# B L U E  R A M

# M O D E M  I N T E R F A C E

# O W N E R ' S  M A N U A L

(With Optional Printer Port)

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INSTALLATION. Open the ZIF socket on the Blue Ram and insert the pins of the Modem Interface box into the ZIF socket such that the cable extends to the left (away from the Blue Ram switches). Close the Blue Ram ZIF socket, carefully seating the Modem Interface box as the handle is closed. Open the ZIF socket on the Modem Interface box, insert the keyboard logic cable in the back row of pins and close that ZIF socket. Attach the 25 pin connector to the mating connector on the modem. Attach the 36 pin connector to the mating connector on the printer. IMPORTANT NOTE: This Modem Interface is specifically designed to operate with the STAR Modem from Livermore Data Systems and the Model 800B Printer from BASE$_2$. Do NOT connect other equipment without consulting Perkins Engineering. Damage to the Modem Interface may result. Consult the respective owner's manuals for the STAR and 800B for proper operation of these equipments. Interface option 15 (DEFAULT mode - see Table 3-1, page 3-10, Model 800B Manual) should be selected on the printer. Load the Modem Interface program tape in the normal way using :INPUT. This completes the installation procedure.

OPERATION. When the program tape is loaded, it will display a menu of functions on the screen. Use the keyboard to select the desired function (a RETURN is not necessary). If function 1 is selected, the modem functions are bypassed and the keyboard and printer are configured as a "typewriter." What is typed on the keyboard will be printed on the screen and on the printer when the RETURN key is pressed. Use CNTL H (hold the CNTL key and press the capital H) to make a backspace (erase). This will print a ? on the screen but will erase one character in the printer's memory. You may use any of the programming functions of the 800B printer (see Table 4-1 and 4-2). For example, pressing ESC followed by : will set the automatic form-feed mode to skip the paper to the top of the next form. Similarly you may use CNTL L to feed a form immediately. Note that the left blank key on the keyboard may be used to switch to bold print and back to normal print again. Press any key on the keypad to return to the function menu.

If function 2 is selected (normal communications function), the program is configured as a "dumb terminal" which transmits all keyboard characters and displays all characters received from the modem. If the printer is online, a hard copy is automatically made of all data received. Use of the printer is optional here.

Function 3 is similar to function 2 except that no screen display occurs. This mode is useful when a long message is being received for hard copy. The printer will run faster when screen output is suppressed. To use this mode, select function 2 first to begin the dialogue and request the data. Then press the keypad to return to the menu and select function 3 to suppress screen output. Note that this technique of function switching can be used to program the printer for auto form-feed, etc. using function 1 and then return to the function menu and select function 2 for normal communications.

Function 4 allows up to 3072 characters to be repeated for display and/or printing. When the program asks "HOW MANY CHARACTERS?" enter a number from 0 to 3071 and press RETURN. This tells the program how many characters you want repeated. A zero entry tells

the program to repeat all characters from the beginning of this block of 3072. For example, if 3500 characters had been received, the current block contains only the last 28 characters (3500-3072). Therefore, an entry of zero in this case would cause the last 28 characters to be repeated. An entry of 500 would cause the last 500 characters to be repeated. If 500 characters had not been received, garbled text will print and/or display for the characters not received. One valuable use of the repeat function is automatic duplication of a "typed" page using the zero entry. Be sure to include a form-feed at the end of the text to prevent the duplicate from beginning on the same page.

ADDITIONAL NOTES:

1. With the CAPS LOCK key latched down, all letter keys are typed as capitals and the SHIFT key shifts the letter keys to lower case. With the CAPS LOCK key up, all letter keys are typed in lower case and the SHIFT key shifts the letter keys to capitals. CAPS LOCK only affects the letter keys.

2. Communications protocols vary widely from network to network. Consult the applicable network documentation for the proper sign-on sequence.

3. If you are a member of the Source, please feel free to leave us mail messages addressed to TCV403.

# A S S E M B L Y  I N S T R U C T I O N S

1. Please read and follow all instructions carefully. They are arranged into individual steps of one or more substeps. The steps are ordered to make assembly easier and more reliable. Most steps contain quality assurance guidance which is valid only when the steps are performed in the prescribed order. A good practice is to perform a step, double check it (including all substeps), and then note its completion on the assembly instructions before going on to the next step. This is especially important if the assembly process is interrupted. Each step is important and most problems can be traced to a missed step or one which was not adequately double checked.

2. The components have been purchased in quantity from reliable sources. Occasionally substitutions are made of comparable quality but of different appearance. Errata will be included where a difference impacts the construction process or makes component recognition difficult. Refer to the parts identification list often to avoid mistakes.

3. The assembly procedure involves 15% mechanical assembly, 80% wire-wrapping, and 5% soldering. Required tools include a small Phillips screwdriver, a small straight screwdriver, a small adjustable wrench, a small sharp knife, a wire-wrap tool, a small soldering iron, and less than 6" of 60/40 rosin core solder. If you are not proficient at either soldering or wire-wrapping, refer to the quality assurance examples in their respective manuals. NOTE: The wire-wrap sockets have their pins trimmed to allow for up to three careful wraps. In most cases only two wraps are required. A given wrap should not include more than two turns of insulation to allow for other wraps on the same pin. If you have trouble controlling the number of insulation turns, it is suggested that you try an un-modified wire-wrap tool. You may wish to experiment with some extra wire until you can wrap in a proper and consistent manner. Also, consult the instructions included with your wire-wrap tool for wrap quality guidance.

4. Remember to double check each step. It is easy to mis-count pin numbers when wire-wrapping. Although this kit can be assembled in three to four hours by an average experienced kit builder, the monotony of repetitive similar wraps may lead to premature fatigue and wiring errors. Don't rush yourself. Stop and get a sandwich if you feel yourself getting tired or careless. If you have any questions not answered by these instructions, please feel free to call (not collect) Perkins Engineering at (616) 582-9832.

# P A R T S  L I S T

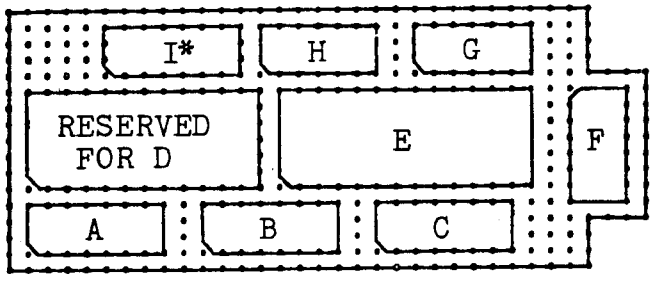
| ITEM | QTY | DESCRIPTION |
|---|---|---|
| 1. | 1 | Housing box composed of a top, a bottom, and four assembly screws. Top and bottom are double slotted. |
| 2. | 1 | Perforated mounting board with double cutouts on one end. |
| 3. | 2 | 14 pin wire-wrap IC socket. Note the angle-cut corner. Pin numbers begin with #1 closest to the angle-cut corner and continue clockwise looking from the bottom (pin side) or counter-clockwise looking from the top. |
| 4. | 5* | 16 pin wire-wrap socket. See item 3 note. |
| 5. | 2 | 24 pin wire-wrap socket. See item 3 note. |
| 6. | 1 | 28 pin wire-wrap socket. See item 3 note. |
| 7. | 1 | 24 pin ZIF socket (with locking handle). |
| 8. | 1 | 16 pin connector with 5 feet of cable attached. |
| 9. | 1 | 25 pin RS232 connector with hood. |
| 10. | 1 | 36 pin Centronics type connector with hood. (Optional with printer port). |
| 11. | 29+ | 3" wire-wrap wires. Note that the measurement refers to the overall length. |
| 12. | 17+ | 3½" wire-wrap wires. |
| 13. | 15+ | 4" wire-wrap wires. |
| 14. | 16+ | 4½" wire-wrap wires. |
| 15. | 9+ | 5" wire-wrap wires. |
| 16. | 8+ | 5½" wire-wrap wires. |
| 17. | 1 | 14 pin component carrier. |
| 18. | 1 | 1uf 35v tantalum capacitor. Note + polarity. |
| 19. | 1 | 47pf capacitor (disc). |
| 20. | 1 | 2N2907 PNP transistor (plastic). |

*One socket for printer port option.

| ITEM | QTY | DESCRIPTION |
|---|---|---|
| 21. | 2 | 4700 ohm (yellow-violet-red) ¼ watt resistor. |
| 22. | 2 | 11K ohm (brown-brown-orange) ¼ watt resistor. |
| 23. | 1 | 22K ohm (red-red-orange) ¼ watt resistor. |
| 24. | 1 | 33K ohm (orange-orange-orange) ¼ watt resistor. |
| 25. | 1 | 4023 or MM5623 integrated circuit. |
| 26. | 1 | CD4518B or MC14518UB integrated circuit. |
| 27. | 1 | CD4049B or MC14049UB integrated circuit. |
| 28. | 1 | CD4027B or MC14027UB integrated circuit. |
| 29. | 1 | D8251C or INS8251 intergrated circuit. |
| 30. | 1* | CD4050B or MC14050UB integrated circuit. |

## A S S E M B L Y  P R O C E D U R E

1. Insert the 14 and 16 pin sockets into the perforated mounting board as shown in the following diagram. Add the 28 pin socket.

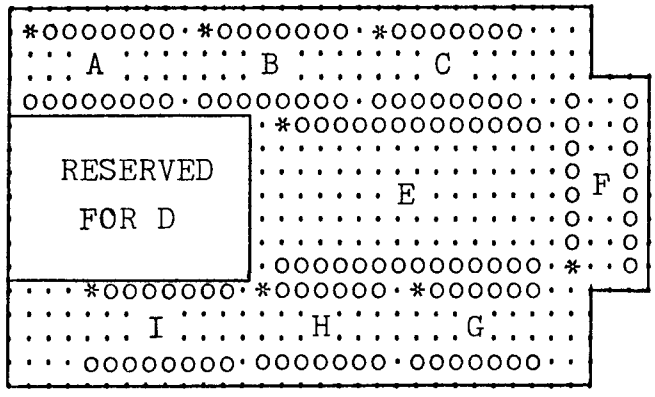



NOTE that this is the TOP view (pins protruding down through the board).

Note the location of the angle-cut corner of each socket.

*For printer port only.

2. Turn the mounting board with sockets over such that the pins are up and the mounting board rests on the sockets. The following several steps consist only of wire-wrapping. The steps are broken into several substeps, each of which contain several wire-wraps. The wire-wrap directions are tabularized into the following format: S(n)-D(n) L" where S=starting socket and pin#, (n)=number of wires on that pin so far (after this one is wrapped), D=destination socket and pin#, and L=overall wire length. C10(1)-C11(1) 3" for example, means wrap one end of a 3 inch wire to pin 10 of socket C (where this is the only wire there so far) and the other end to pin 11 of socket C (where again this is the only wire there so far). Be sure to allow enough room for two wraps on each pin. The wraps will hold the sockets in the board. Dress wires neatly against the board. Route wires between rows of socket pins. DO NOT allow any wires to enter the area reserved for socket D.




BOTTOM VIEW

Note that pin 1 has been marked with an asterisk (*).

Use this diagram to assist in socket and pin number location.

3. Proceed with wire-wrapping as follows. Remember to count pin numbers carefully. Count clockwise from pin 1.

C10(1)-C11(1) 3"
C11(2)-C16(1) 3"
C16(2)-B1(1) 3½"
B1(2)-A10(1) 3"
A10(2)-A16(1) 3"
E26(1)-H14(1) 3"
H14(2)-G14(1) 3½"
E4(1)-A1(1) 4½"

H7(1)-G7(1) 3½"
F1(1)-F8(2) 3½"
G5(1)-G13(1) 3"
G3(1)-G4(1) 3"
G4(2)-F14(1) 3½"
G6(1)-G14(2) 3"
G1(1)-E11(1) 3½"
G8(1)-E8(1) 4"

A1(2)-A8(1) 3½"
A8(2)-B8(1) 3½"
B8(2)-C4(1) 3"
C4(2)-C12(1) 3"
C12(2)-C7(1) 3"
C7(2)-C8(1) 3"
C8(2)-C9(1) 3"
C9(2)-F8(1) 3"

G12(1)-F16(1) 3½"
G2(1)-E19(1) 3"
A2(1)-A14(1) 3"
A7(1)-A15(1) 3"
H1(1)-H2(1) 3"
H2(2)-H10(1) 3"
H10(2)-H8(1) 3"
H8(2)-C5(1) 4"

4. Continue wire-wrapping as follows. Snug wraps against board to ensure that sockets are held tight.

A9(1)-B2(1) 3"
B2(2)-C3(1) 3½"
C3(2)-E20(1) 3½"
A7(2)-C1(1) 4"
A5(1)-H11(1) 4½"
A11(1)-H13(1) 4½"

A12(1)-H12(1) 4½"
C6(1)-H9(1) 4"
C2(1)-C13(1) 3"
C15(1)-E9(1) 3"
E9(2)-E25(1) 3½"
E3(1)-B12(1) 3"

4a. FOR PRINTER PORT OPTION ONLY. Make the following wire-wrap connections:

G7(2)-I8(1) 4"
G6(2)-I1(1) 5"
B5(1)-B15(1) 3"
G9(1)-H5(1) 3½"
H5(2)-H3(1) 3"
H3(2)-H4(1) 3"
H6(1)-B7(1) 4"

E1(1)-B14(1) 3"
E2(1)-I7(1) 4"
E5(1)-I5(1) 4"
E6(1)-I11(1) 4"
E7(1)-I9(1) 4"
E27(1)-I14(1) 3½"
E28(1)-I3(1) 3½"

NOTE: Step 10 may have been completed by the factory. If the 36 pin connector is already attached to the cable, skip step 10.

5. Continue wire-wrapping as follows. Take time to do it neatly.

| | |
|---|---|
| E17(1)-E22(1) 3" | I15(1)-F13(1) 5½"* |
| E22(2)-B10(1) 3½" | I2(1)-F4(1) 5½"* |
| B9(1)-F15(1) 4½" | B4(1)-F12(1) 4½" |
| B11(1)-F2(1) 4½" | I6(1)-F5(1) 5"* |
| G10(1)-F9(1) 4" | I4(1)-F11(1) 5½"* |
| G11(1)-F7(1) 4" | I12(1)-F6(1) 5½"* |
| B6(1)-F3(1) 4½" | I10(1)-F10(1) 5½"* |

6. Set the board aside for a moment and place a 24 pin socket pins up in front of you. Wrap one end of the following wire lengths to the specified pins and fold the wire upward along the pin when each wrap is complete.

| | | |
|---|---|---|
| Pin 1 5" | Pin 8 4½" | Pin 16 4½"* |
| Pin 2 5½" | Pin 9 4½" | Pin 17 4½" |
| Pin 3 5" | Pin 10 5" | Pin 18 5" |
| Pin 4 5" | Pin 11 4" | Pin 19 5" |
| Pin 5 5" | Pin 13 4" | Pin 20 5½" |
| Pin 6 4½" | Pin 14 4½" | Pin 21 5½" |
| Pin 7 4" | Pin 15 4½" | Pin 22 4½" |

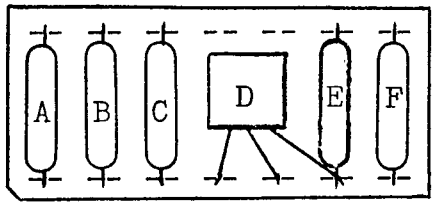
7. Turn the board right side up and align the 24 pin socket with the area reserved for D. Observing where the pins would enter the board in area D, thread the wrapped wires through the board exactly two holes in from where the pins would enter. The result should be two rows of wires two holes apart. Now insert the 24 pin socket into the board at its proper location. Note that it will only enter part way because of the wire-wraps on its pins. Turn the board over and complete the following wire-wraps. Be sure to route all wires down the center of the D area. Each wire should have about ½" of slack after each wrap is complete.

| | | |
|---|---|---|
| D1-E4(2) | D8-E28(2) | D16-H4(2)* |
| D2-E8(2) | D9-E27(2) | D17-E21(1) |
| D3-E7(2) | D10-C10(2) | D18-E11(2) |
| D4-E6(2) | D11-B13(1) | D19-E10(1) |
| D5-E5(2) | D13-H7(2) | D20-E13(1) |
| D6-E2(2) | D14-G10(2) | D21-E12(1) |
| D7-E1(2) | D15-G11(2) | D22-E26(2) |

This completes all wire-wrapping. Place the remaining 24 pin socket top over the wires in the D area and force the two 24 pin sockets together, totem-pole style.

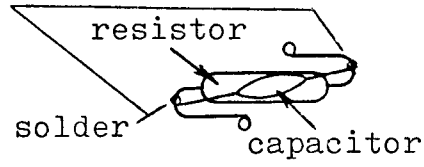
*Omit these connections if printer port is not included.

8. Warm up your soldering iron. This step connects all discrete components. Locate the component carrier and lay in the following components as shown in the diagram. Note that the transistor lies with its flat side against the component carrier. Clip off excess leads and solder components to the carrier.




A = 22K ohm resistor
B = 4700 ohm resistor
C = 33K ohm resistor
D = 2N2907 transistor
E = 11K ohm resistor
F = 11K ohm resistor

Form the leads of a 4700 ohm resistor into a "S" shape and then make a single wrap of the leads of a 47pf capacitor at the widest part of the "S" (see inset). Make a small loop in each of the resistor leads about ½" from the resistor body and clip off the excess length. Leads should loop away from the resistor body. Place one loop over B3 and the other over B13 and solder the leads to those pins. Forming similar loops in the leads of the 1uf capacitor about ¼" from the capacitor body, place the looped lead closest to the + marking over C16 and the other over B8 and solder in place. NOTE: Adjust the discrete components such that they do not touch other pins and are even with or below the height of the socket pins. This completes the discrete component connection.




9. This is the final soldering step and completes the cable assembly. Notice the markings on the cable near the 16 pin plug end closest to pin 16 on the plug. Trace these markings to the other end and separate five wires from that side. Using a tearing motion separate the cable (all but 3") toward the plug. The result should be a five wire bundle and an eleven wire bundle with the five wire bundle entering the plug at pin 16. Separate the wires of the five wire bundle back about 1" and strip about 1/8" of insulation from the end of each wire and apply solder to "tin" the ends. Counting the wires from 1 (closest to the outside - pin 16) to 5, solder them to the pins of the 25 pin RS232 plug as follows.

Wire 1 to Pin 10
Wire 2 to Pin 7
Wire 3 to Pin 5
Wire 4 to Pin 3
Wire 5 to Pin 2

Attach the RS232 plug hood to the plug and tighten the hood assembly.

10. Complete this step for the printer option only. Separate the wires of the eleven wire bundle and strip and tin them as in the previous step. Pass the cable through the hood and solder them to the pins of the 36 pin Centronics type connector as follows. Again, wire 1 will be the one closest to the outside (pin 8).

| | |
|---|---|
| Wire 1 to Pin 14 | Wire 7 to Pin 5 |
| Wire 2 to Pin 13 | Wire 8 to Pin 4 |
| Wire 3 to Pin 11 | Wire 9 to Pin 3 |
| Wire 4 to Pin 8 | Wire 10 to Pin 2 |
| Wire 5 to Pin 7 | Wire 11 to Pin 1 |
| Wire 6 to Pin 6 | |

This completes the cable assembly. Plug the 16 pin plug of the cable into socket F such that the cable extends away from the board.

11. Plug the component carrier into socket G ensuring that the angle-cuts align. Similarly plug the integrated circuits into their sockets ensuring proper alignmemt. Pin 1 is denoted on the integrated circuits by a small dot or notch near one end. This end should align with the angle-cut end of the socket.

| | |
|---|---|
| Socket A - CD4518B | Socket E - D8251C |
| Socket B - CD4049B | Socket H - CD4023B |
| Socket C - CD4027B | Socket I - CD4050B* |

*For printer port only.

12. Place the board assembly in the housing bottom such that the pins of socket D protrude through the bottom slots. The cable should rest in a shallow notch at the end. Place the housing top over the bottom and allow the top of socket D to protrude through the slots in the top. Seat the top and fasten it with the four housing screws provided. Align the 24 pin ZIF socket with socket D in the top such that the handle is adjacent to the angle-cut. Press it firmly into place. This completes the entire assembly procedure. Consult the MODEM Test Procedure for final checkout. Note that the timing signal required to establish the 300 BAUD rate is derived from the Bally's clock so there are no adjustments necessary.

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