCC chip correctly if the socket is placed incorrectly on the board.

You will be placing the ICs in the sockets using the notch for pin 1 identification. The board will not work and the ICs may be damaged if they are populated backwards. If you do solder a dip socket in backwards the board will still work, but

You must be extremely careful to orient the IC to the notch silk-screened on the board and not according to the notch on the socket.

3.4 DS1812

The DS1812 is a reset chip in a TO92 package. This IC must be inserted to match the footprint on the board.

3.5 Electrolytic Capacitors

Capacitors C1 – C4 and C5 are electrolytic capacitors. Electrolytic capacitors are polarized components. The positive terminals of the capacitors are indicated by the (+) sign or a square pad on the R-420SP board. The capacitors have labels to indicate their polarity and value. Often, the negative terminal is indicated by a minus (-) sign.

3.6 Headers

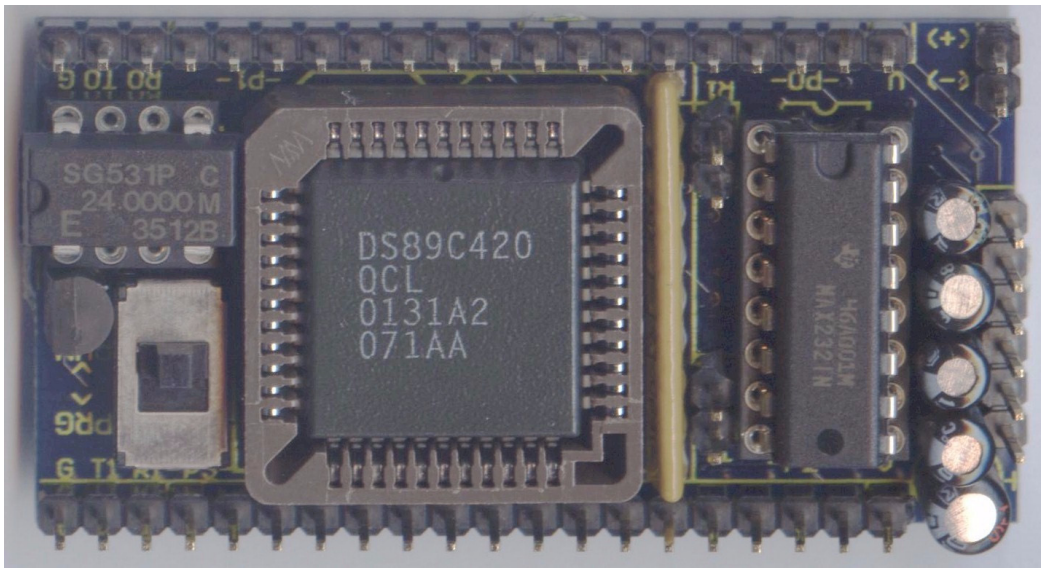
J1 is the serial connector for the board. It is a 1x6 100mil header.

J4 and J5 are the connectors used to access the signals on the board. They are 1x20 100mil headers or sip sockets. The headers are labeled on the board with the corresponding signals available.
J6 is the header that brings the 5-volt operating current to the board. A 1x2 100mil header is used for the power connector. The positive terminal of J6 is marked by a '+' on the R-420SP board.
J2 and J3 are available for selecting the serial ports to be used on the board.

3.7 Slide Switch

The slide switch does not have a polarity.

The board below is assembled correctly.



4 VISUAL INSPECTION

Most of the problems in assembling the R-420SP are due to faulty solder joints. Inspect each solder joint, looking for missing solder, too much solder, shorts between pins or tracks due to excessive solder. Remove excessive solder with solder wick. Care taken for a thorough visual inspection often saves time in the long run.

5 POWER SUPPLY TESTING

Before any of the ICs are inserted, connect a 5 Volt power supply to the power header JP6 on the board. Verify the voltage on the Vcc and Ground pins of the sockets for U1, U2, and U3.

The ICs have a notch or mark on one end. This must be matched with the silk-screen notch on the board.

When the notch is to the left, and viewed from the top, the lower leftmost pin is pin 1. Pins in the lower row are enumerated, from left to right. For example, the last pin in the bottom row of U1 is pin 8. The pins on the upper row are enumerated from right to left (thus, continuing in the counterclockwise direction). The rightmost pin in the top row of U1 is pin 9, and the leftmost, pin 16.

IC Socket	IC	VCC Pin	Ground Pin
U1	MAX232	16	15
U2	8x5x	44	22
U3	Clock	1, 8	4

If supply voltages are not observed, inspect all tracks, connections, and solder joints.

6 FUNCTIONAL TESTING

You are now ready to insert the ICs and test the functionality of the board. In order to prevent permanent damage to the ICs, do not attempt this step if discrepancies were observed during the prior tests. Please note that all of the ICs are CMOS Complementary Metal Oxide Semiconductors), which are affected by static.

Do not insert or remove the ICs while the power is connected to the R-420SP.

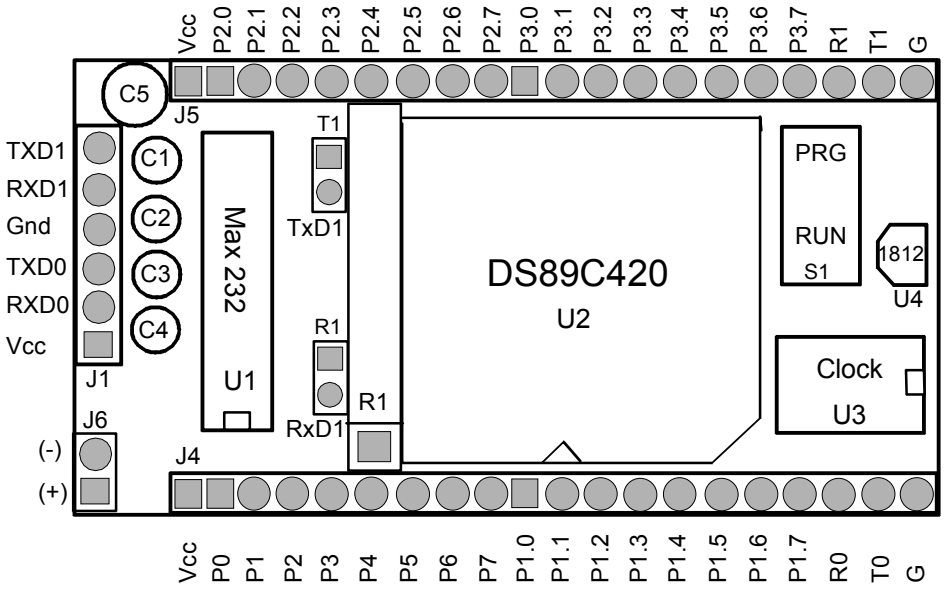
Also avoid exposure to static electricity. For example, the ICs may be zapped by static electricity collected on a sweater. Ground yourself, or touch a good conductor to ground before handling the ICs. Disconnect the power. Insert the ICs, observing their orientation. The ICs have a notch or mark on one end. This must be matched with the notch on the board overlay and should match the notch on the socket. Connect the power supply.

7 R-420SP BOARD PARTS LIST

We give Mouser part numbers for all components used on this board. Mouser has data sheets on-line for most of their parts so you can cross reference to different manufacturers and suppliers if you wish. In addition Mouser accepts orders for single pieces and small dollar amounts, which you may pay for by credit card Mouser's web site is www.mouser.com.

Quantity	Part	Mouser Part Number	Designator
3	**10nF**	**PCC103BCT-ND**	**C6, C7, C8**
4	1uF	140-MLRL50V1.0	C1-C4
1	47uF	140-MLRL50V1.0	C5
1	10K gang	266-10K	R1
2	**1N4001 / 1N4148**	**583-SM4001 / 621-MMBD4148**	**D1, D2**
3	1X2 Header	100mil	T1/J2, R1/J3, J6
1	1X6 Header	100mil	J1
2	1X20 Header	100mil	J4, J5
1	16 Pin Dip Socket	575-199316	U1
1	44 Pin PLCC	575-442494	U2
1	8 Pin Dip Socket	575-199308	U3
1	MAX232	MAX232CPE	U1
1	DS89C420	DS89C420MNG	U2
1	Clock	11.0592 / 12 / 24 MHz	U3
1	DS1812	DS1812-10	U4
Part #'s in Bold are Surface Mount Parts populated on the bottom of the board			

6 TOP OVERLAY



Bottom Overlay