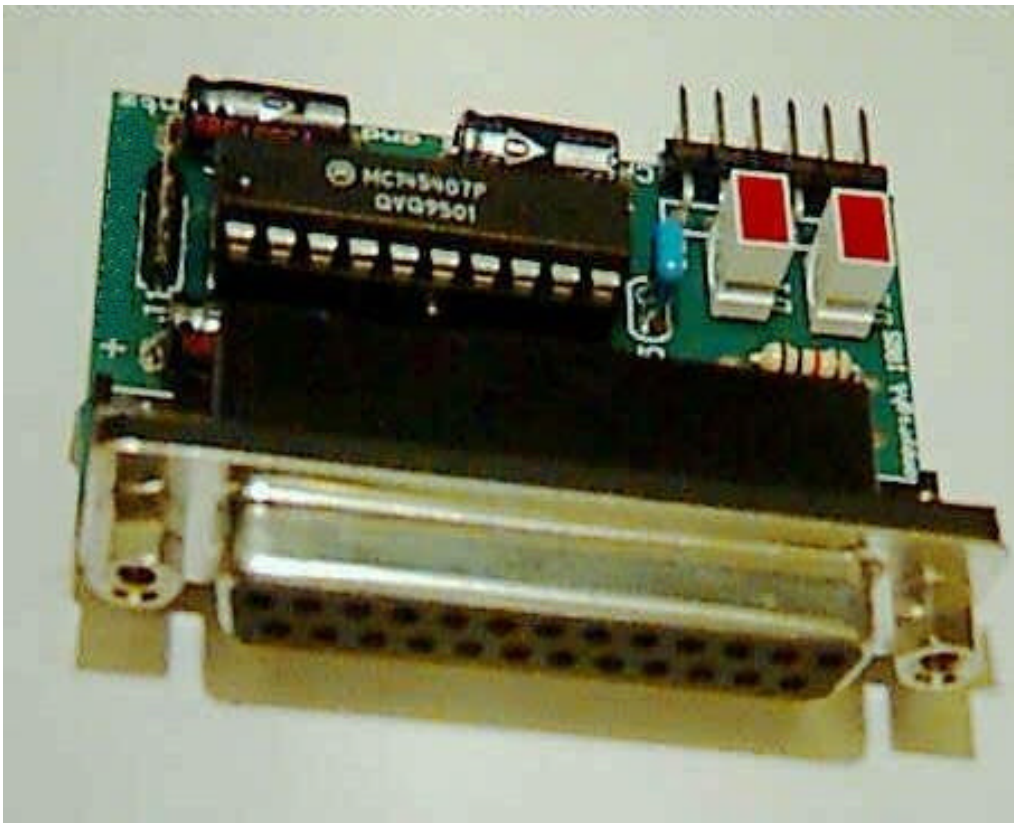


ASSEMBLY MANUAL MEKATRONIX MB2325 BIDIRECTIONAL SERIAL COMMUNICATIONS VOLTAGE CONVERTER

By Keith L. Doty
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- Low cost,
- Wide availability,
- Open architecture,
- An open, enthusiastic, dynamic community of users sharing information.

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1 ASSEMBLING MEKATRONIX PRINTED CIRCUIT BOARDS

1.1 Skill Level

Assembling this board requires the ability to solder and modest manual dexterity. If you are inexperienced in soldering or would like a quick review of soldering techniques, refer to *Soldering Note* in the manuals section of the Mekatronix web site (<http://www.mekatronix.com>) for soldering tips. If you feel uncomfortable with assembling a printed circuit board you might want to consider purchasing one assembled and tested from the factory .

1.2 Personal Safety

Practice safe assembly techniques. When assembling printed circuit boards, be sure to work in a well ventilated area and wear eye protection. If you have not been instructed in PCB assembly techniques, you should seek assistance from an experienced technician.

1.3 Component Protection

Integrated circuits (IC) and other semiconductor devices are static sensitive. One can easily destroy an IC with static discharge. To protect against static discharge from destroying semiconductor devices, you might want to wear a wrist grounding strap while assembling your board. Axial and radial leaded components, such as resistors and capacitors, while rugged, can be damaged by careless handling. A common failure results when the leads are bent too much and their connection to the component is weakened or broken.

1.4 Questions and Further Information on the MB2325

For technical support email all questions to tech@mekatronix.com.

1.5 Equipment Needed to Construct the MB2325

The following tools are needed to complete this board. Make sure you have them handy before you start work.

1. Soldering iron
2. 60/40 rosin core 0.032 diameter electronics solder (do not use an acid core solder or acid flux on the board)
3. Small diagonal cutters for cutting wire and headers
4. Needle nose pliers
5. Wire strippers
6. Hot glue gun and hot glue for mechanically securing wires to connectors.
7. Masking tape

1.6 Equipment Needed for Testing the MB2325

You will need the functionality or equivalent to the following equipment.

1. Multimeter
2. A MEKATRONIXTM C2325 6-wire serial cable.
3. A Personal Computer running DOS or Windows with a 25 pin serial cable connector capability for COM1 or COM2 to connect with the MB2325 board.
4. Motorola PCBUG11 (freeware) or Interactive C (freeware for versions less than 3.1) or ICC11 (purchase from a MEKATRONIXTM distributor).
5. Jumpers

2 MB2325 COMMUNICATIONS BOARD

Note:

- *top of board* refers to the side with the white part outlines and text on it.
- *bottom of board* refers to the non-text side of the board.

Figure 1 is a photograph of the MB2325 PCB and components. Table 1 on the next page lists the MB2325 parts. The part labels in Table 1 correspond to the part labels in Figure 3 (two pages hence). Figure 3 and Table 1, together, illustrate how to place the components for soldering. Usage of the MB2325 is illustrated in Figure 4. The circuit diagram of the MB2325 appears in Figure 5.

3 ASSEMBLING THE MB2325

1. Insert and solder C5 into the area designated for it . Solder the four electrolytic capacitors, C1 through C4, with polarity shown. Some polarized capacitors may have markings indicating the negative side. Observe the positive polarity of each capacitor is the pin closest to J1.

Caution: Make sure you understand the markings on the capacitor before soldering it on the board. Improperly soldered electrolytic capacitors can rupture with applied voltage.

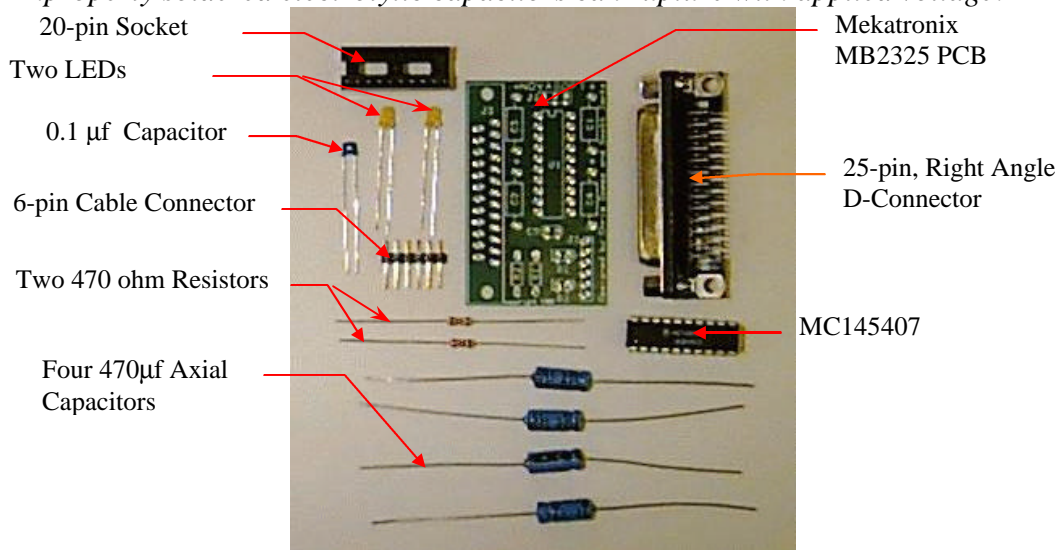


Figure 1 Layout of the MB2325 PCB and components.

2. Insert 20 pin socket SU1 into the board with notch nearest J1. Tape the socket firmly against the pc board with masking tape. Make sure the notch on the socket lines up with the notch in the outline on the top of the board. Flip the board over and solder the sockets leads, taking care to ensure that the sockets lie snug and flat against the top surface of the board. Solder opposite diagonal pins first in order to clamp the socket securely to the board. Solder the rest of the socket pins as desired.
3. Place the circuit components listed in Table 1 according to the layout shown in Figure 3 and solder them onto the board.
 - The resistors should be mounted snugly to the board. After soldering, cut excess leads from the back side of the board. Wear eye protection and deflect the leads away from your person as they can fly away with high velocity when cut.
 - The LED cathode (short lead) mounts in the hole nearest J2.

4. Cut a six pin, right angle male header and insert into J2. With the male header firmly held against the MB2325 PC board, solder one pin at the left end. Keeping the header firmly against the board solder the diagonally opposite pin. Check to make sure the header pins appear like the ones in Figure 2.

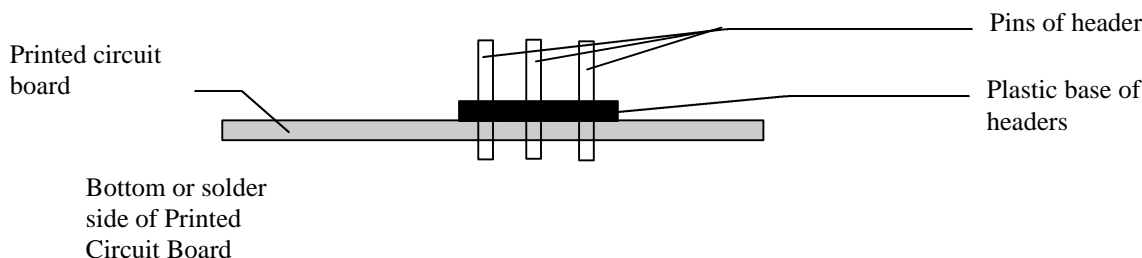


Figure 2 Proper placement of headers.

Table 1 MB2325 Parts List

Label	Value	Component Description	Polarized Device
C1-C4	10µf	Axial lead electrolytic capacitor	Yes
C5	0.1µf	Capacitor	No
D1	LED, Green	Green light indicates RXD line high, J2[2]	Yes
D2	LED, Green	Green light indicates TXD line high, J2[3]	Yes
J1	3 pin Male Header (Optional)	Jumper for DTR loop back (J1[2] shorted to J1[3])	No
J2	6 pin Right Angle Male Header	Six pin RS232C Serial communication pins	No
J3	DB25SRS	Mounting holes for the 25 pin DB25SRS connector	No
R1-R2	470Ω	Resistor	No
SU1	20 pin	Socket for U1	Yes
U1	MC145407	RS232, Driver/Receiver, 5V ONLY	Yes

IMPORTANT: If a part is polarized (last column in Table 1), then the insertion orientation is important. Incorrect insertion may cause the part to fail when power is applied.

5. Cut a 3 pin male header and solder into J1.
6. Make a 30cm six wire cable with terminated at each end with 6 pin female connectors.

4 TESTING

1. With a multimeter measure the resistance between ground and power, J2[2] and J2[4] (Figure 3). You should get an open circuit (infinite resistance). If not, check for solder bridges. After removal of solder bridges test for shorts again. Proceed to the next step only when all sources of shorts have been removed.
2. Place a jumper on J1 shorting J1[2] to J1[3] (DSR/CTS generated by DTR from Host computer) (Figure 3).

- 3.** Insert IC U1 (MC145407).
- 4.** Connect board to COM1 serial port of your computer (Figure 4). D1 should light.
- 5.** Place a scope probe on pin 5 of header J2. Using Kermit, or some equivalent serial communications program, hold down a single key for continuous transmission. The waveform generated by the ASCII bit pattern of that key should appear on the scope. The waveform should swing from 0 to 5 volts.
- 6.** Connect the MB2325 to an MRC11, a TALRIK^{II}, a TJ, a Motorola MC68HC11 SCI interface, or your own project with the appropriate 6-pin serial communications cable (Figure 4) and test the full communications capability by loading and downloading data.

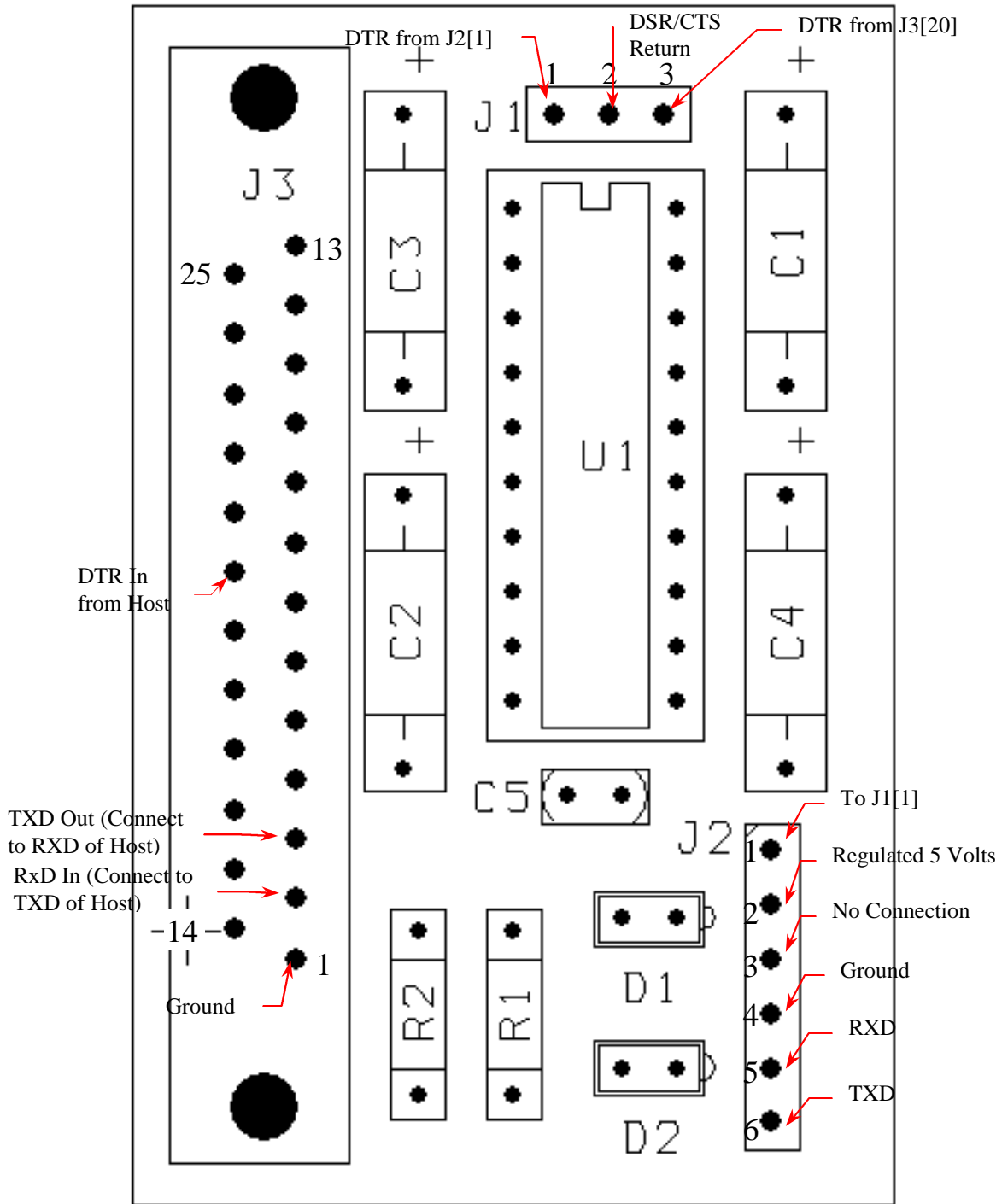


Figure 3 Layout and header pin numbers on the MB2325 board.

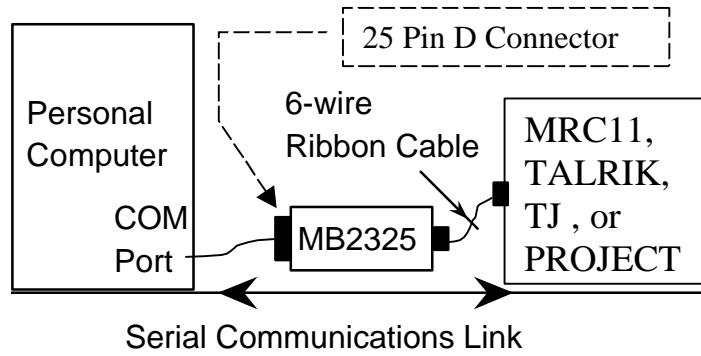
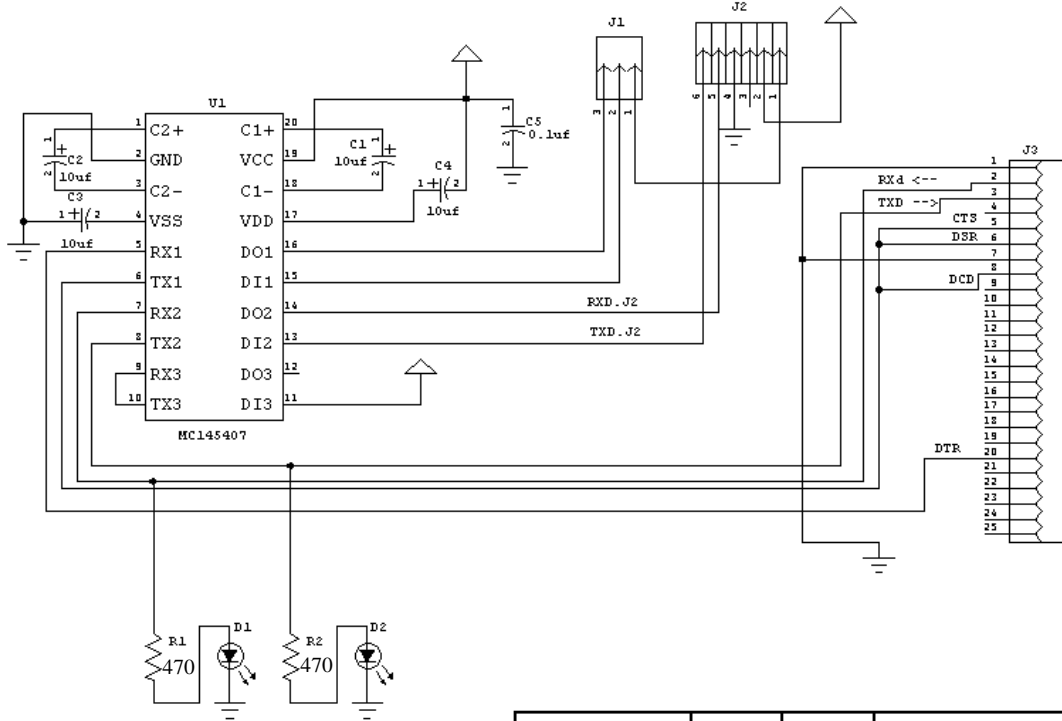


Figure 4 Configure your PC, the MB2325 communications board, and your project as shown. The MB2325 requires a 25-pin D-connector on the PC side. If the COM port on your PC has a 9-pin D-connector, you will have to get a 9-pin to 25-pin D-connector converter plug.




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Figure 5 Circuit schematic for the MB2325 bidirectional serial communications module.