Raster Technologies

Model One/80

INSTALLATION GUIDE

Revision 3.0

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TABLE OF CONTENTS

TABLE OF CONTENTS, continued

Figures

1.0 INTRODUCTION

This manual provides a complete guide for the installation of the Model One/80. In addition, it provides instructions for assembly of those Model One/80s shipped disassembled (with the boards separated from the chassis) and for replacement of individual boards.

Section 2 gives a brief description of the Model One/80.

Section 3 describes how to unpack the Model One/80.

Section 4 provides complete assembly instructions for those Model One/80s shipped with the boards separated from the chassis; this section can also be used to replace individual boards. (NOTE: boards should not be replaced without consulting your Raster field office or local representative, as injudicious modifications may void your warranty.)

Section 5 covers the installation of the assembled Model One/80, terminal, Raster keyboard, monitor, and tablet or mouse. Environmental specifications are also covered.

Section 6 provides instructions for testing the Model One/80 system before connecting it to the host computer.

Section 7 explains how to configure the Model One/80's RS-232 ports.

Section 8 describes the serial and DMA interfaces to the host computer and explains how to connect the Model One/80 system to the host computer.

Five appendices provide the details of the digitizing tablet DIP switch settings, the memory unit DIP switch settings, the pinouts for the RS-232 and DMA interfaces, the jumpers on the graphics processor (GPU) board, and describe how to change the GPU board PROMs.

2.0 THE MODEL ONE/80: A BRIEF DESCRIPTION

The Model One/80 is a high-resolution, high-performance graphics system. It provides up to 1280x1024 display resolution, with 8 or 24 bit planes. The refresh rate is 30 or 60 Hz, and is switchable under software control. Vector writing rates are over 60,000 vectors per second; the pixel update time can be as fast as 9.5 nanoseconds per pixel. Over 150 graphics commands are available, including display list and shaded rendering firmware. Diagnostics commands simplify testing.

The Model One/80-S is a specialized system for displaying locally shaded and Z-buffered polygons. (The standard graphics primitives are also available.) The 1280x1024 memory may be "folded" under software control to produce a 640x512 shading memory and Z-buffer memory.

All Model One/80s incorporate standard RS-232 interfaces. A DMA interface is standard as well. Self-testing is done on power-up; in addition, a complete set of diagnostics may be run under user control.

3.0 UNPACKING YOUR MODEL ONE/80

When you receive your Model One/80, you should inspect the boxes you receive for external damage. If there is any damage, report it to your shipper immediately and contact Raster Technologies or your local representative.

Your Model One/80 may be shipped with the printed circuit boards separate from the chassis. In this case, follow the unpacking instructions below, then continue to section 4.0. If your Model One/80 is shipped completely assembled, skip section 4.0 and continue to section 5.0.

You will be shipped:

* Large box: Model One/80 chassis (with boards for Model One/80s shipped assembled), documentation notebook, cables
* Smaller "pizza" boxes: these boxes continue the printed circuit boards for Model One/80s where the boards are shipped separately from the chassis
* Keyboard (if ordered)
* Monitor (if ordered)
* Data tablet or mouse (if ordered)

Examine all the components as you unpack them. If there is any damage, contact your shipper and Raster Technologies (or your local representative) immediately.

If your unit was shipped with the boards separate from the chassis, continue to section 4.0; otherwise, continue with section 5.0.

4.0 ASSEMBLING THE MODEL ONE/80

When you receive a disassembled Model One/80, remove the front panel of the chassis and look inside. (You may need a 5/16" wrench to remove the nuts holding the front panel in place.) On the "floor" of the chassis is a label which indicates which board goes into which slot. It also indicates what the board's DIP switch settings are (if the board has a DIP switch). Section 4.1 and 4.2 describe how to assemble the Model One/80 using the information on the label and on the board packaging. You will need the information in the other sections only if this label is missing, or if you are replacing boards or upgrading a system.

You should write down the serial numbers of your boards and their DIP switch settings before you assemble the system; the chart below duplicates the Model One/80's label. You will need this information if you are contacting Raster or your representative for field service or upgrade information.

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NOTE: SLOT 1 = TOP SLOT

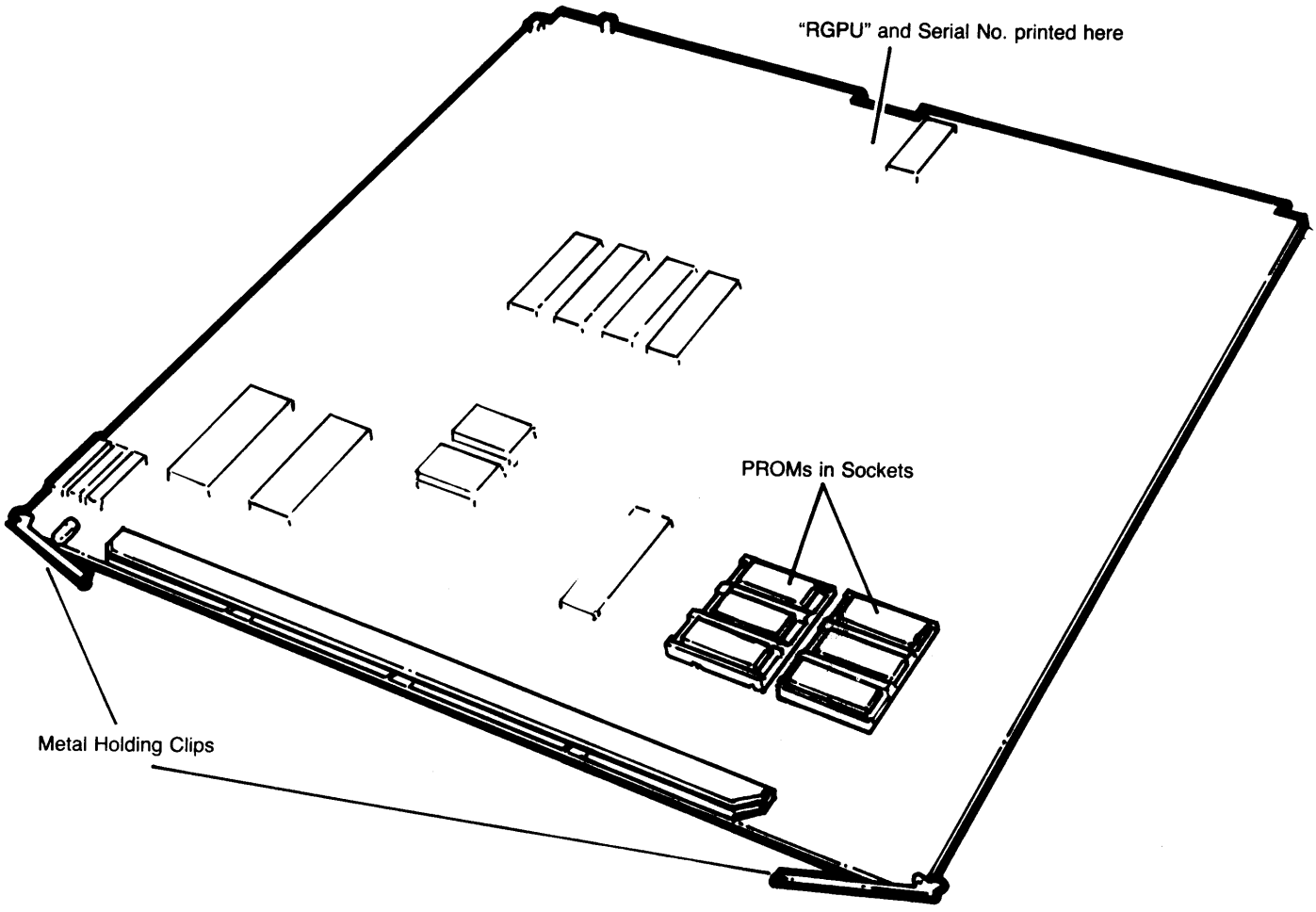
		SWITCH X=ON					
SLOT 1							
SLOT 2							
SLOT 3							
SLOT 4							
SLOT 5							

4.1 Recognizing the Boards and Preparing for Assembly

When you remove the boards from their packaging, you should find the serial number and type of board written on the outside of its plastic wrapper. Keep this information with the boards, as it will greatly simplify assembling the Model One/80. If this information is not on the packaging, keep reading this section; otherwise, skip to section 4.2.

The GPU board can be identified by several characteristics. If you hold the board with the chips up and the metal holding clips toward you (one in each hand), it has six PROMs (with white labels) in the closest right corner. Second, if you look at the gold fingers (on the edge furthest from you), you will see "RASTER TECHNOLOGIES RGPU," the Raster part number, and a hand-scratched serial number. Figure 4.1 shows the GPU board and its identifying characteristics.

The memory boards can be identified by once again holding the board with the chips up and the metal holding clips toward you, one in each hand. Then, by your right hand will be three DACs. In the middle of the side closest to you is the six-position DIP switch used to set the memory board configuration. (Appendix II gives details of this DIP switch, should you wish to verify the setting. Normally, the factory settings are correct and the DIP switch need



The GPU Board

Figure 4.1 The GPU Board

not be reset.) On the far side by the gold fingers is the identifier "GMU" (Graphics Memory Unit).

Should you have a 24 bit plane system, there will be three memory boards. In this case, one--and only one--of the boards must be terminated. To recognize which board is terminated, look at the lower-right corner of the board (with one holding clip in each hand and the fingers away from you). Between the two chips closest to that corner and next to the connector strip on the terminated board are four small black jumpers, about 3/8" tall and 1/4" wide. Figure 4.2 shows the two versions of the memory unit: an unterminated memory unit is shown in Figure 4.2A, and a terminated unit is shown in Figure 4.2B.

The bulk memory card can be identified by its limited number of gold fingers, by the large amount of board space labeled "SPARE," and by the text "BULK MEMORY." (The bulk memory card is optional and may not be part of your Model One/80.)

Once you have identified the cards, label them and put them to one side.

4.2 How to Insert the Printed Circuit Boards

To insert the printed circuit boards into the Model One/80 chassis, follow these steps:

1. Unplug the Model One/80 chassis entirely by disconnecting the power cable.

2. Place the chassis right side up with the front panel facing you.

3. Remove the front panel (by unscrewing the holding nuts (5/16" inch wrench) on each side) and put it to one side, making sure you don't lose the holding nuts.

4. Slide the circuit board into the correct slot (see sections 4.3 through 4.6), with the metal holding clips outward. WHEN THE BOARD IS ALMOST IN, HOOK THE CLIPS CAREFULLY INTO THE END OF THE SLOT AND PRESS AGAINST THE CLIPS THEMSELVES TO SEAT THE BOARD PROPERLY. It also helps to use the edge of the side panels as a grasping point, to obtain the needed leverage to push the board in. The last quarter-inch can be somewhat resistant; do not hesitate to push firmly on the edge of the board.

   NOTE: You cannot always use the holding clips to push to boards in. You may have to push on the connector housings on the edge of the board, or pull the center of the board up gently to make sure it doesn't sag.

Figure 4.3 shows how to insert a board into the chassis.

4.3 The 8-Bit Model One/80

The 8-Bit Model One/80 uses two printed circuit boards: the GPU and a single terminated memory unit. The GPU is placed into slot 1 (the top slot), the memory unit into slot 3.

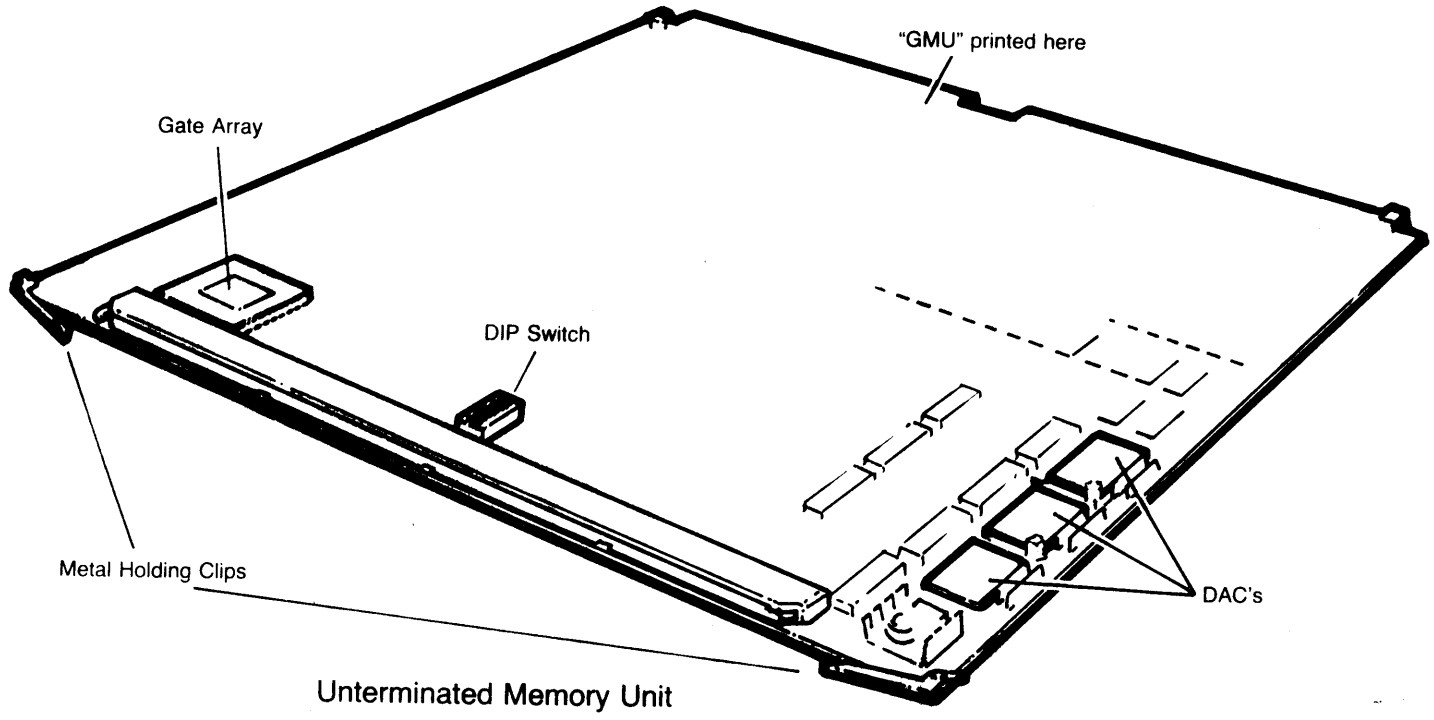


Figure 4.2A The Unterminated Memory Board

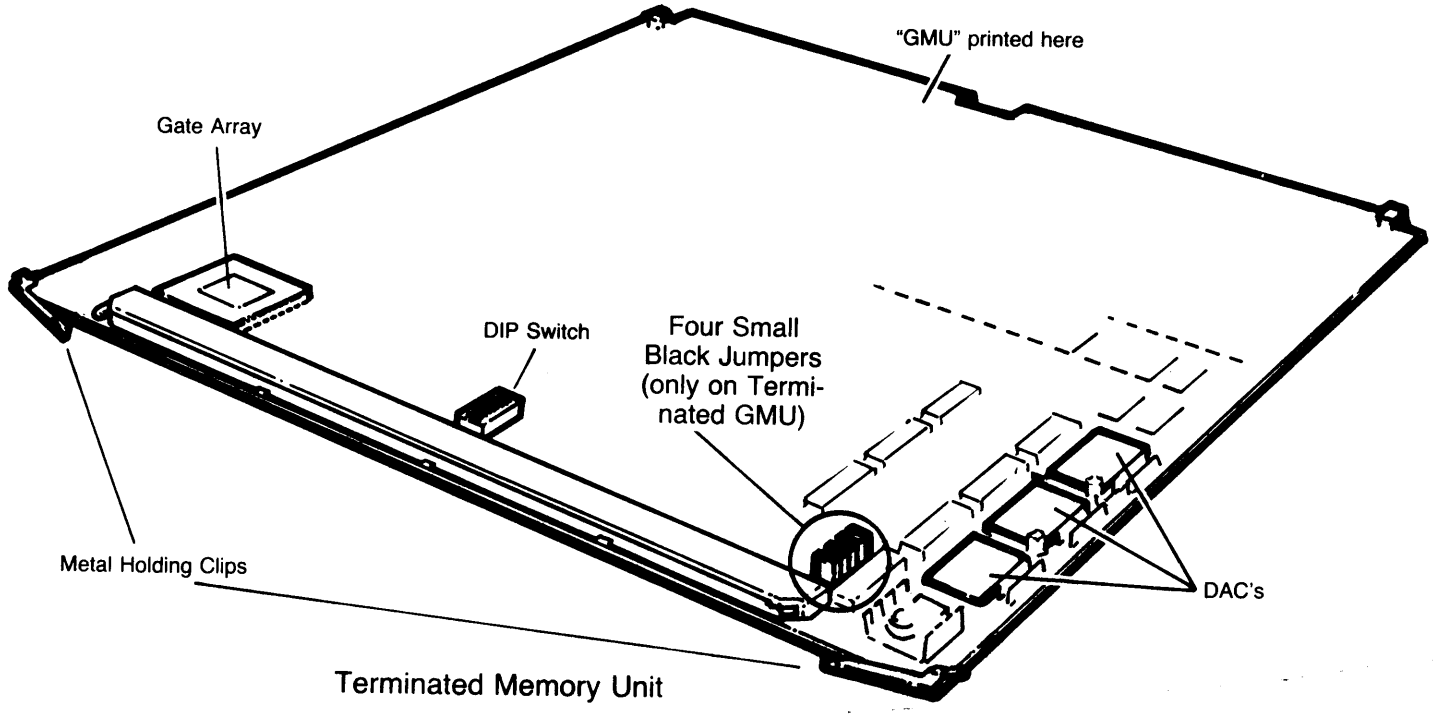


Figure 4.2B The Terminated Memory Board

If your Model One/80 includes an additional bulk memory card, insert the card into slot 2.

After the boards are inserted firmly into the chassis, connect all four cables to each pair of connectors.

Figure 4.4 shows the assembled 8-bit Model One/80.

Replace the front panel. If you have difficulty replacing the front panel, try loosening the top cover screws and placing the unit so that the front overhangs the supporting surface (over the edge of a table, for example). Then lift the top cover slightly and replace the front panel. Retighten the top cover screws. The front panel includes a metal rope used for shielding; do not remove this rope. This rope should be wholly within the cabinet after the front panel is in place.

Assembly of the Model One/80 is now complete.

4.4 The 24-Bit Model One/80

The 24-bit Model One/80 uses four printed circuit boards: the GPU and three memory units. One memory unit is terminated; the other two are not. The GPU is placed into slot 1 (the top slot). The unterminated memory units go into slot 3 and 4; the terminated memory unit into slot 5.

If your unit includes a bulk memory card, insert the card into slot 2.

After the boards are inserted firmly into the chassis, connect all four cables to each group of connectors.

Figure 4.5 shows the assembled 24-bit Model One/80.

Replace the front panel. If you have difficulty replacing the front panel, try loosening the top cover screws and placing the unit so that the front overhangs the supporting surface (over the edge of a table, for example). Then lift the top cover slightly and replace the front panel. Retighten the top cover screws. The front panel includes a metal rope used for shielding; do not remove this rope. This rope should be wholly within the cabinet after the front panel is in place.

Assembly of the Model One/80 is now complete.

4.5 Adding the Display List Bulk Memory Card

If your unit includes a bulk memory card, it should be inserted into slot 2. After all the boards are inserted into the chassis, connect all four cables to each group of connectors.

Figure 4.6 shows a 24-bit Model One/80 with a bulk memory card.

If your system uses more than one bulk memory card, the extra cards will be inserted into the first available slot.

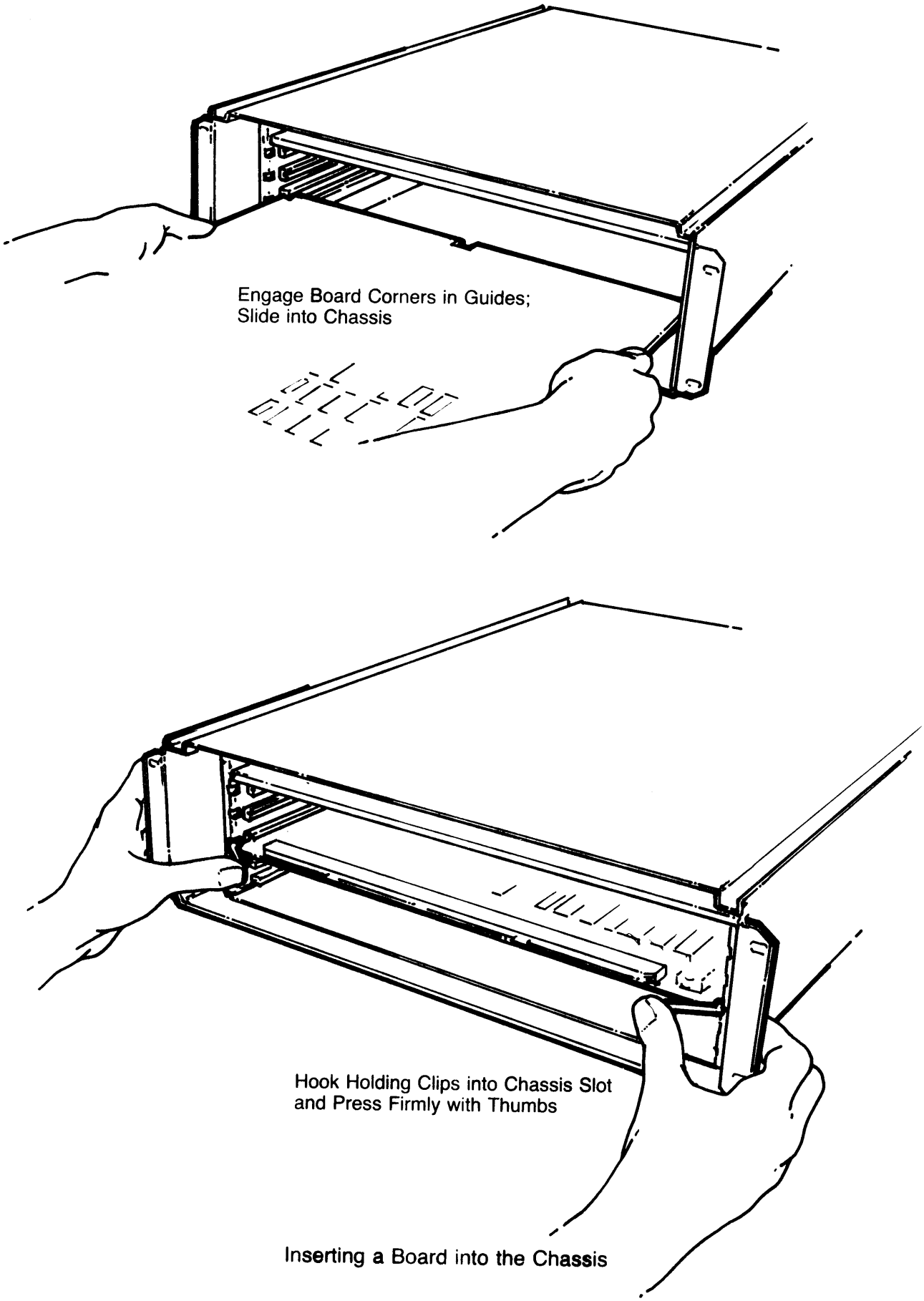
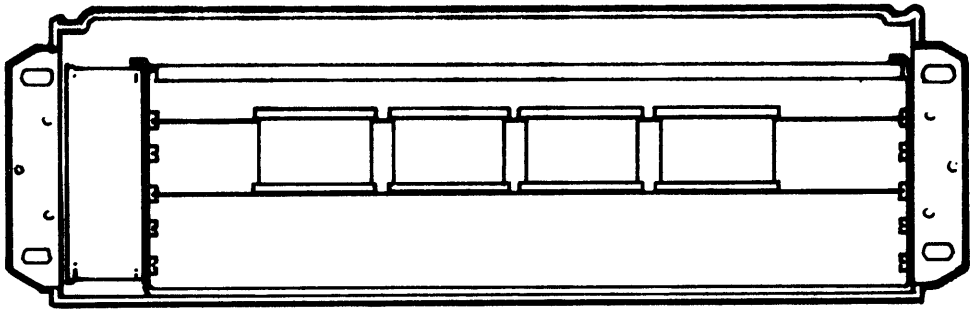
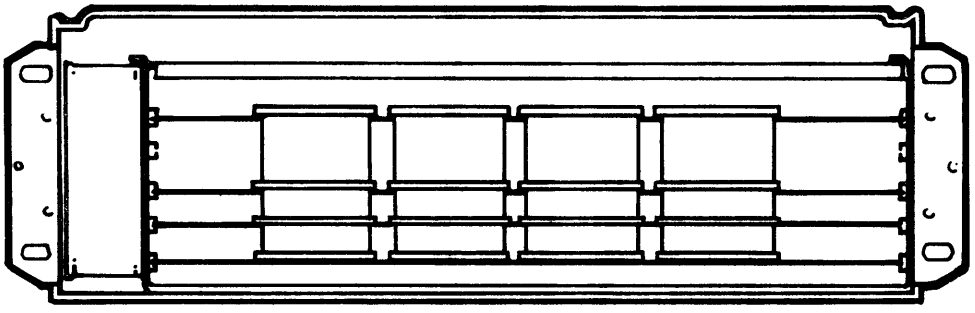


Figure 4.3 Inserting a Board Into the Chassis



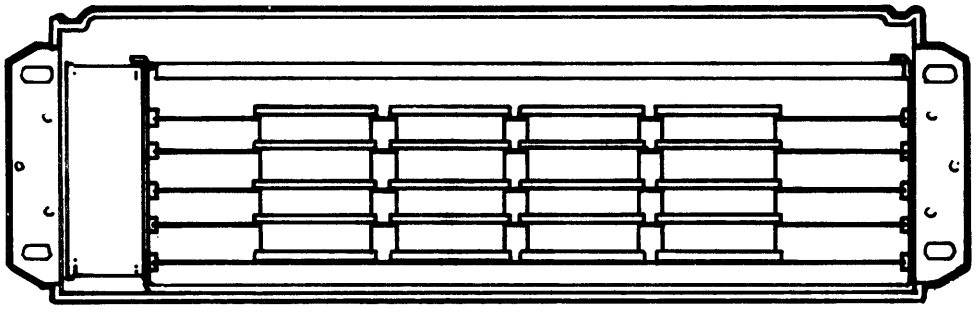
The 8-bit Model One/80

Figure 4.4 The 8-Bit Model One/80



The 24-bit Model One/80

Figure 4.5 The 24-Bit Model One/80



The 24-bit Model One/80 with Bulk Memory Card

Figure 4.6 The 24-Bit Model One/80b with the Bulk Memory Card

5.0 INSTALLING THE MODEL ONE/80

5.1 Environmental Specifications

The Model One/80 can be operated in an office or industrial environment. It requires one inch of clearance on the vented sides. The monitor should not be placed on top of the Model One/80.

The specifications for the Model One/80 are:

* Dimensions: 5.25 x 17.25 x 24 inches
* Weight: 50 pounds
* Operating Temperature: 0 to 40 degrees Celsius
* Maximum Humidity: 95
* Power Consumption: 750 watts
* Noise Level: 53 DBA
* Voltage Requirements: 110 VAC or 220 VAC, 60 or 50 Hz
* Video Output: RS-343/noninterlaced or interlaced scan (software selectable)
* Interfaces: 4 RS-232 interfaces; HOST, ALPHA, and TABLET have 25-pin female RS-232 D-connectors; KEYBD has 15-pin female RS-232 D-connector. A DMA interface is standard.

The Model One/80 is a Class A computing device.

The Model One/80 can be used with its own keyboard and the alphanumeric terminal emulation firmware, or it can be used with a separate alphanumeric terminal.

5.2 Connecting the Interactive Devices

You can connect the following interactive devices to the Model One/80:

- display monitor
- keyboard
- alphanumeric terminal
- digitizing tablet
- mouse.

The rest of this section describes how to connect these devices. Figure 5.2 is a diagram of these devices connected to the Model One/80.

5.3 Connecting the Display Monitor

To connect the display monitor to the Model One/80, connect the three R, G, B cables (BNC cables) to the red, green, and blue outputs on the Model One/80's back panel and to the corresponding red, green, and blue inputs on the back of the monitor. Set the monitor's termination switches to 75 ohms for a single monitor; for daisy-chained monitors, set the intermediate monitors to high, with the monitor furthest from the Model One/80 at 75 ohms.

Make sure your monitor (if you did not buy it through Raster Technologies) can use sync-on-green instead of a separate sync signal. In addition, because the Model One/80 supplie sync on the green cable, you may not have any picture or have an unstable picture if the green channel is not connected properly.

After you have connected the monitor to the Model One/80, connect the Model One/80's power cable and plug it in. If necessary, connect the monitor's power cable and plug that in as well.

Note: You should wait .5 to 1 second between powering off the Model One/80 and powering it back on, to allow the power supply to fully discharge.

5.4 Installing the Raster Keyboard

If you are using a separate terminal, skip to section 5.5.

To connect the Raster keyboard to the Model One/80, plug in the D-connector (15 pin) on the keyboard cable to the connector labeled KEYBD on the back panel of the Model One/80. The ON-LINE light at the keyboard will then light up when the Model One/80's power is on. The back panel of the Model One/80 is shown in Figure 5.1.

After connecting the keyboard, turn on the system by pressing the ON switch on the back panel. (Make sure everything is plugged in first.) After a few seconds, press the RESET button. Now, you should be able to communicate with the Model One/80 and have your input displayed on the monitor. Type a [CTRL-D] at the keyboard; you should see the ! prompt on the monitor. If you do not, you will have to type blindly for several graphics commands, to enable the keyboard communications.

Follow these steps to enable the keyboard communications if the prompt is not visible:

1. Type [CTRL-D].

2. Type these commands:

```
DEF 0                    (Define window 0, using defaults)
SEL 0                    (Select window 0, using defaults)
VL 17 0 0 0              (Set background to black)
ALPHEM ON                (Enable alpha emulation)
```

3. After you have enabled keyboard communications by using the above commands, type the command SAVCFG (described in detail in section 7), a carriage return, and answer "Y" when asked to verify the configuration (again followed by a carriage return). This will set the Model One/80's internal configuration so that the above commands will be executed whenever the system is turned on. (To disable the alphanumeric emulation and keyboard communications, type ALPHEM OFF and re-execute the SAVCFG command.)

5.5 Installing the Alphanumeric Terminal

To install your alphanumeric terminal as part of your Model One/80 system, first connect it directly to your host computer and verify that it is working and that communications can be done with your host computer. This will simplify connecting the Model One/80 to your host computer later. Make a note of the number of stop bits used, the number of bits in a character (7 or 8), the parity and the baud rate of the line.

The alphanumeric terminal must be set to correspond with the default configuration for the alphanumeric interface port on the Model One/80 before the terminal can communicate successfully with the Model One/80. The default configuration is: baud rate, 9600; parity, none; stop bits, 2; and an 8-bit character length. Once the terminal has been set for this configuration, connect the terminal to the Model One/80's ALPHA connector on the back panel.

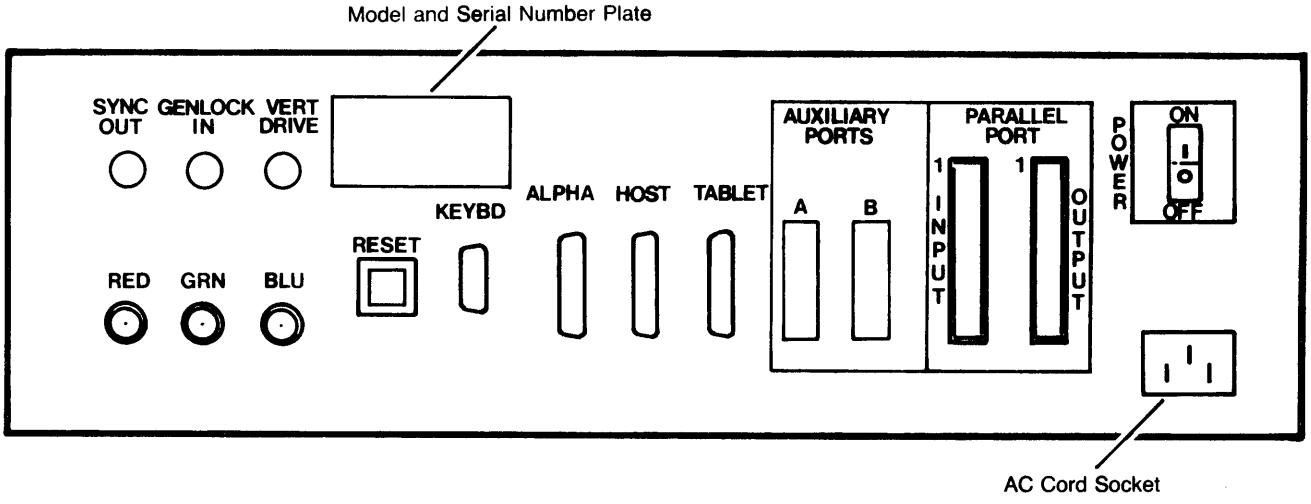
The pinouts are given in Appendix III. All connectors are 40-pin D-connectors.

The Model One/80's back panel is shown in Figure 5.1.

Once you have connected the terminal to the Model One/80, turn on the Model One/80 (and the terminal). The message "Model One/80 Display Controller" will appear on the terminal screen. If it does not, recheck the terminal parameters and press the RESET button. (It takes from ten to thirty seconds for the message to appear, since the Model One/80 performs an extensive set of internal diagnostics before sending this message.)

The Model One/80 may print internal diagnostic error messages instead. In this case, first try pressing the RESET button again; then, if you still receive error messages, contact Raster Technologies or your local representative for assistance. Make a note of the error messages before you call.

If the message still does not appear, try resetting the applicable parameters on the terminal to other values and pressing the RESET switch between each try; some terminals simply do not have the capability to set some parameters. (Don't forget that you may have to power the terminal off and on again to reset its internal parameters.)



The Model One/80 Back Panel

Figure 5.1 The Model One/80 Back Panel

5.6 The Digitizing Tablet

5.6.1 Setting the Tablet DIP Switches

The digitizing tablet's DIP switches will be set at the factory to correspond to the default settings for the TABLETSIO port. If you are supplying your own tablet, the tablet must have an RS-232C interface and be compatible with the Summagraphics Bit-Pad family or the GTCO Digi-Pad 5. The tablet should be set as follows:

9600 baud
8-bit binary transmission
Parity disabled
Continuous output
30 updates per second (target rate: you may have to set the tablet to slightly more or less)

The SYSCFG SERIAL TABLET command sets the tablet port for the type of tablet being used. In addition to SYSCFG SERIAL TABLET, you have to specify the type of tablet, as shown below:

GTCO	GTCO tablet
SUMMA	Summagraphics Bit-Pad
NGRID	Summagraphics Microgrid

Appendix I gives the DIP switch settings for the GTCO Digi-Pad, Summagraphics Bit-Pad and Summagraphics Microgrid digitizing tablets.

5.6.2 Connecting the Digitizing Tablet

To connect the digitizing tablet, connect the RS-232C cable to the TABLET port on the back panel of the Model One/80 and to the J5 connector on the GTCO tablet. Plug in the power supply. Connect the cursor or stylus to the tablet.

Testing of the digitizing tablet is covered in section 6.

5.6 The Mouse

To connect the mouse, connect its RS-232 interface cable to the TABLET port on the back panel of the Model One/80. There are no DIP switches to set. Plug in the power supply.

The SYSCFG SERIAL TABLET RMOUSE command sets the tablet port for the mouse being used. The Mouse Systems mouse is shipped configured to work with the Model One/80; if you use another mouse, it must have its configuration parameters set as for the tablet (see Section 5.5.1).

Testing of the mouse in covered in section 6.

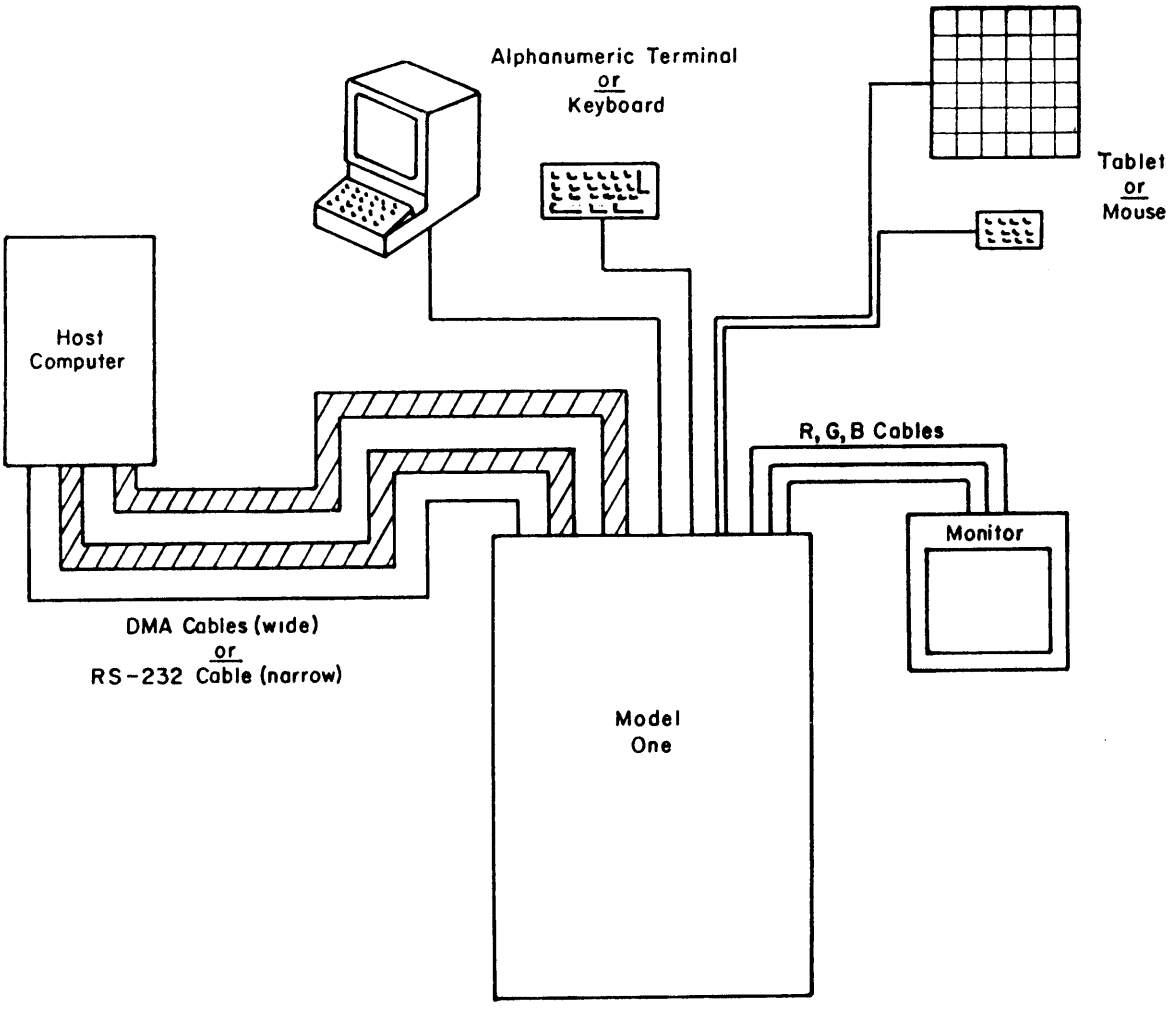


Figure 5.2 Model One/80 With Interactive Devices Connected

- All connections to the Model One are through the back panel.
- The Model One is connected to the display monitor by three BNC cables (red, green, and blue).
- The Model One can be connected to either an alphanumeric terminal (which includes a keyboard) or simply a keyboard (but not usually both)
- The Model One can be connected to either a digitizing tablet or a mouse (but not both at the same time, since they both use the TABLET port).
- The Model One is connected to the host computer by either two DMA cables or one RS-232 cable (see Section 8).

6.0 STAND-ALONE TESTING

At this point, you should have an assembled Model One/80 (section 4), with the Raster keyboard or alphanumeric terminal connected (sections 5.3 and 5.4), the monitor connected (section 5.7), and possibly a mouse or digitizing tablet (sections 5.5 and 5.6). Follow these steps to test the system before connecting it to the host computer:

1. Turn on all the components; press the Model One/80's RESET button. Throughout the testing, whenever you press the RESET button, you will see the text "Testing memory unit" displayed. This indicates that the Model One/80 is performing its internal diagnostics. Other start-up information may also be displayed.

   The Model One/80 start-up message ("Model One/80 Display Controller") should appear on the screen after about 10 to 30 seconds. This indicates that the Model One/80 has passed its internal diagnostics. If this message does not appear, check the baud rates, parity, and so on. Then press RESET and try again. If this does not work, turn off the power, re-open the front panel, press the boards firmly back into the back plane, push the connectors in tightly, and press the RESET button again. If this still doesn't work, contact Raster Technologies or your local representative.

2. Type a [CTRL-D] at the keyboard or alphanumeric terminal. The ! (exclamation point) user prompt should appear on the monitor or the terminal screen. If you are using a keyboard and the prompt does not appear, follow the instructions in section 5.3 to enable the alphanumeric windows. If you are using a terminal or have checked section 5.3 already and the prompt still does not appear, double-check all of the connectors to make sure they are tightly attached. Make sure the power is on and the DIP switches on the terminal set correctly.

   If the prompt still does not appear, consult Raster Technologies or your local representative.

3. Once you have the prompt on the screen, you can begin testing the stand-alone system. Type these commands:

```
! RGBTRU ON          Type this command on a 24-bit Model One/80 on
ly.
! VAL8 1             Set the color to value 1
! LUT8 1 0 0 255     Set value 1 to blue
! PRMFIL ON          Enable filled primitives
! CIRCLE 500         Draw a large blue circle
! VAL8 2             Set the color to value 2
! LUT8 2 0 255 0     Set value 2 to green
! CIRCLE 300         Draw a medium green circle
! VAL8 3             Set the color to value 3
! LUT8 3 255 0 0     Set value 3 to red
! CIRCLE 150         Draw a small red circle
```

You should now have a bulls-eye of sorts on your monitor screen. If your monitor doesn't show anything at all, check the cables and make sure it's turned on. If the colors are wrong (blue outside, green next, red center), the cables are connected incorrectly; change them until the colors are right. If the circles are not round, consult the manual for the monitor and adjust its horizontal and vertical size until they are.

Your monitor and your Model One/80 are factory-set to the same video rate (30 or 60 Hz). However, if you are using a 60 Hz monitor and have the Model One/80 set to 30 Hz (using the software command VIDFORM INTERLACE ON will do this), the image will look fairly strange; there will be half a circle here, half a circle on the other side of the screen. In this case, try typing the command VIDFORM INTERLACE OFF while in graphics mode (type a [CTRL-D] to enter graphics mode).

If you are attempting to drive a 30 Hz monitor at 60 Hz, the image will appear streaky, and generally wrong. In this case, type the command VIDFORM INTERLACE ON to try and correct the situation.

If, after trying all the suggestions above, your monitor still does not function correctly, contact Raster Technologies or your local representative.

4. The next step is to check the tablet or mouse. Type these commands:

! CURSOR ON	Enable the full-screen cursor
! MACDEF 10	Begin definition of macro 10
$ CMOVE 17 2	Write the digitizer (mouse) location into the cursor location (moving the cursor) whenever macro 10 is executed
$ MACEND	End macro 10
! BUTTBL 0 10	Execute macro 10 every 1/60th second

Once these commands have been entered, moving the cursor or mouse will move the displayed cursor on the screen. If the full-screen cursor doesn't move, double-check the connectors and the power-supply and repeat the commands given above. If the tablet or mouse still doesn't work, contact Raster Technologies or your local representative.

5. The final step in the stand-alone testing is to exercise the complete system. Press the RESET button on the back of the Model One/80 and wait for the start-up message to appear. Type [CTRL-D] and a carriage return. Now type:

```
! DIAGS THRU 0 FULL
```

This command executes the complete set of full internal diagnostics for the Model One/80. It takes a few minutes to run. If you receive any messages indicating problems, disconnect the power, then remove the front panel of the Model One/80, reseat the boards and the ribbon cables, and then re-execute the command. If you still receive error messages, contact Raster Technologies or your local representative. Make a note of the error messages and problem areas before you call.

6. You have now finished the stand-alone testing of the Model One/80. Sections 7 and 8 describe the serial and DMA interfaces for the Model One/80.

7.0 CONFIGURING THE SERIAL PORTS: THE CONFIGURATION COMMANDS

Four commands are used to configure the Model One/80's RS-232 interfaces: SYSCFG, SAVCFG, DISCFG, and DFTCFG.

Each of these commands is discussed below; details are given in the Model One/80 Command Reference.

You will not need this section if you are using the DMA interface and do not want to change the default configurations for the TABLET, KEYBOARD, and ALPHA terminal ports. You will need to use this section to change any of these ports; you will also need this section to change the HOST serial port if you are using serial communications to your host computer.

7.1 DFTCFG and DISCFG

Press the Model One/80's RESET button and wait until the start-up message has appeared. Now, type [CTRL-D]. You will receive the user prompt (!). Type the command

```
DISCFG
```

which displays the current configuration for the four serial (RS-232C) ports.

The command

```
DFTCFG
```

resets the configuration to the default configuration. The default configuration is:

PORT	STOP	BITS	XIN	XOUT	CTRL	PARITY	BAUD
KEYBSIO	2	7	ON	OFF	ON	NONE	300
TABLETSIO	2	8	OFF	OFF	OFF	NONE	9600
ALPHASIO	2	8	ON	OFF	ON	NONE	9600
HOSTSIO	1	8	OFF	ON	OFF	NONE	9600

To change any of these default characteristics, you must use the SYSCFG command. (NOTE: on some versions of firmware, the keywords RTS and CTS appear; these options are not applicable to the Model One/80 and should be ignored.)

The SYSCFG and SAVCFG commands are described in detail in the next section.

7.2 SYSCFG and SAVCFG

The SYSCFG and SAVCFG commands are used together to change the configuration of the Model One/80's serial ports.

The SYSCFG command is:

```
SYSCFG SERIAL [port_mnemonic] PARITY [E/O/L/H/N] BAUD [baud rate]
               XIN [on/off] XOUT [on/off] CTRL [on/off]
               STOP [1/2] NBITS [7/8]
```

The keywords are:

port_mnemonic supplies the mnemonic of the serial port that is to be configured. This must be given. The mnemonics are: KEYBSIO, TABLETSIO, ALPHASIO, and HOSTSIO, for the keyboard port, tablet (or mouse) port, alphanumeric terminal port, and host serial port.

PARITY specifies the input/output parity. Parity may be Even (E), Odd (O), High (H), Low (L), or Not used (N).

BAUD specifies the baud rate. Valid values are: 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200, and 38400. The maximun baud rate for the host port is 19200.

XIN indicates whether XON/XOFF is to be accepted at input: XIN ON specifies that output will be enabled or disabled according to the XON/XOFF signals received by the port; XIN OFF indicates that XON/XOFF signals should be ignored. XIN does not apply to the TABLETSIO port.

XOUT indicates whether XON/XOFF should be sent when the port's queue is near full (XOUT ON) or simply not used (XOUT OFF). XOUT does not apply to the TABLETSIO port.

CTRL instructs the Model One/80 whether it should accept control characters from the port (CTRL ON) or ignore them (CTRL OFF). NOTE: this includes [CTRL-S] and [CTRL-Q].

STOP specifies whether one or two stop bits should be used.

BITS tells whether seven or eight bits are sent per byte.

You should configure the HOSTSIO port to match the characteristics of the terminal that was connected to the line previously. Then, you can connect the cable to your host computer and start using the Model One/80 immediately.

Some examples of the SYSCFG command are:

```
SYSCFG SERIAL HOSTSIO BAUD 19200 PARITY L

SYSCFG SERIAL ALPHASIO BAUD 4800
```

Any parameters which are omitted are left unchanged. After you issue the SYSCFG command, you will be asked

```
ARE YOU SURE?
```

Type Y or YES to execute the command and put the requested changes into effect.

If your host computer cannot be configured to send 8-bit binary characters, you can configure the host port to accept ASCII characters, where each opcode (command code) is represented as 2 hexadecimal digits:

```
SYSCFG HOST HOST ASCII
```

Once you have configured all ports, execute the command

```
SAVCFG
```

and answer Y or YES when asked ARE YOU SURE? The SAVCFG command saves the current configuration (and whether ALPHEM is ON or OFF) in non-volatile RAM. It also saves changes made with the SPCHAR command. Once a SAVCFG is executed, subsequent power on/off cycles, RESETs, or COLDstart commands will use the latest configuration that was saved with SAVCFG.

8.0 THE HOST COMPUTER: THE INTERFACES AND THE FORTRAN LIBRARY

Two types of host interfaces are available for the Model One/80. The serial interfaces (RS-232C) are configured as described above.

This section describes how to install the serial and DMA interfaces. Installation of the FORTRAN library for the VAX and PDP-11 computers is also described.

8.1 The Serial RS-232C Interface

Once you have configured the HOSTSIO port as described in section 7 (above), you can connect your host cable to the Model One/80. Plug in the cable to the HOSTSIO port on the back panel. Then, you will be able to send commands to your alphanumeric terminal (or to the Model One/80 in alphanumeric terminal emulator mode) as if the Model One/80 were not there. Of course, you can also send graphics commands to the Model One/80 from your host computer and from the terminal or keyboard.

To test your serial host interface, press the RESET button on the back of the Model One/80. This performs a COLDstart and resets the system. After the COLDstart, you will receive the startup message (after about ten to thirty seconds). The Model One/80 starts up in ALPHA mode.

You should be able to talk to your host computer as if the Model One/80 were not part of the system; try a few host commands to verify this. For example, try typing a file listing command on your keyboard or alphanumeric terminal. The listing should be displayed either on the Model One/80 monitor or at the terminal. If this does not work, then check the host communication parameters to make sure the host channel and the HOSTSIO port match.

Once you have tested for proper host communications, type [CTRL-D] to enter GRAPHICS mode. You can then perform the same tests you performed on the stand-alone system (section 6). To return to ALPHA mode, type the command QUIT.

If these tests do not work, try the suggestions below. If the system still does not work correctly, contact Raster Technologies or your local representative.

First, re-execute the DISCFG command to be sure that the HOSTSIO and other ports are configured correctly. Try several different configurations until proper communications are obtained. Once the communications are proceeding correctly, execute the SAVCFG command.

Second, make sure that all the cables are connected correctly and that the host computer is set correctly. It may be necessary to change the host's internal log for entirely new systems, for example.

If you will use only the serial interface, you should now skip to section 8.3 to install the FORTRAN library.

8.2 Installation of the DMA Interface Card

The sections below cover the DEC DR11-W interface card (8.2.1), the MDB DR11-W interface card (8.2.2), and the DRV11-B interface card (8.2.3). You should turn directly to the applicable section for your installation.

Note: The handshake of the ModelOne/80 will ignore a busy when received while a cycle request is being asserted. This may cause the system to hang. This will only be a problem for those people implementing their own DR11-W interface. This is not a problem for the DEC, PE, Prime, Ikon, and MDB interfaces.

8.2.1 The DEC DR11-W Interface Card for the VAX

Installation and use of the DMA interface requires that the DEC UNIBUS backplane and DR11-W be set up correctly, as described in DEC's user manuals (DR11-W Direct Memory Interface Module User's Guide EK-DR11-W-U6-001). These steps should be done by a qualified DEC field engineer; Raster cannot provide these services. Briefly, these steps must be done:

1. The NPR jumper between backplane pins CA1 and CB1 removed.

2. The E105 DIP switch set correctly.

1	2	3	4	5
OFF	ON	OFF	ON	ON

   Note that Table 6-4 of the Direct Memory Interface Module User's Guide does not illustrate correct switch settings.

3. The card address switch (E120) and card vector DIP switch (E15) set for your system. Refer to section 6 in the DR11-W Direct Memory Interface Module User's Guide.

4. The burst switch set to 2-cycle (not N-cycle).

5. The cables connected (see Figure 8.1).

6. The card installed in a UNIBUS slot.

Once the switches are properly set, connect the J1 and J2 cables to the interface card and Model One/80 as shown in Figure 8.1. NOTE: If after installing and testing the DMA interface you encounter DMA read/write problems, try all four possible configurations of the cables before assuming the interface does not work correctly. If the interface will not work with the cables in any configuration, call Raster Technologies or your local representative for assistance.

8.2.2 The MDB DR11-W Interface Card for the VAX

Use the switch settings on page 26 to install the MDB DR11-W interface.

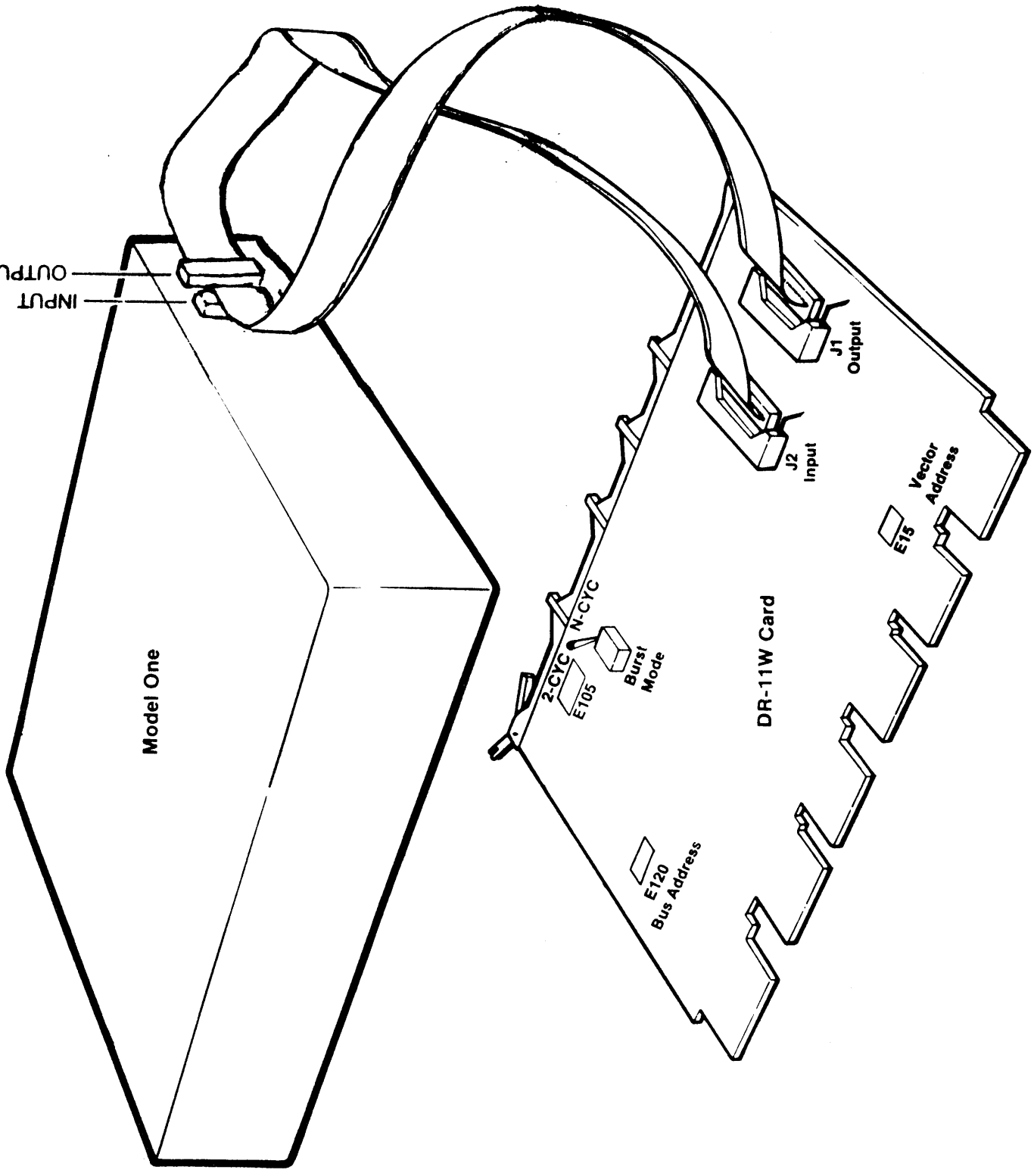


Figure 8.1 Connecting the DR11-W Interface

```
LONG TST    down
SCOPE       down
W LINK-M    down
B LINK      up
DMA THRTL   down
A00         up
W ENB       up
N CYC       down
EIR         down
```

Set the address and vector settings for your installation. Make a note of those settings, as you will need them later.

ADDRESS: _____
VECTOR: _____

Connect the cables from the MDB board to the Model One/80 as shown in Figure 8.1.

8.2.3 The DEC DRV11-B Interface Card for the PDP-11

To install and use the DRV11-B (QBUS) interface, follow these steps:

1. Set the card address and card vector DIP switches correctly for your system.

2. Connect the cables.

3. Install the interface card into the backplane.

Make a note of the card address and card vector DIP switches; you will need these to install the DMA driver.

Connect the J1 and J2 cables between the QBUS card and the Model One/80 as shown in Figure 8.2.

8.3 Installing the FORTRAN Library

When you install the FORTRAN library for the Model One/80 on your host computer, you can also install the DMA driver for your host.

8.3.1 The FORTRAN Library on the VAX

To install the Model One/80 FORTRAN subroutine library for the VAX/VMS system, follow these steps:

1. Create a directory for the top level of the Raster software directory tree. This directory can be a root-level directory or a sub-directory of an already existing tree.

   ```
   $ CREATE /DIRECTORY [RASTER]
   ```

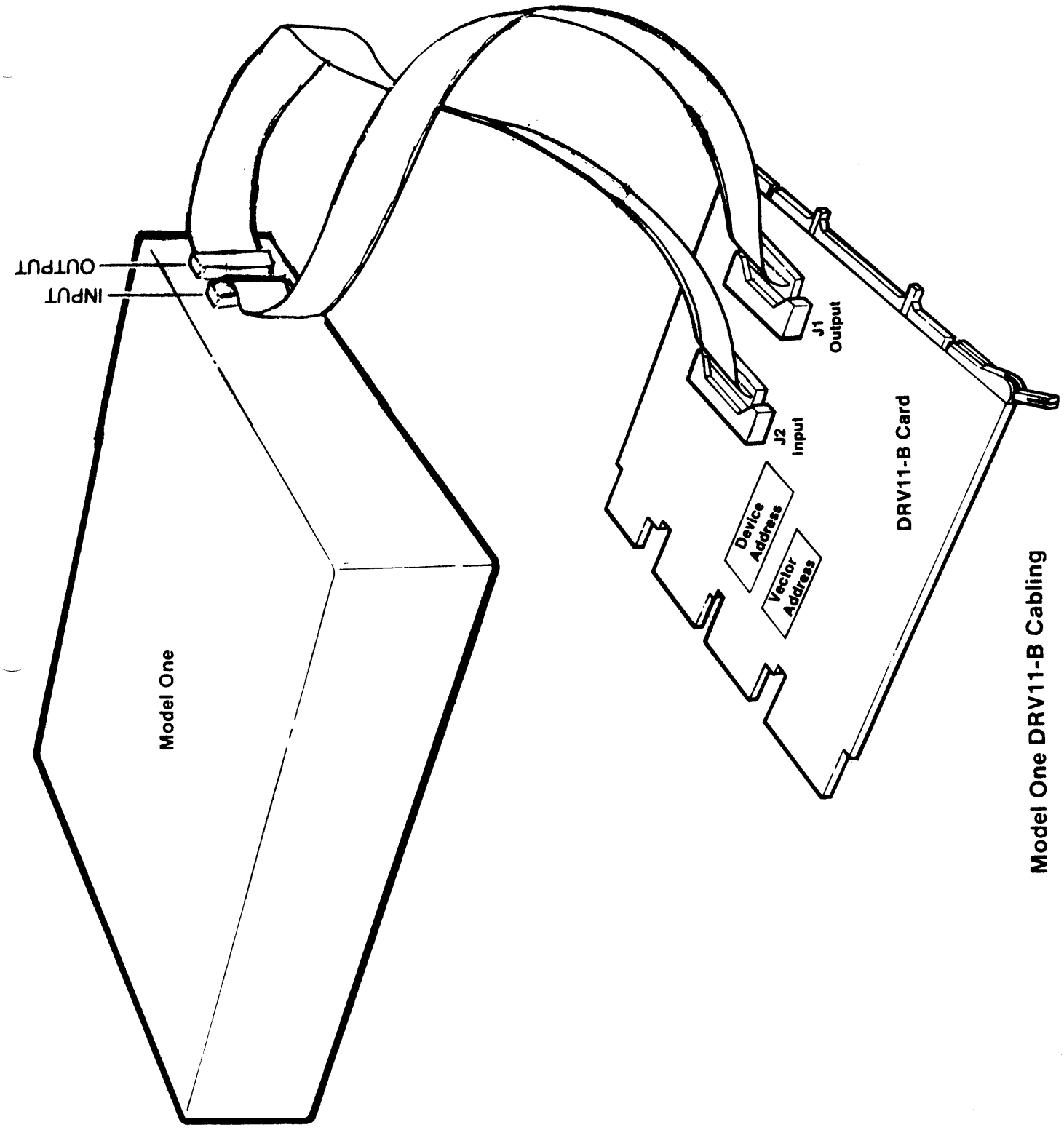


Figure 8.2 Connecting the DRV11-B Interface

2. Make the new directory the default directory.

   $ SET DEFAULT [RASTER]

3. Mount the distribution tape containing the software.

   $ MOUNT MSA0: RASTER: RASTER/OVER=OWNER

4. The following documentation is also supplied:

   README.DOC describes how to install the ONELIB software.
   RELNTSV*.TXT describes release-specific information on the software. The * is replaced by the version number; for example, RELNTSV81.TXT describes release 8.1 of the library.

5. Execute the command procedure, INSTALL.COM.

   $ @INSTALL

   Suggestion: The INSTALL command prints a lot of information on the structure of the library and on the DMA interface. You may want to use a hardcopy terminal.

   INSTALL.COM prompts you for answers to three questions. The first question asks you to verify that the files have been copied from the tape. You should answer "Y" to this question.

   The second question asks whether you want to change the default device type affinity for the library. You should answer "Y" to this question.

   The third question asks whether you want to install a demonstration program for the Model One/380. You should respond "N" to this question, since the program only works on a 40-bit Model One/380.

6. When the INSTALL command has been executed, you will have these subdirectories:

   [DRIVER.DIR] contains the DMA driver.
   [ONELIB.DIR] contains the ONELIB software object module library.
   [SOURCE.DIR] is the root directory for all source files.
   [SOURCE.COMMANDS.DIR] holds Model One output-only command source files.
   [SOURCE.IO.DIR] contains Model One I/O-related command and driver source files.
   [SOURCE.UTILS.DIR] contains the ONELIB utility source files.
   [TEST.DIR] holds the test programs.

7. The INSTALL procedure also creates these command procedures in the root directory. In this list, directory [RASTER.DIR] is assumed.

SYSLOGIC.COM defines logical symbols in the system symbol table. If can be executed as part of the SYSTARTUP.COM command procedure. The symbols created are:

RASTER_DIRECTORY points to the root directory.
RASTER_ONELIB points to [RASTER.ONELIB.DIR].
RASTER_LIBRARY points to [RASTER.ONELIB].
RASTER_DRIVER points to [RASTER.DRIVER].
RASTER_SOURCE points to [RASTER.SOURCE].
RASTER_COMMANDS points to [RASTER.SOURCE.COMMANDS].
RASTER_UTILS points to [RASTER.SOURCE.UTILS].
RASTER_IO points to [RASTER.SOURCE.IO].
RASTER_TEST points to [RASTER.TEST].

LOGICALS.COM defines logical symbols in the process symbol table if desired. The symbols are the same as in SYSLOGIC.COM.

SYMBOLS.COM defines two global symbols used for linking to the library. LINKONE links an object module to the Model One/80 library. LINKONEDB links an object module, using the /DEBUG specifier on the LINK command.

These symbols can be used as follows:

```
$ FORTRAN myprogram
$ LINKONE myprogram
$ RUN myprogram
```

Note: The library modules are compiled with the /NODEBUG/OPTIMIZE compiler switches. If you wish to examine any module using the debugger, you will need to recompile the module with the /NOOPTIMIZE/DEBUG switches. This module will then need to be linked in before you link to the library.

8.3.2 The FORTRAN Library and DMA Driver on the PDP-11

Additional documentation is included in the file RELNOTES.TXT on the distribution tape.

To build the FORTRAN library and DMA driver, follow these steps:

1. Create a new directory. [2,5] is recommended.

2. Use the FLX command to load the files from the tape:

```
FLX SY:/RS=MT:[*,*]*.*/DO   copies all files into directory
PIP *.DAT;*/DE                delete the image data files
FLX SY:/RS/FB=MT:[*,*]*.DAT/DO copies all data files from the tape
```

3. A set of command files is now available:

ONE80BLD.CMD D80TSTBLD.CMD GBBLD.CMD

The command @ONE80BLD compiles the FORTRAN routines and creates the object library.

The command @D80TSTBLD compiles and builds the test programs for the FORTRAN library.

The command @GBBLD builds the DMA driver. You must be in directory [2,5] to build the driver successfully. To build the serial library, type

```
MCR>@ONEBLD
```

To build the DMA library, type

```
MCR>@GBBLD
```

Before executing @GBBLD, be sure to edit GBPRE.MAC to reflect your hardware configuration.

4. Once the DMA driver is built, it must be loaded:

   LOA GB:/HIGH

5. Now, you should run the test programs. The test programs are described with the FORTRAN library and in the release notes accompanying the FORTRAN library tape.

The PDP-11 DMA Driver on the 18-Bit QBUS

Remove (or comment out) the symbols RT$Q22 and RT$MDB in the file GBPRE.MAC.

The PDP-11 DMA Driver on the 22-Bit QBUS

Verify that RT$Q22 is defined in GBPRE.MAC.

For the 22-bit MDB board, verify that RT$Q22 and RT$MDB are defined in GBPRE.MAC.

Use of DRV11-B cards is not recommended on the 22-bit QBUS since these cards can address only the low 256Kb of memory.

The DMA Driver on UNIBUS PDP-11s

Remove or comment out the sumbols RT$Q22 and RT$MDB in GBPRE.MAC.

Installing the MDB-MLSI-DR11-W QBUS DMA Card on the PDP-11

Set the switches as follows:

Switch	18-Bit	22-Bit
W-LINK-M	closed	closed
B-LINK	open	open
DMA THRTL	closed	closed
A00	closed	closed
W ENABL	open	open
N CYCLE	closed	closed
MDB EIR REG	open	open
4 LEVEL INTR	open	open
22B ADRS	closed <---->	open
SELF TEST	closed	closed
LONG TEST	closed	closed
SCOPE	closed	closed

Refer to the MDB manual for the appropriate vector and address switch settings.

8.4 Loading the VAX DMA Driver

To load the VAX DMA Driver, follow the steps below.

1. Login to the SYSTEM account.

2. Edit SYS$SYSTEM:STARTUP.COM. Replace the command

   AUTOCONFIGURE ALL

   with the command

   AUTOCONFIGURE ALL/EXCLUDE=XA.

3. Run the SYSGEN utility:

   ```
   $ SET DEF SYS$SYSTEM
   $ RUN SYSGEN
   SYSGEN>
   ```

4. Determine the Unibus adapter number on which the DR11-W is installed:

   SYSGEN>SHOW/CONFIGURATION

   If Digital (DEC) installed your DR11-W, you will see something like this:

   ```
        System CSR and Vectors on 29-DEC-1982 09:37:37.20
   Name:  TTA Units:  8 Nexus:8 (UBA) CSR:  760100 Vector1:  300 Vector2:
   304
   Name:  ....
   Name:  XAA Units:  1 Nexus:8 (UBA) CSR:  760260 Vector1:  310 Vector2:
   000
   SYSGEN>
   ```

XAA is the default name given to the DR11-W; XADRIVER.EXE is its device driver. This is the startup default for this particular system and results from using the command AUTOCONFIGURE/ALL in the SYSGEN part of SYS$SYSTEM:STARTUP.COM.

Make a note of these values, as you will need them later:

Nexus: _____ (This is also called the Adapter Number.)
CSR: _____
Vector1: _____

NOTE: the next time the system is booted, the XAA device will not be listed. This is because of the modification made in step 2. to the SYS$SYSTEM:STARTUP.COM command.

5. Shut down and reboot your system, following the standard procedures for your installation.

6. Login to the SYSTEM account. Execute the command

   @[RASTER]LOGICALS

   to use the logical names for the FORTRAN library. If you used a directory not named RASTER for the FORTRAN library, substitute the correct name here.

7. Run the SYSGEN utility:

```
$ SET DEF SYS$SYSTEM
$ RUN SYSGEN
SYSGEN>
```

The CSR and Vector addresses in the CONNECT command below are the same addresses the XAA device used, as can be seen from the SHOW/CONFIGURATION command in step 4, above. NOTE THAT THE %O IS NOT A ZERO, BUT AN "O" (AS IN ORANGUTAN). This allows you to attach the device without changing the CSR and Vector addresses on the board. The Vector, CSR, and Adapter values may be different in your system, of course. If the XADRIVER is not excluded from the AUTOCONFIGURE, an error message would be generated.

```
SYSGEN>CONNECT GDA0/ADAPTER=n/CSR=%Onnnnnn/VECTOR=%Onnn>/NUMVEC=1-
SYSGEN>/DRIVERNAME=RASTER_DRIVER:GDDRIVER
NOTE: if you did not use RASTER as the default directory when
installing the FORTRAN library, change the name in this command.
SYSGEN>AUTOCONFIGURE ALL/EXCLUDE=XA

For VAX-11/730s:
SYSGEN>AUTOCONFIGURE ALL/EXCLUDE=XD

For multiple DR11-W cards, you will need to issue multiple commands:
SYSGEN>CONNECT GDB0/ADAPTER=n/CSR=Onnnnnn/NUMVEC=1...
SYSGEN>CONNECT GDC0 .....
```

A few notes: using the CSR and Vector addresses from the SHOW/CONFIGURATION command allows the device to be attached without changing the CSR and Vector toggles on the board itself. The Adapter number for this system is given in the Nexus field of the SHOW/CONFIGURATION output.

8. Once you have installed the DMA driver and the FORTRAN library, you may want to make the assignments part of the permanent system startup procedure. You can accomplish this by editing the file SYS$MANAGER:SYSTARTUP.COM. Then, insert the lines:

```
$ @[RASTER]SYSLOGIC or @[RASTER]LOGICALS
$ @RASTER_DIRECTORY:CONNECT
```

Note that [RASTER] indicates the root-level directory; you may have used a different name.

Once you have reached this step, you should run the DMA tests supplied with the library.

8.5 Using the FORTRAN Library

8.5.1 The VAX FORTRAN Library

To use the VAX FORTRAN library, you will need the information in this section.

Linking User Programs

SYMBOLS.COM defines:

```
LINKONE:==@RASTER_DIRECTORY:LINK    (for normal linking)
LINKONEDB:==@RASTER_DIRECTORY:LINKDEB    (for linking and debugging)
```

The normal program sequence is:

```
$ EDIT programname
$ FORTRAN programname
$ LINKONE programname
$ RUN programname
```

Specifying the Model One/80 for Serial I/O

Call RTINIT with the logical device name of the terminal to which the Model One/80 is connected:

```
CALL RTINIT ('TT',2)
CALL RTINIT ('RASTER',6)
CALL RTINIT ('TTA2:',5)
```

The arguments are the logical device name and the number of characters in the name.

Call RTSTOP before attempting to talk to a different Model One with a second call to RTINIT.

Specifying the Model One/80 for DMA I/O

Call RTINIT with the logical device name of the DMA device to which the Model One/80 is attached:

```
CALL RTINIT ('DEV',3)
CALL RTINIT ('ONE80DMA',8)
CALL RTINIT ('GDA0:',5)
```

The arguments are the logical device name and the number of characters in the name.

Assign the logical device name in the DMA driver:

```
$ ASSIGN GDA0:  name
```

Again, call RTSTOP before attempting to talk to a different Model One with a second call to RTINIT.

Verifying the VAX Library

For serial tests: assign logical device DEV:

```
$ ASSIGN TT DEV
```

Then, the serial tests are: CPRIMS1 tests output; BREADCR tests the readback functions. To run these programs, execute these commands:

```
$ SET DEF [RASTER.TEST]
$ ASSIGN TT DEV
$ RUN CPRIMS1
$ RUN BREADCR
```

For DMA tests, assign logical device DEV:

```
$ ASSIGN GDA0:  DEV
```

ADMASTAT verifies the DMA interface. CPRIMS1 tests output. BREADCR tests the readback functions. To run these programs, execute these commands:

```
$ SET DEF [[RASTER.TEST]]
$ ASSIGN GDA0: DEV
$ RUN ADMASTAT
$ RUN CPRIMS1
$ RUN BREADCR
```

8.5.2 The PDP-11 FORTRAN Library

This section provides information you will need to use the FORTRAN library on the PDP-11.

Linking User Programs

The libraries are:

```
ONELIB.OLB (serial I/O)
ONE80D.OLB (DMA I/O)
```

The Serial Library

To link to the serial library, the command line will be similar to:

```
MCR>TKB programname, [2,5]ONELIB/LB
```

A suggested command file for task building is:

```
.; ONETKB.CMD
.ENABLE SUBSTITUTION
.ASKS FIL filename
TKB 'FIL';1/CP = 'FIL',ONELIB/LB
```

Linking to the DMA Library

The command line will be similar to:

```
MCR>TKB programname, [2,5]ONE80D/LB
```

A suggested command file is:

```
.; ONEDMATKB.CMD
.ENABLE SUBSTITUTION
.ASKS FIL filename
TKB 'FIL';1/CP = 'FIL',ONE80D/LB
```

Specifying the Model One/80

The Model One/80 is specified by calling RTINIT:

```
CALL RTINIT ('TI:',3)
CALL RTINIT ('GB:',3)
CALL RTINIT ('RT:',3)
CALL RTINIT ('DV:',3)
```

If a logical device name is used, the device assignment must have been done prior to calling RTINIT:

```
MCR>ASN TT3:=RT:
MCR>ASN GB:=DV:
```

Verifying the PDP-11 Library

TEST.DOC indicates which test programs are intended for which Model One. To test the library, use these commands:

Serial:

```
RUN TEST1
RUN RDTST1
```

DMA:

```
RUN D25TEST1
RUN D25RDTST
```

APPENDIX I. THE DIP SWITCH SETTINGS FOR DIGITIZERS

The DIP switch settings for the GTCO Digi-Pad 5 Port A (J5) are:

SW1-1	OFF	SW2-1	ON	SW3-1	OFF
SW1-2	OFF	SW2-2	ON	SW3-2	OFF
SW1-3	ON	SW2-3	OFF	SW3-3	OFF
SW1-4	ON	SW2-4	OFF	SW3-4	ON
SW1-5	OFF	SW2-5	OFF	SW3-5	ON
SW1-6	OFF	SW2-6	ON	SW3-6	OFF
SW1-7	ON	SW2-7	OFF	SW3-7	ON
SW1-8	ON	SW2-8	ON	SW3-8	OFF

Note: On tablets shipped before 8/82, SW2-2 should be OFF; to set the tablet to 1200 baud, set SW1-7 to ON (and change the TABLETSIO port configuration as well).

The DIP switch settings for the Summagraphics Bit-Pad are:

S1: 7 and 9 ON (don't change the others)
S2: 1 ON, 2 OFF, 3 ON, 4 OFF, 5 OFF, 6 OFF
S3: 2 ON only; all others OFF

Note: To set the tablet to 1200 baud, set S3-5 to ON, all others on S3 OFF.

The DIP switch settings for the Summagraphics Microgrid are:

SW1-1	ON	SW2-1	OFF
SW1-2	OFF	SW2-2	OFF
SW1-3	OFF	SW2-3	ON
SW1-4	ON	SW2-4	ON
SW1-5	ON	SW2-5	OFF
SW1-6	OFF	SW2-6	OFF
SW1-7	ON	SW2-7	ON
SW1-8	OFF	SW2-8	ON

APPENDIX II. MEMORY SELECT DIP SWITCHES

The DIP switches on the memory unit are defined as follows:

Position 6 — Indicates whether the memory unit includes the HIGH or LOW bits.
For an 8-bit system, HIGH (OFF or OPEN) should be used; for a 16-bit system, the top board (slot 3) should be OFF/OPEN, the bottom board (slot 4) LOW (ON/CLOSED). For a 24-bit system, all boards should be HIGH (OFF/OPEN).

Position 5 — Not used.

Positions 4-1 — Indicate the memory unit address (as used by the command MEMSEL). The address may be from 0 to 15, as follows:

Bit 4	3	2	1	
OFF	OFF	OFF	OFF	Address 15
OFF	OFF	OFF	ON	14
OFF	OFF	ON	OFF	13
OFF	OFF	ON	ON	12
OFF	ON	OFF	OFF	11
OFF	ON	OFF	ON	10
OFF	ON	ON	OFF	9
OFF	ON	ON	ON	8
ON	OFF	OFF	OFF	7
ON	OFF	OFF	ON	6
ON	OFF	ON	OFF	5
ON	OFF	ON	ON	4
ON	ON	OFF	OFF	3
ON	ON	OFF	ON	2
ON	ON	ON	OFF	1
ON	ON	ON	ON	0

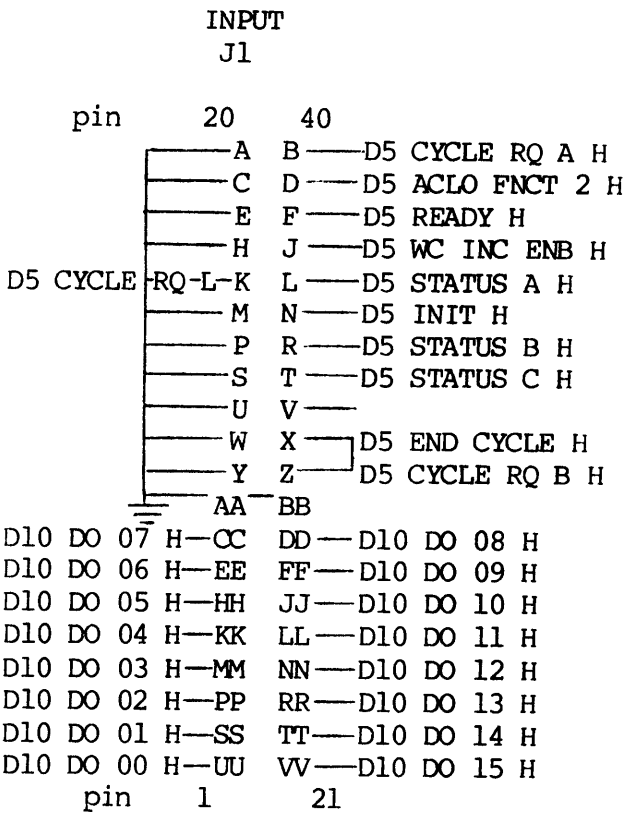
The normal defaults are memory unit address 0 for an 8-bit system, addresses 0 and 1 for a 16-bit system, and addresses 0, 1, and 2 for a 24-bit system. Board 0 goes in slot 3, board 1 in slot 4, and board 2 in slot 5.

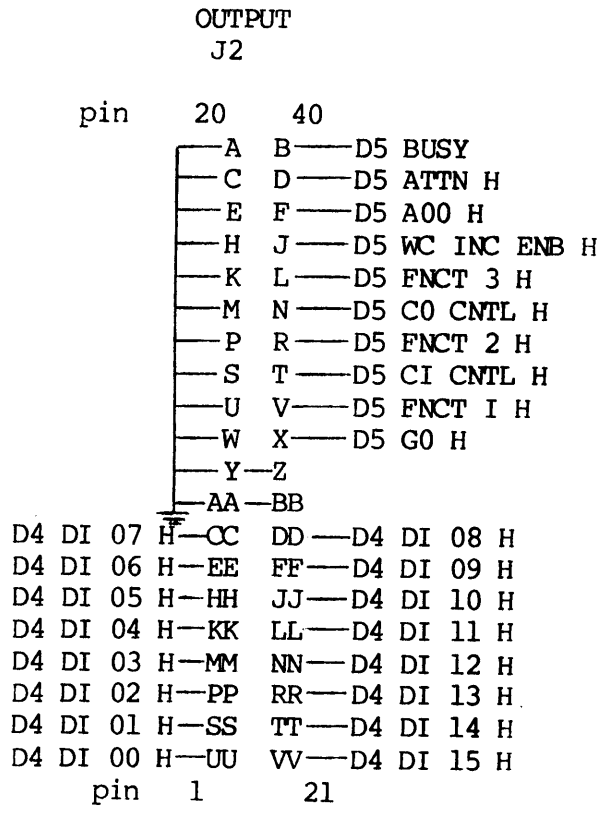
APPENDIX III. PINOUTS FOR RS-232C AND DMA INTERFACES

The pinouts for the RS-232C interfaces on the Model One/80 are:

HOSTSIO	Receive Data 3
	Transmit Data 2
	Ground 7
ALPHASIO	Receive Data 2
	Transmit Data 3
	Ground 7
TABLET	Receive Data 2
	Transmit Data 3
	Ground 7
KEYBOARD	Receive Data 2
	Transmit Data 3
	Ground 4
	+5V 5
	Ground 6

The pinouts for the DMA interface are:





APPENDIX IV. JUMPERS ON THE GPU

The Model One/80 GPU jumpers are located according to the letters and numbers printed on the sides of the GPU board. They are:

Jumper	Location	Function	Default
J100	B5	RS-232/TTL non-inverted TTL inverted	Jumper toward A5: RS-232
J101	D17	Not used	Not installed
J102	B16	Byte swap	Jumper toward A16: LSB first
J103	P16	4MHz/8MHz processor	Jumper toward P15: 8MHz
J104	K4	NVRAM store enable	Installed: enabled
J105	L1	16Kx4/64Kx4 WCS RAMs	Installed: 16Kx4
J106	N1	128K/256K EPROMs	Not installed: 128K
J107	B28	FNCT 1/FNCT 2: Read/Write	Jumper toward A28: FNCT 2, R/W
J108	A13	Short/long cycle request	Not installed: long cycle
J109	A28	Attention bit enable	Jumper toward A29: disabled

To perform a hardware reset to the default of the NVRAM (to initial defaults, overriding the SAVCFG command), locate the 256x4 NVRAM X2212D chip at location L5. Jumper pin 7 to pin 8. Power up the Model One/80. Turn off the Model One/80 and remove the jumper; the Model One/80 will have been reset to standard defaults for the RS-232 ports.

APPENDIX V. UPGRADING THE MODEL ONE/80 FIRMWARE

The Model One/80 firmware can be upgraded by replacing the GPU board PROMs. This should be done only under the supervision of Raster Technologies or your local representative.

Follow these steps to upgrade the Model One/80 firmware:

1. Place the Model One/80 so that the top panel is fully accessible. Turn off the power and remove the power cord entirely.

   Alternatively, if the Model One/80 has been rack-mounted, you may prefer to remove the front panel and take out the GPU board. See section IV for details of assembling the Model One/80. Briefly, you can remove the holding nuts with a 5/16" wrench, slide out the GPU board (in slot 1), and then continue to step 3 below. Make sure you turn off the power before you open the Model One/80.

2. Remove the six Phillips-head screw on the top lid and the seven screws (also Phillips-head) along the top of the back panel. Remove the top lid of the Model One/80.

3. Figure A.1 shows the location of the six PROMs. Using a chip puller or a small screwdriver, remove the PROMs from their sockets. Place them where they will not be damaged--their legs bent or stressed--or subjected to static electricity.

4. Install the new PROMs carefully into the correct sockets. Match the location numbers on the PROMs to the location numbers in Figure A.1. BE EXTREMELY CAREFUL TO ORIENT THE PROMS WITH THE NOTCH FACING IN THE DIRECTION INDICATED ON THE BOARD. BE CAREFUL NOT TO BEND THE PROM ITSELF, ITS LEGS, OR THE BOARD WHEN YOU INSERT THE PROMS.

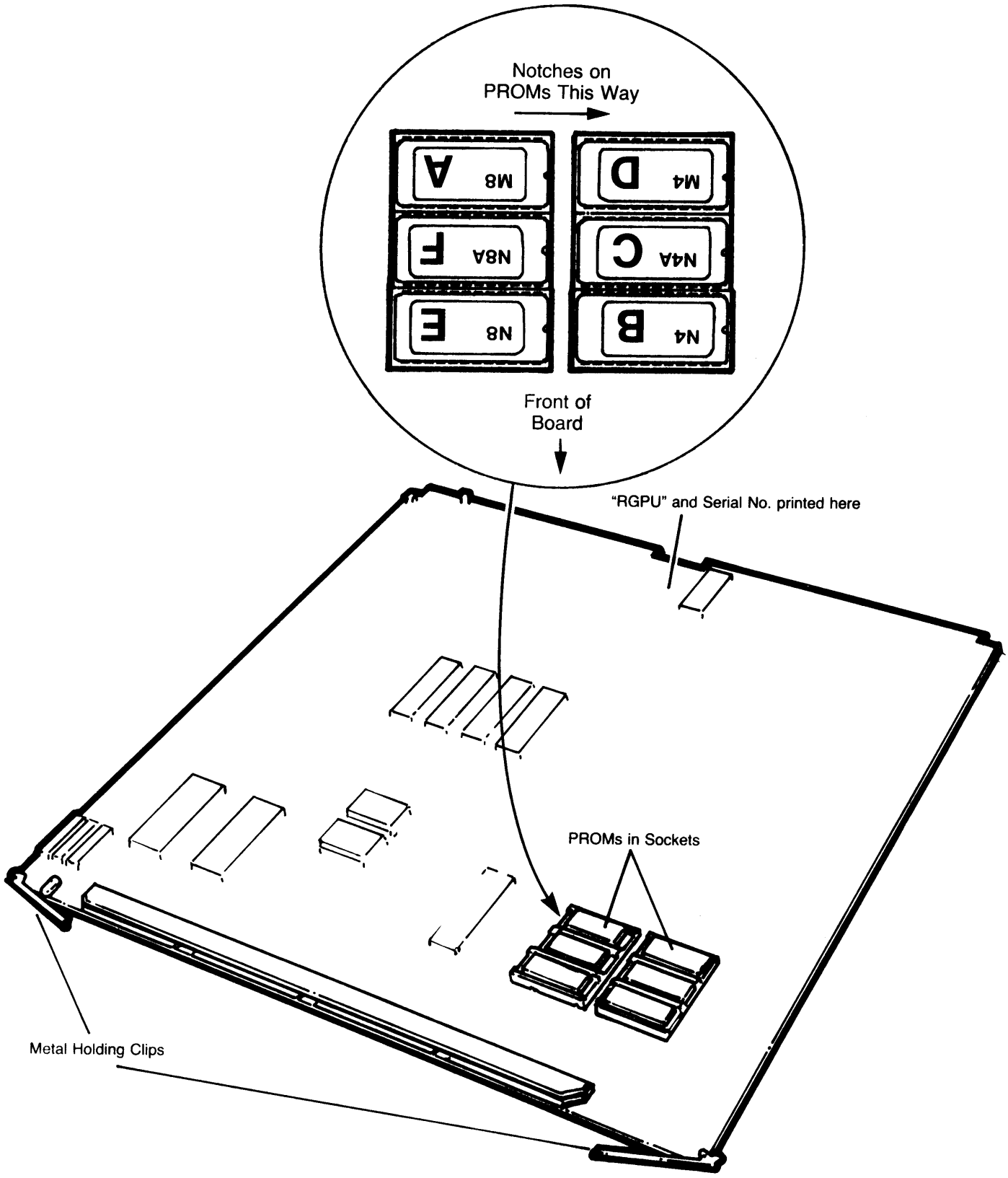
5. Verify that the PROMs are inserted correctly, with the notches oriented correctly and that the location numbers correspond correctly. Verify that all six PROMs are of the same version and revision level.

   NOTE: If the PROMs are inserted with the notches facing the wrong direction and the unit is powered on, those PROMs will be destroyed!! Be extremely careful about the orientation of the PROMs.

6. Reconnect the power to the Model One/80 and turn on the system. Press the RESET button to COLDstart the unit. The power-up message should appear. If it does not, check the seating of the PROMs and whether they are located correctly. If any are oriented wrong (with the notches facing the wrong direction), they have now been destroyed and you will have to obtain a new set of PROMs.

   Once the unit COLDstarts correctly, continue to the next step.

7. Replace the top cover and all thirteen screws. You can now re-install the Model One/80.



PROM Sockets on the GPU Board