CHAPTER 3
INSTALLATION AND INTERFACE INFORMATION

3.1 GENERAL

This chapter contains the information needed to unpack and install the VT18X upgrade kit to convert the VT100 to a VT180. The system installation procedure describes how to select the correct input voltage for either 115 Vac or 220–240 Vac operation, site considerations, and cabling information. The power-up and checkout procedure using ROM-based and diskette-based diagnostics is also provided.

3.2 SITE CONSIDERATIONS

The design of the VT180 normally poses few constraints on selecting a place to install the terminal. In most cases, any environment suitable to the operator is a satisfactory environment to operate the terminal in. Extremes of temperature and humidity should be avoided. A summary of VT180 guaranteed operating conditions may be found in Chapter 1.

The VT180 system consists of a modified VT100 terminal, a detachable keyboard, and either one or two dual disk drives. The dimensions of the basic units are shown in Figure 3-1.

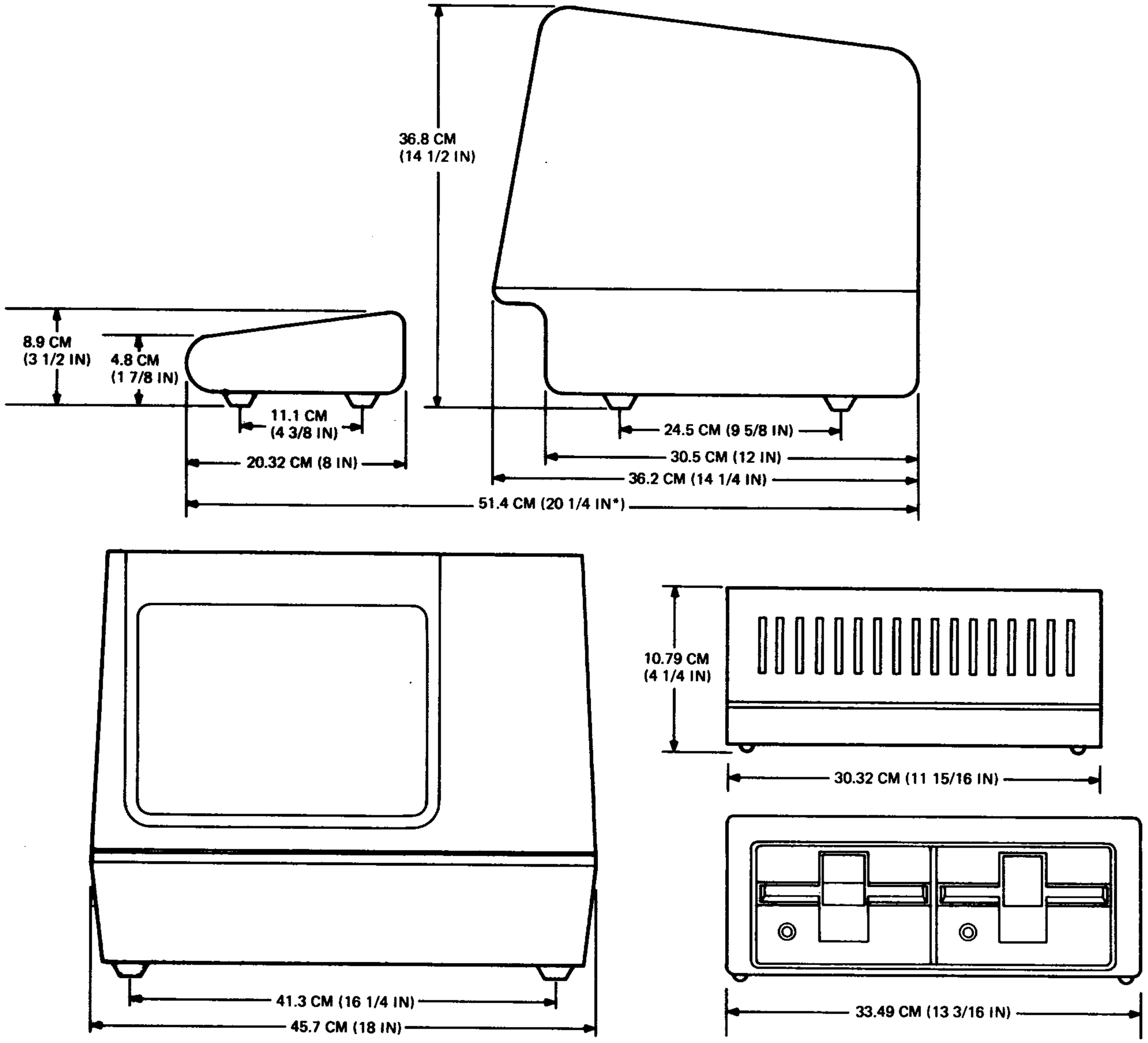
NOTE

When installing the VT180, make sure that all power and signal cables are free from any stress, sharp bends, or obstructions. Also, be sure the position of the units allows access to the power controls on the back of the monitor and disk drive unit.

Several ventilation openings on the terminal and disk drive prevent these units from overheating. The disk drive has ventilation openings on the back, sides, and bottom of the unit. The ventilation openings for the terminal are located on the top, back, and bottom of the unit. Do not place any objects in a position that will block the air flow to these openings. Also, do not allow liquids, coins, paper clips, and other objects to enter the ventilation openings. These objects may damage the terminal or disk drive if they are allowed to come in contact with internal circuitry.

The VT180 system can be placed on a desk or tabletop. However, people usually prefer the keyboard at standard typewriter table height rather than desk height. The placement of the disk drive in relation to the terminal will depend on whether the system has one or two RX180 disk drives. If the system has one disk drive, it can be placed on top or on either side of the terminal, as shown in Figure 3-2. In a VT180 system with two disk drives, unit 1 is placed on top of unit 2 and both units can then be placed on either side of the terminal.

Position the terminal so that it faces away from light sources that reflect off the screen. If reflected light is a problem, nonreflective and antiglare screens are available from Digital. Static mats are also available for installations with static electricity problems.



VT180 TERMINAL AND KEYBOARD

RX180 DISK DRIVES

*MEASUREMENT TAKEN WITH THE KEYBOARD PLACED FLUSH TO FRONT OF TERMINAL UNDER UNDERCUT.

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Figure 3-1 VT180 Unit Dimensions

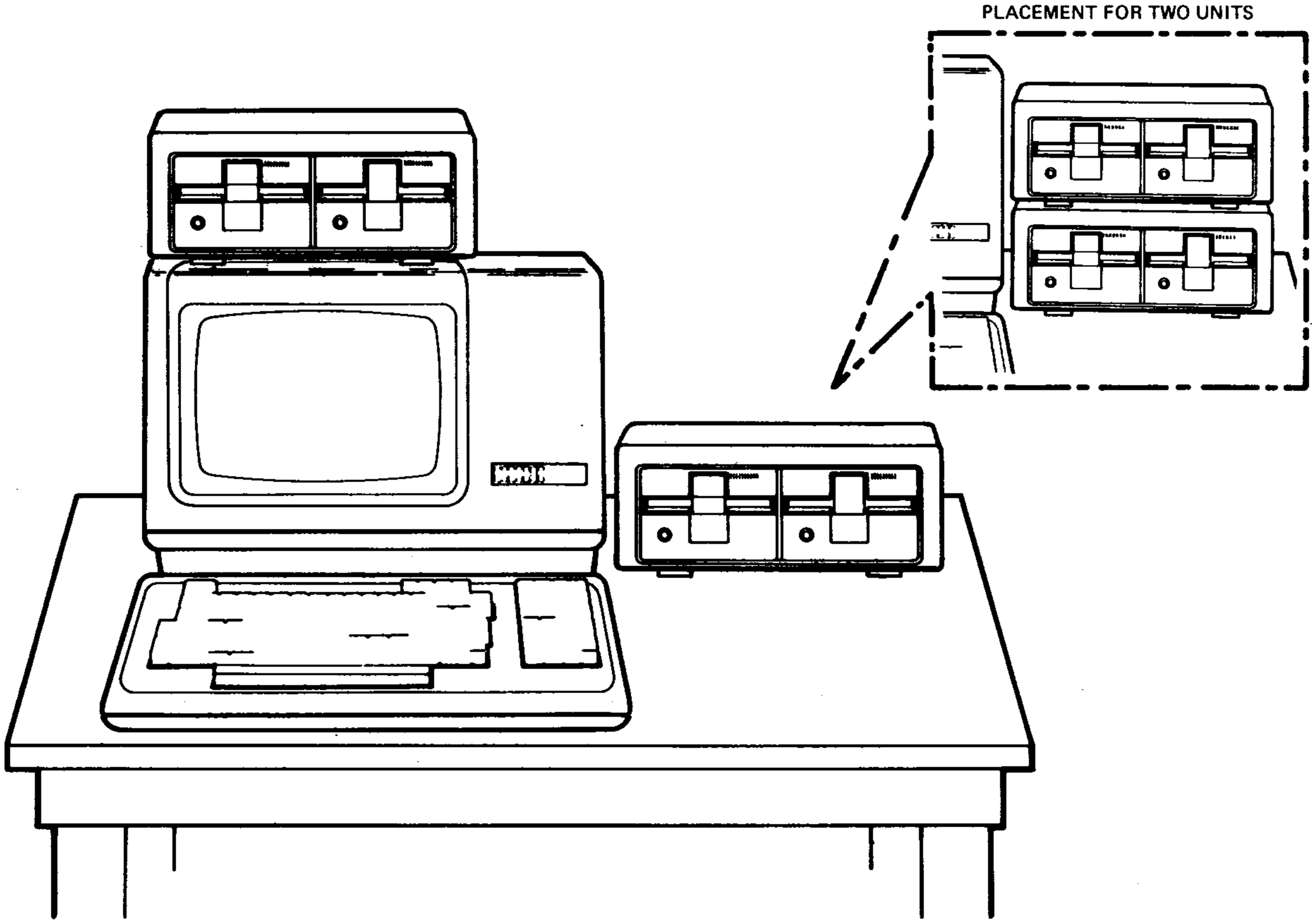


Figure 3-2 Alternatives for Placement of the Dual Disk Drive Units

3.3 UNPACKING AND INSPECTION

The VT180 system consists of a VT100 terminal and the VT18X Personal Office Computing Upgrade Kit. This unpacking and inspection procedure assumes that the user has a VT100 installed on site and wants to add the VT18X option kit to upgrade the terminal to a VT180 personal office computer. The VT18X upgrade kit is packed in a reinforced carton, which contains the following parts.

	Parts Kit	**Part Number**
1	VT18X control module	54-15152-AA
1	VT180 paddle board	54-15150
1	VT100 expansion backplane	54-13384-01
1	Shield, card cage (RF shield)	74-25604-01
1	Shield, rear (module access cover)	74-26146
1	Cable access cover (wort cover)	74-26145
2	Card guides	12-12405
1	Cable, 16-conductor	70-08612-OM
1	RX180 dual disk drive unit (drives A and B)	RX180-AB
1	BC26K cable, terminal to disk	17-00297
1	Line cord, coiled	17-00150-01
1	Box of small miscellaneous mounting hardware	

If the VT18X upgrade kit includes two disk drive units, the second disk drive unit (drives C and D, order number RX180-AE) is shipped in a separate carton that contains the following parts.

Part		Part Number
1	RX180-AD dual disk drive unit (drives C and D)	RX180-AD
1	BC26Z cable, disk-to-disk	17-00298
1	Line cord	17-00150-02

Instructions for unpacking the VT18X option kit are provided by the *VT18X Unpacking Guide* (EK-VT18X-PG). This unpacking guide will be the first item that is removed from the shipping carton when it is opened (Figure 3-3).

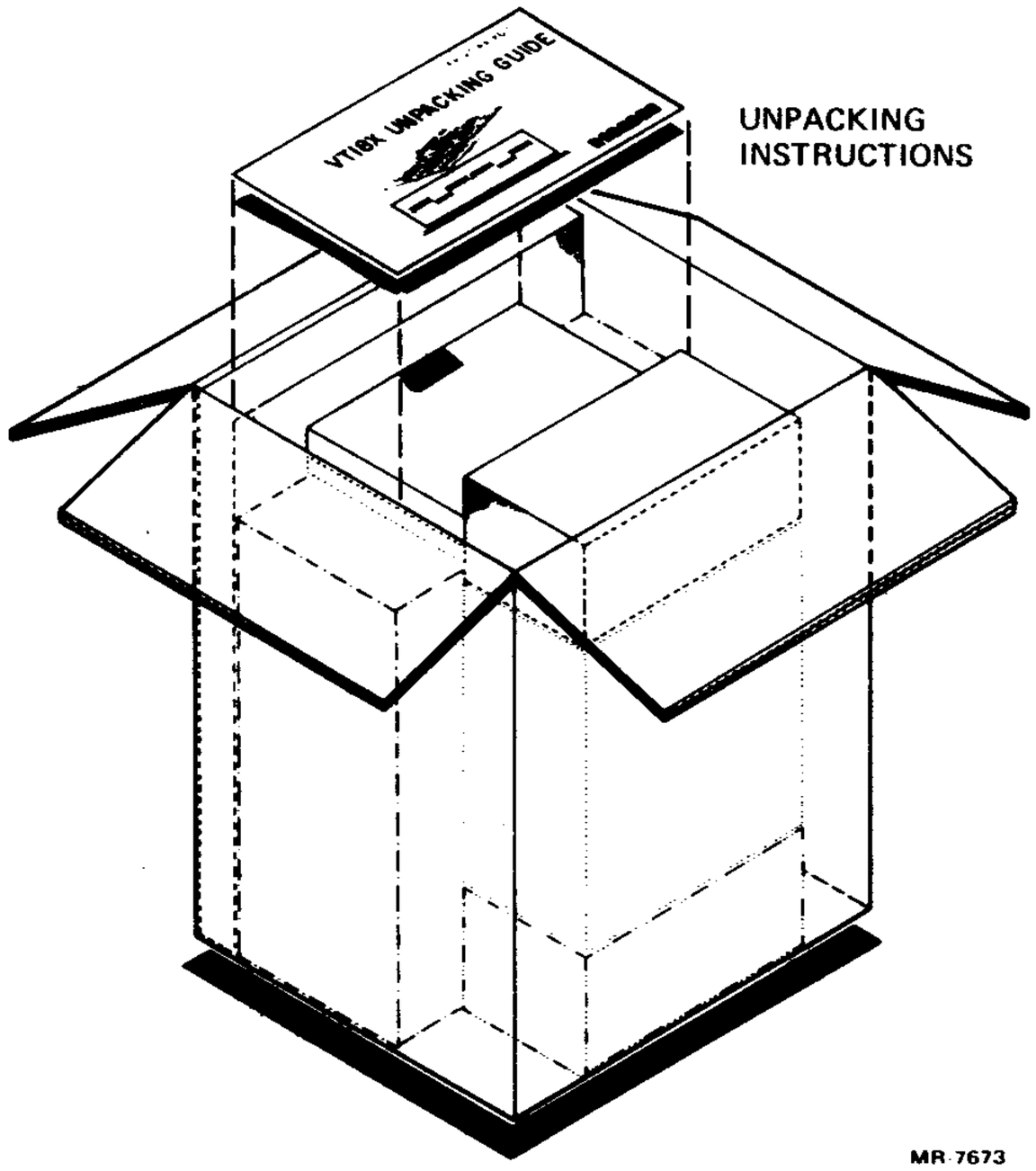


Figure 3-3 VT18X Shipping Carton

If a second disk unit (drives C and D) is included in the shipment, instructions for unpacking the unit are provided by the *RX180 Unpacking Guide* (EK-RX180-PG). This unpacking guide is contained in the RX180 shipping carton.

3.4 VT18X UPGRADE KIT INSTALLATION

This section describes the procedure for adding the VT18X upgrade kit to the VT100 video terminal. The kit also adds an RF shield to the VT100. New government rules have specified shielding of electronic equipment to prevent interference with radio equipment.

The VT18X option can be installed only in certain models of the VT100 series of terminals. Table 3-1 lists the models of the VT100 that can and cannot use the VT18X option.

Table 3-1 VT100 Series Terminals that Can and Cannot Use the VT18X Option

Model	Use VT18X Option	Cannot Use VT18X Option	Reason
VT100-AA, -AB	X		
VT100-L, - N	X		
VT100-WA, -WB	X		
VT100-WC, -WZ		X	Foreign character set
VT100-X	X		
VT101		X	Nonexpandable
VT102		X	Nonexpandable
VT103		X	LSI-11 backplane
VT105 (VT1X5)		X	Lose graphics capability
VT125		X	Lose graphics capability
VT131		X	Nonexpandable
VT132*		X	Lose block mode and local edit capability

*The terminal can use the VT18X option if it is reconfigured to a basic VT100, but it loses the feature(s) mentioned.

The tools needed for installing the VT18X upgrade kit are as follows.

1 ¼ inch nut driver
1 Phillips head screwdriver, number 1
1 Flat blade screwdriver
1 Needlenose pliers

NOTE

The VT180 does not support the 20 mA option (VT1XX-AA), nor the printer port option (VT1XX-AL, -AM, -AU, -AV).

3.4.1 Check the ROMs on the Terminal Controller Module

To use the VT18X on the VT100, the ROMs on the terminal controller module must be the same as for a standard VT100. The ROMs are the memory chips that plug into the sockets on the terminal controller module. The ROMs contain the program for the terminal operation. If the ROMs are not the same as those for the VT100, they may cause an error message or an unexpected halt. Use the following procedure to check these ROMs.

1. Remove ac power from the VT100 by setting the 1/0 switch on the back of the VT100 to 0. (See Figure 3-4.) Remove the ac line cord from the wall receptacle and from the back of the VT100. Save this ac line cord, as it will be needed later.

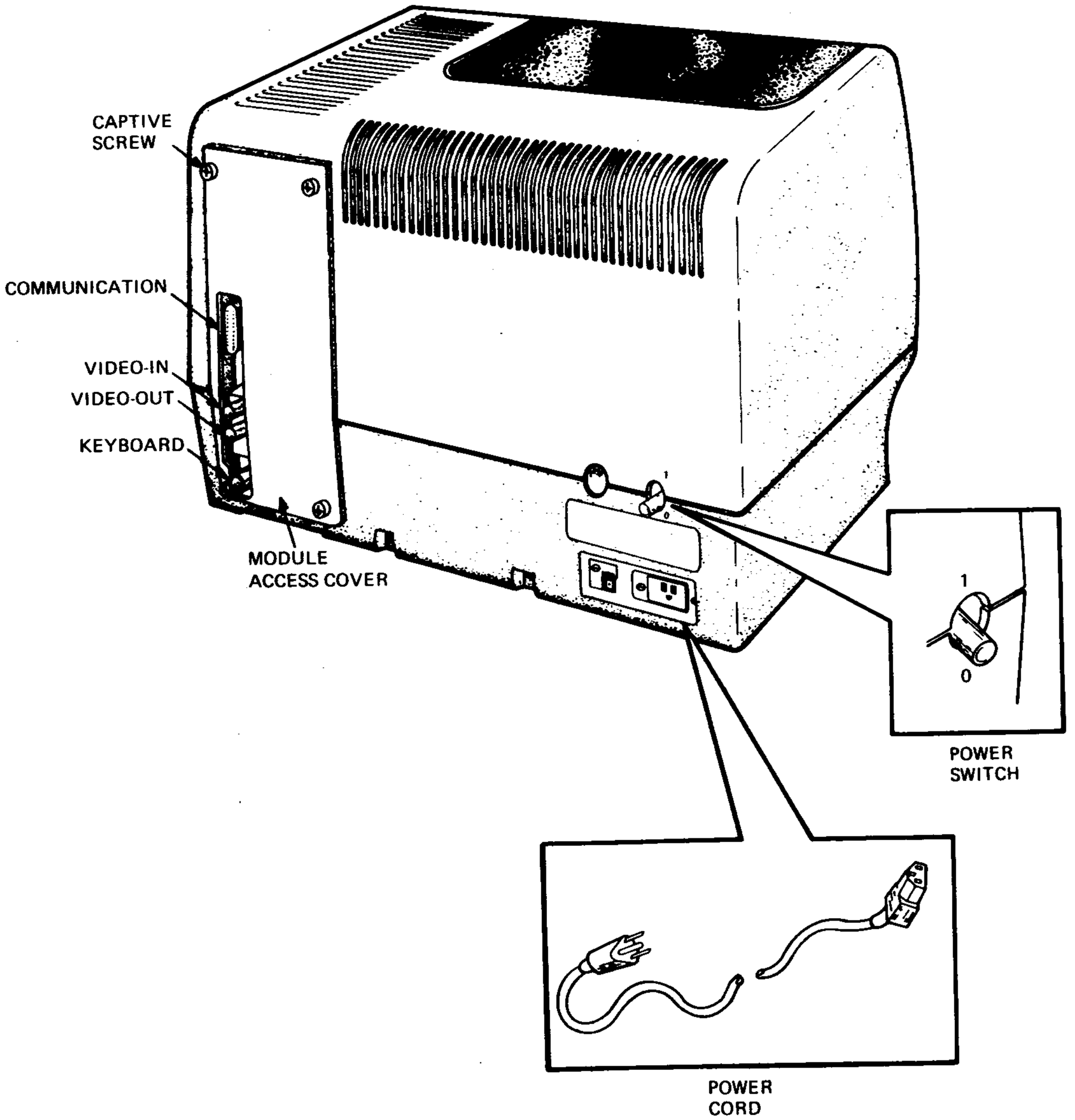


Figure 3-4 VT100 Video Terminal (Rear View)

2. Unplug the keyboard and the communication cable if it is attached to the back of the terminal. Unplug any video-in or video-out cables. (See Figure 3-4.)

3. With a screwdriver, loosen the four captive screws from the module access cover at the back of the terminal. Remove this cover; it will not be used with the VT180. (See Figure 3-4.)

4. Remove the terminal controller module (Figure 3-5) from the left side of the module access opening on the back of the terminal. Disconnect the ground wire, if present, from the module.

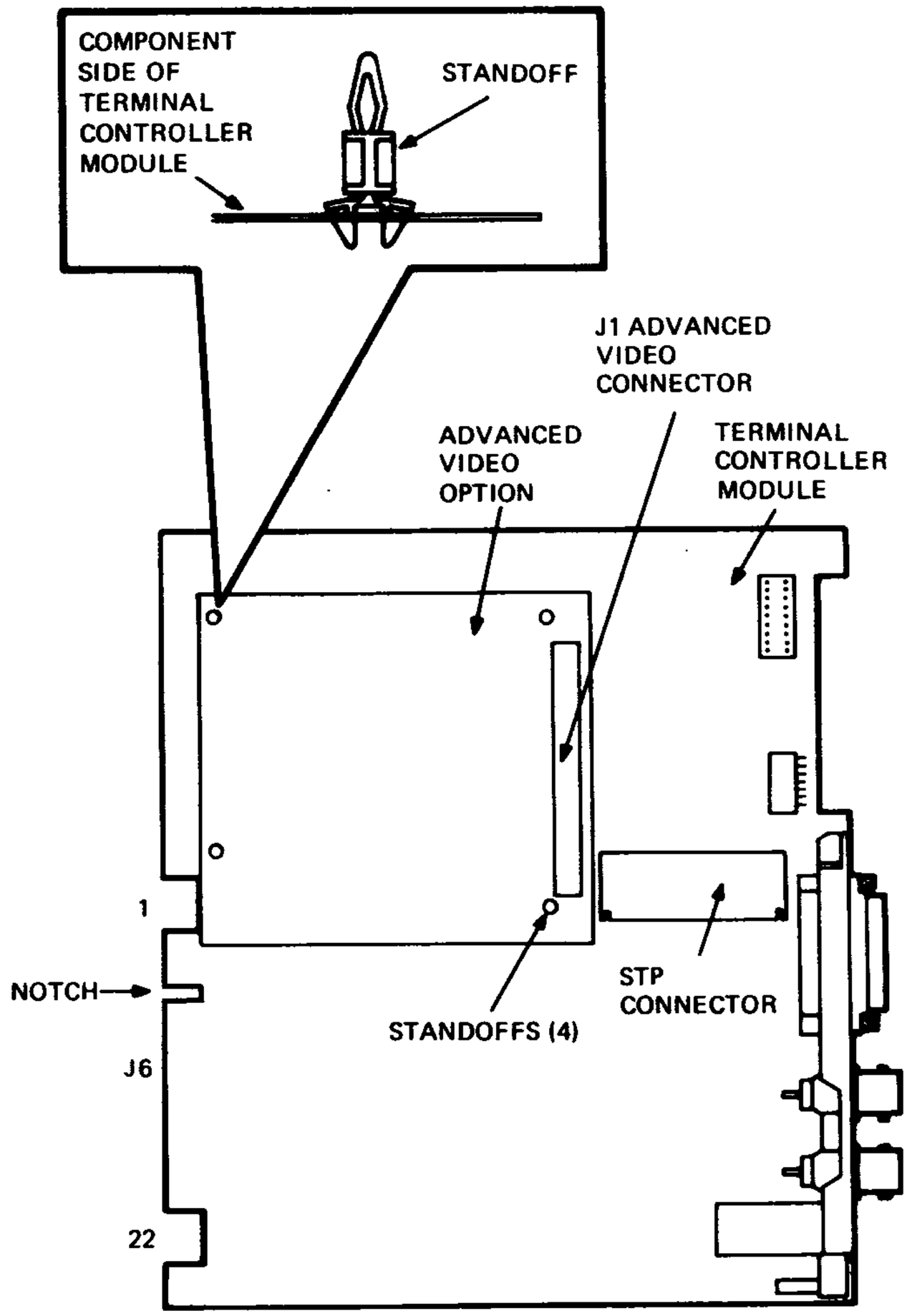


Figure 3-5 Advanced Video Option Removal and Installation

5. If present, remove the advanced video option (AVO), shown in Figure 3-5, from the terminal controller module.

6. Remove any module installed in the STP connector on the terminal controller module (Figure 3-5). The printer port option (VT1XX-AC) is not used in this new computer. If a printer port option is removed, go to Paragraph 3.4.13 for special instructions; if not, continue with step 7.

7. Check the ROMs on the terminal controller module, and compare the numbers on the module with the numbers in Figure 3-6. They should be the same; if not, go to Paragraph 3.4.13 for ROM removal and replacement.

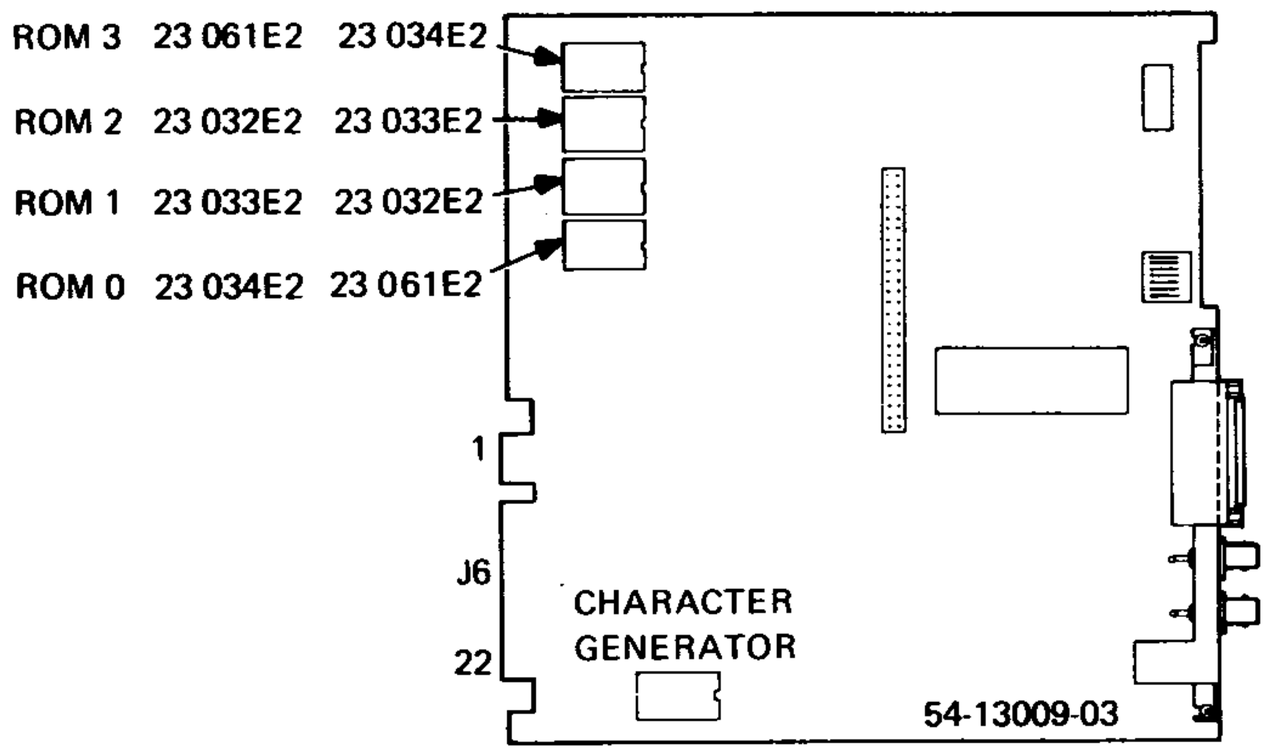
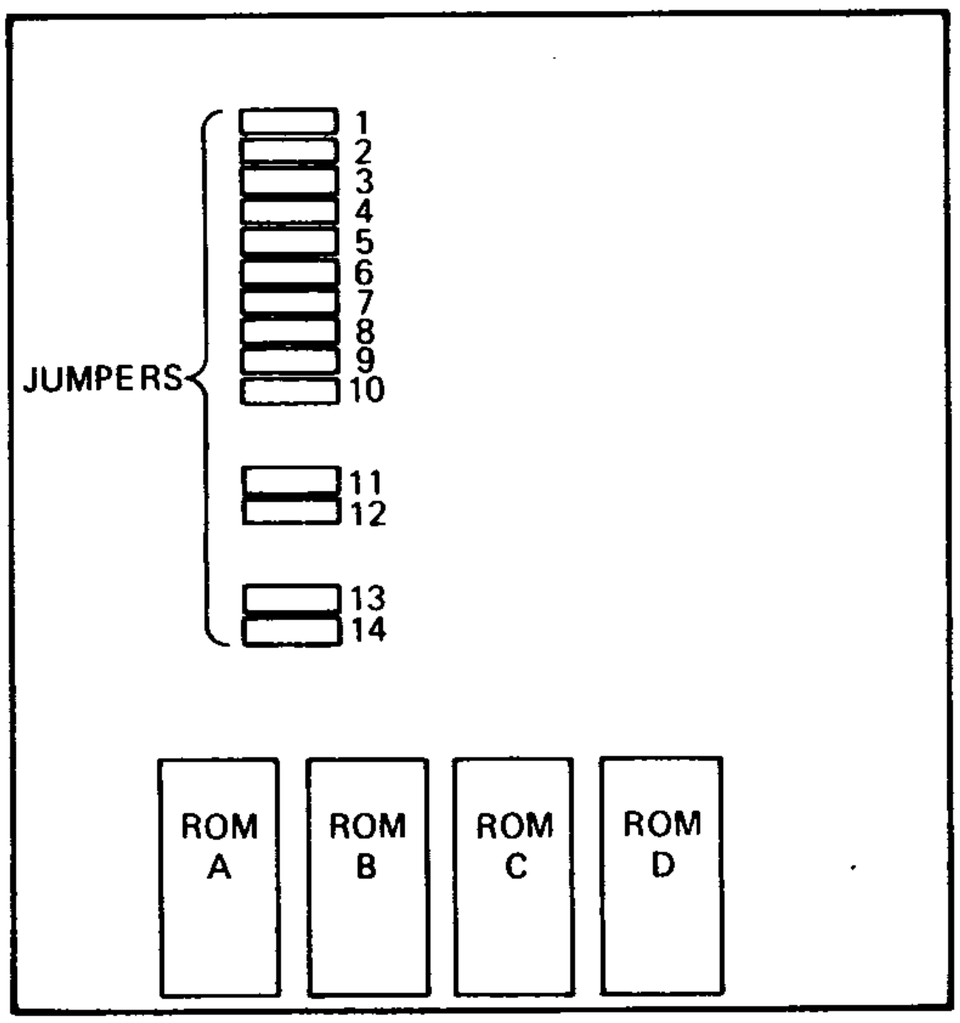


Figure 3-6 Checking ROM Numbers on the Terminal Controller Module

8. If previously removed, check for the presence of ROMs and jumpers (or switches) on the advanced video option (AVO). Except for a VT100 with a word processing option, the VT180 uses no ROMs or jumpers on the AVO. (See Figure 3-7.) If the AVO has switches instead of jumpers, see Figure 3-8.



3-7 Advanced Video Option with Jumpers

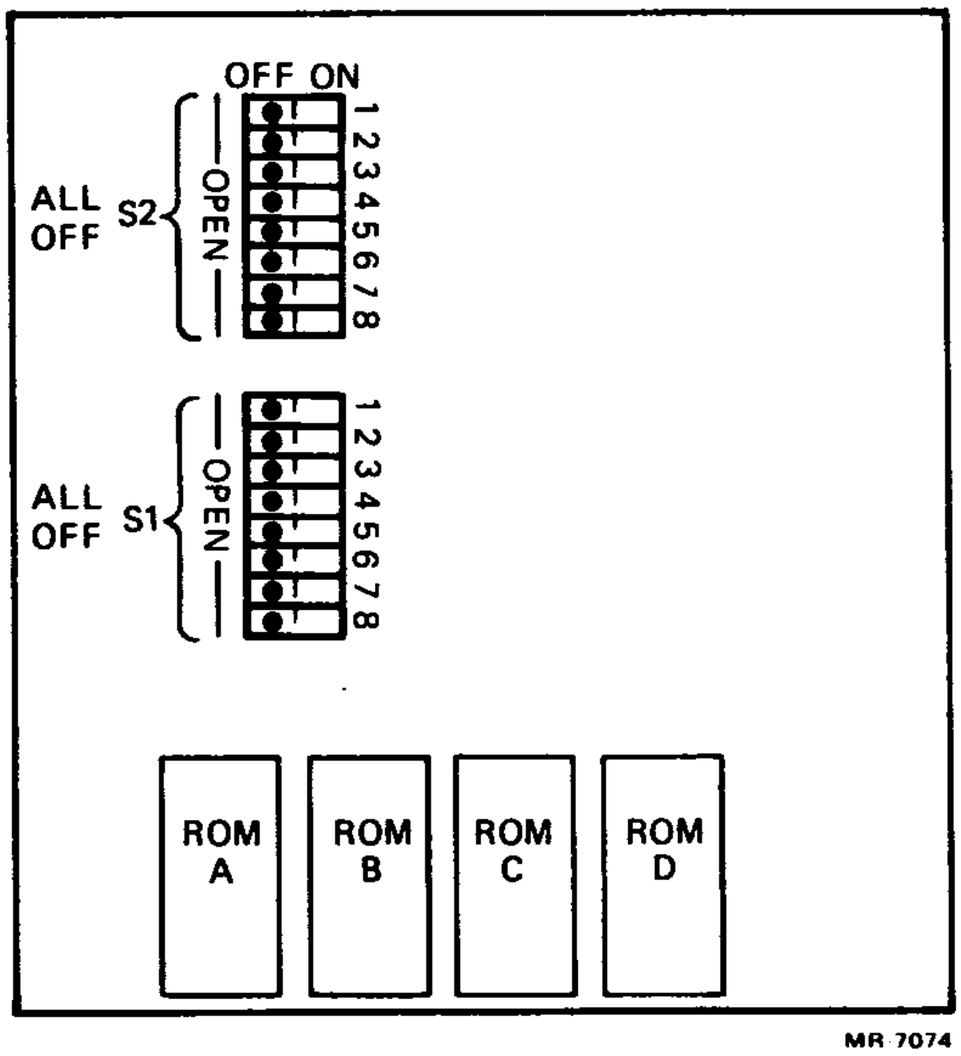


Figure 3-8 Advanced Video Option with Switches

NOTE
For an AVO on a VT100 terminal with a word processing option installed (VT100-WA, WB), refer to Paragraph 3.4.14 for special configuration.

9. Reinstall the advanced video option on the terminal controller module. (See Figure 3-5.)

3.4.2 Install the VT180 Paddle Board

Use the following procedure to install the VT180 paddle board.

1. Insert the VT180 paddle board (54-15150) in the STP connector on the terminal controller module (Figure 3-9). Fasten this paddle board to the terminal controller module through the fiber spacer with a 4-40 by ¼ inch Phillips head screw and a flat nylon washer.

2. Place one end of the 16-conductor ribbon cable in connector J2 on the VT180 paddle board. Extend the cable to the right of the module (Figure 3-9). Make certain that the red line on the ribbon cable is facing pins 1 and 16 of connector J2.

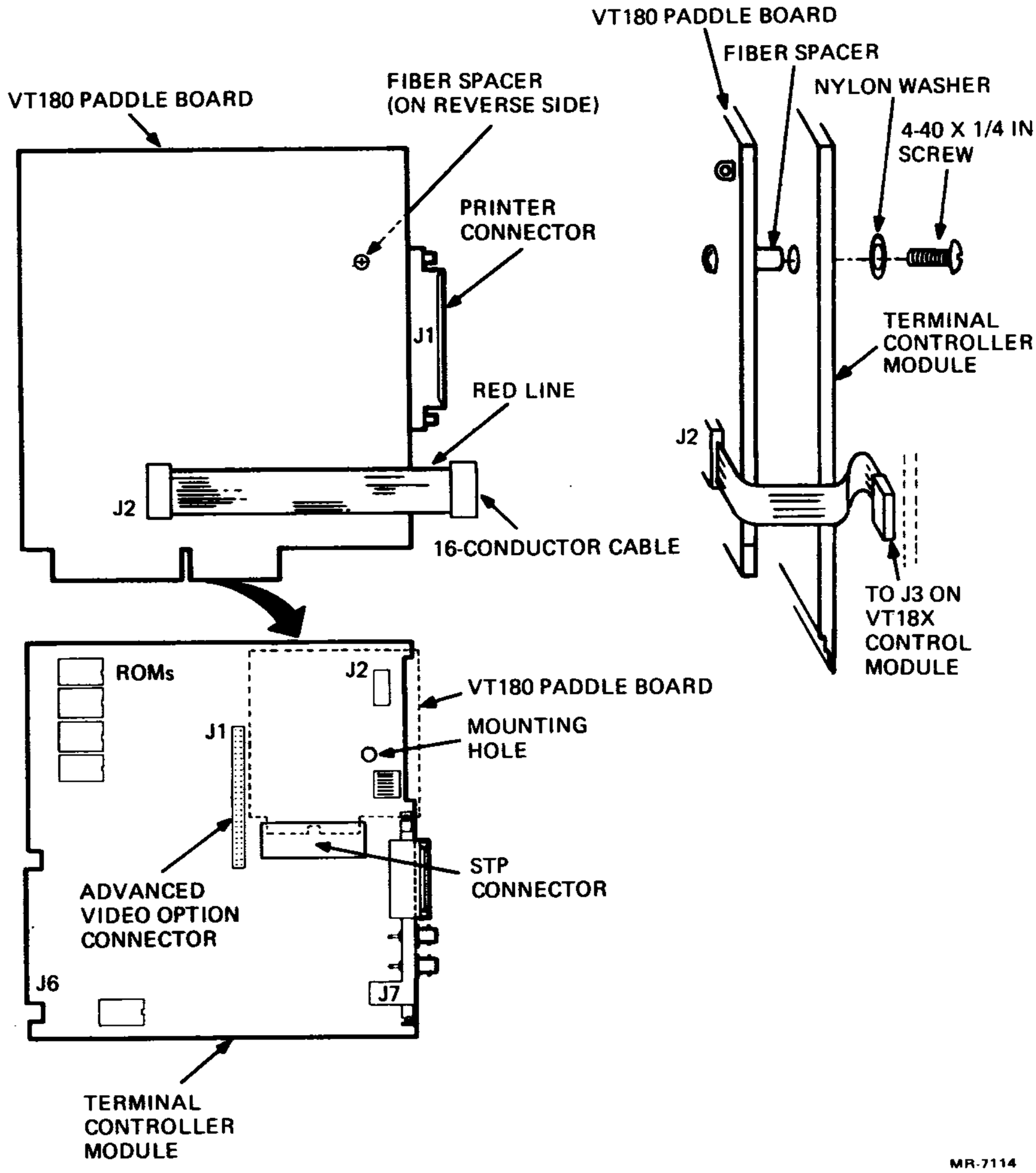


Figure 3-9 Installing the VT180 Paddle Board

3.4.3 Install the Expansion Backplane on the Card Cage

Use the following procedure to install the VT100 expansion backplane.

1. Remove the top cover on the video terminal as follows.

   a. Using a scriber, release the two front pop fasteners found under the video screen. (See Figure 3-10.)

   b. Next, release the two pop fasteners found under the lower back edge of the bottom cover. (See Figure 3-10.)

   c. Remove the top cover by lifting it straight up.

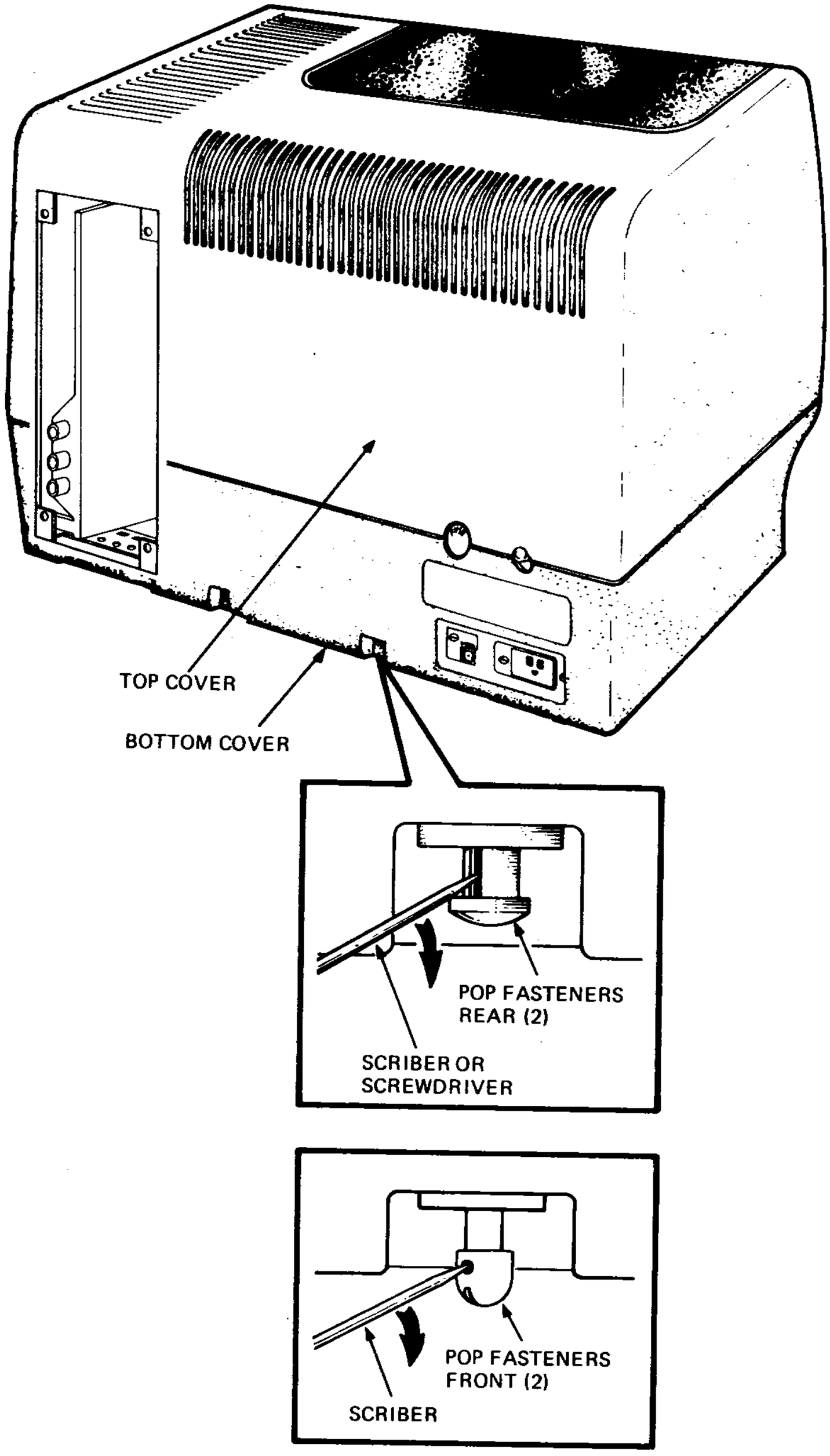


Figure 3-10 Top Cover Removal

2. Remove the bottom cover on the video terminal as follows.

   a. When facing the front of the terminal, turn it on its left side and remove the four screws (if present) fastening the bottom cover to the chassis during shipment. Save these screws if the terminal is to be sent to another location. Turn the terminal upright (Figure 3-11).

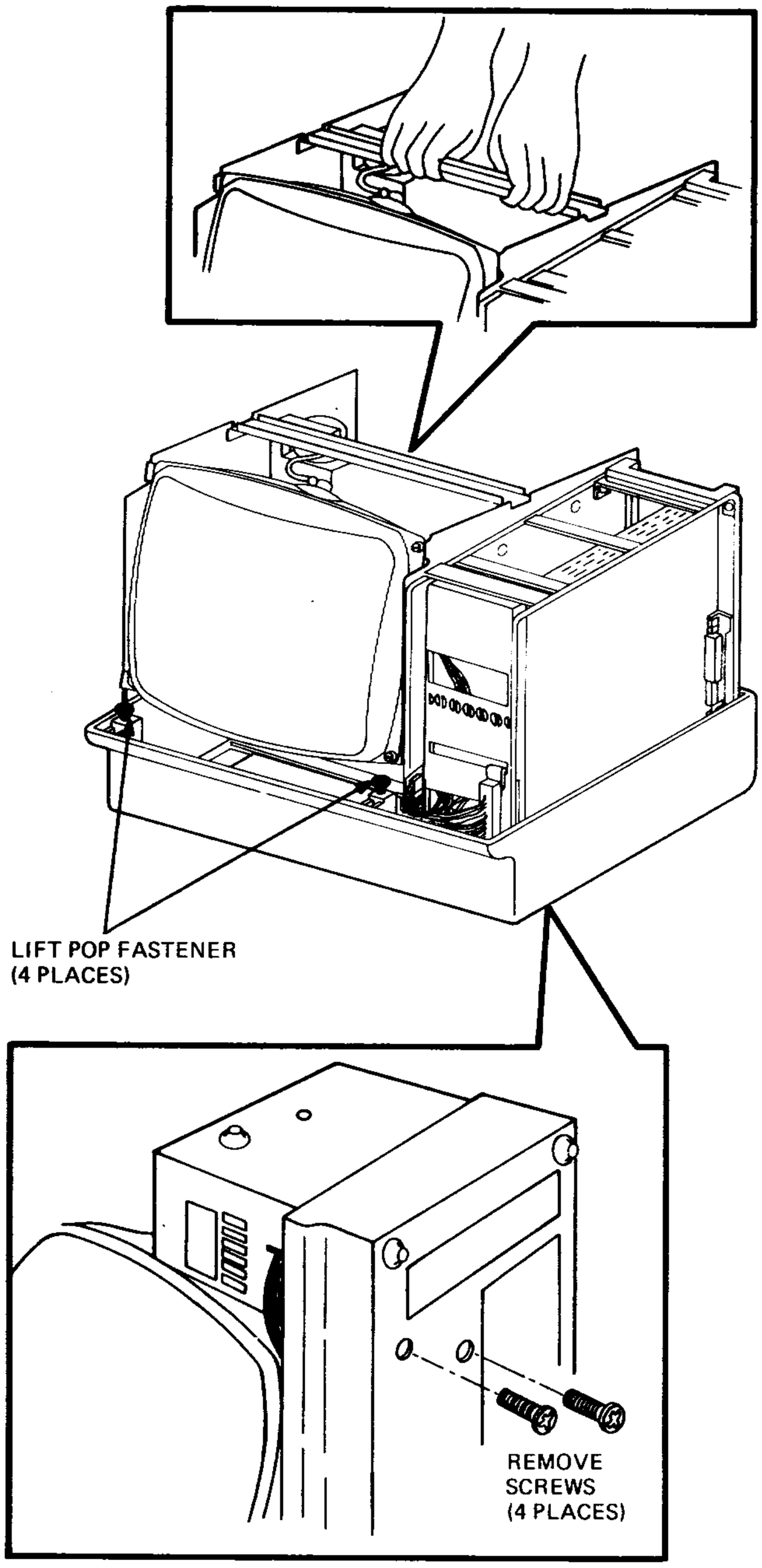


Figure 3-11 Removing the Bottom Cover

b. Find the four pop fasteners holding the chassis to the bottom cover. Pull the fasteners up until they click.

c. Using both hands, grasp the chassis by its center support bar and lift it up and out of the bottom cover.

3. Remove the 22-pin connector (Figure 3-12) from the front, right chassis by releasing the two retaining rings from its edge with needlenose pliers, or lift the clips off the top and bottom of the connector and discard.

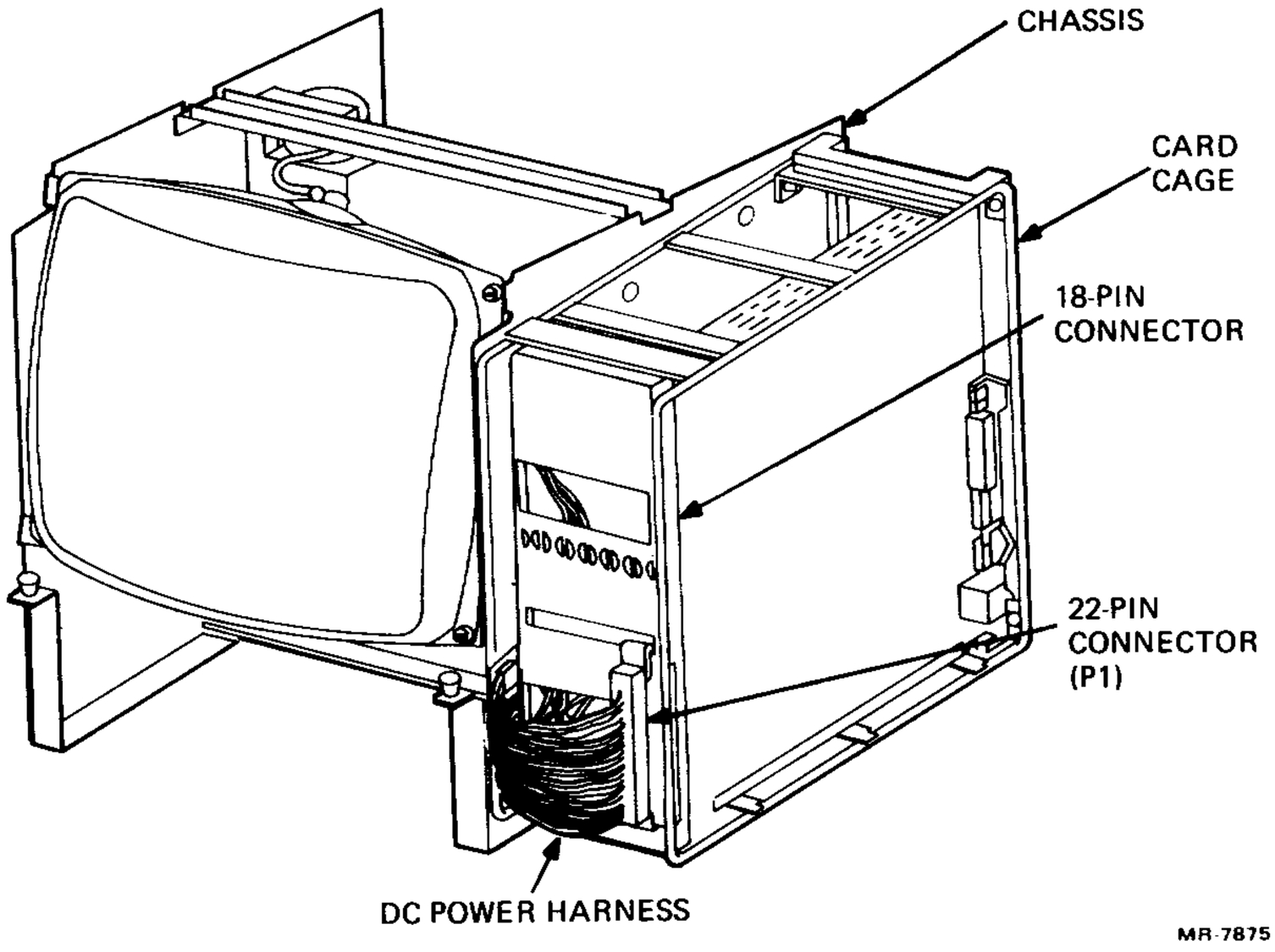


Figure 3-12 Disconnecting the dc Power Harness

4. The expansion backplane, shipped with the VT18X personal office computing option, has a key plug in connector J6 on the backplane. (See Figure 3-13.) This key plug is for the new VT100 terminal controller module (54-13009-03), which has a slot in its edge connector J6.

   Examine the terminal controller board in your VT100 for a notch in connector J6. (See Figure 3-6.) If the notch is not present, you will have to remove the key plug from J6 of the expansion backplane or you will not be able to insert the module into the backplane. Use needlenose pliers to pull the key plug out of the connector on the backplane.

5. Install the VT100 expansion backplane (54-13384-01) to the front, right chassis on the terminal. Use four 4-40 by ½ inch screws, round fiber spacers, and kep nuts. (See Figure 3-14.) Install the screws through the top and bottom holes in connectors J4 and J6 on the expansion backplane and fasten the backplane to the card cage.

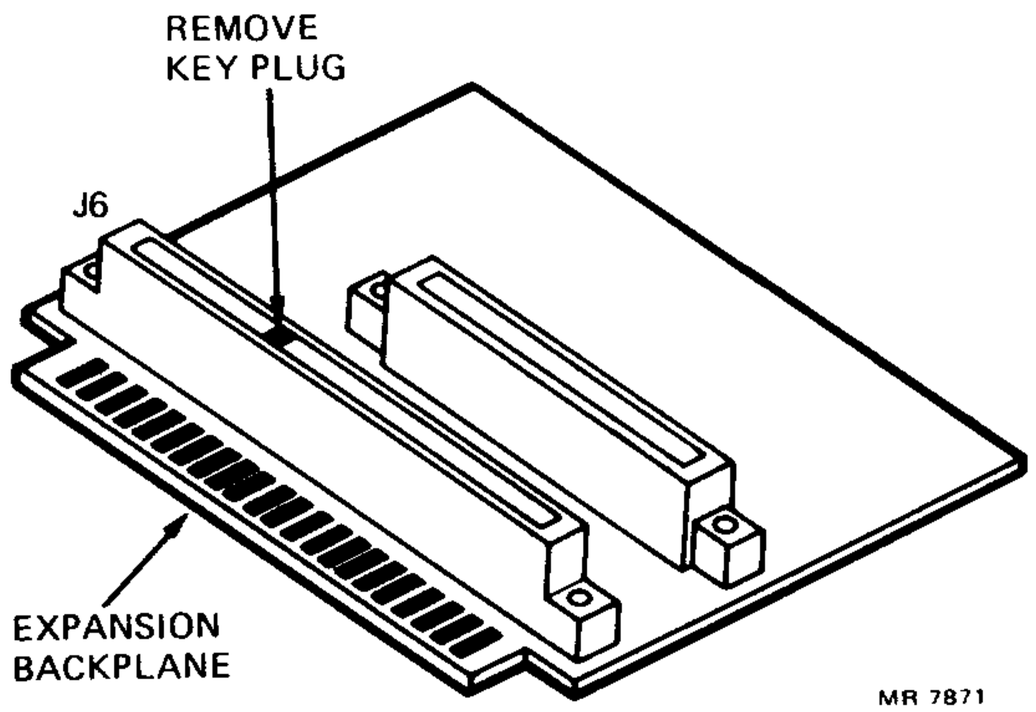


Figure 3-13 Remove the Key Plug from the Expansion Backplane

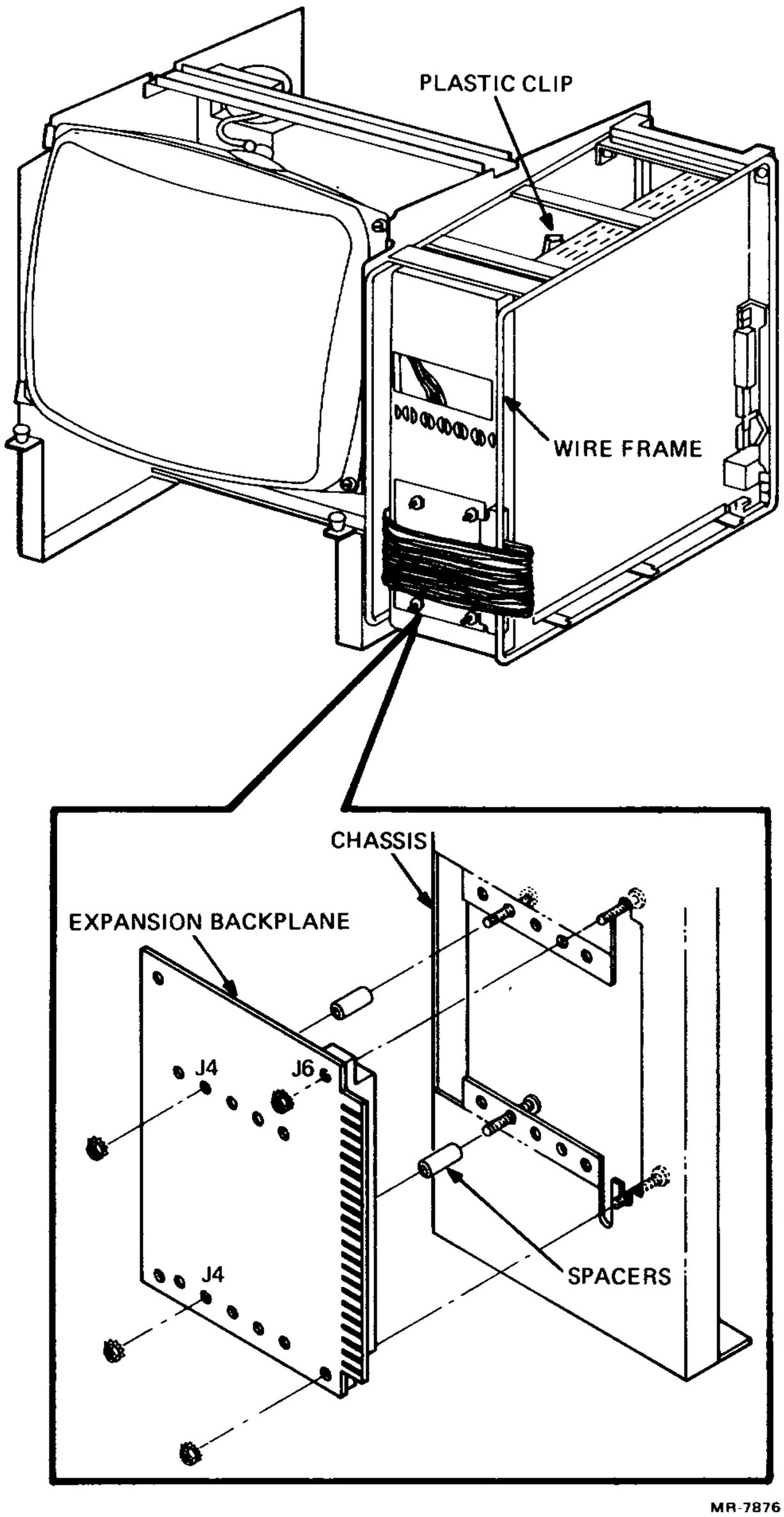


Figure 3–14 Installing the Expansion Backplane

6. Bend the dc power harness around the card cage and install the 22-pin connector on the expansion backplane module fingers. You may have to remove the shorter wires from the plastic clip on the chassis. The dc power harness must be flat against the chassis to permit the RF shield to slide over it during the installation.

NOTE

On early VT100 video terminals (prior to 1979), a nylon key plug was installed in the VT100 dc power harness between pins 5 and 6 of connector P1. This plug ensured correct alignment of the terminal controller module, which had a slot in its connector J6. The slot was later removed and the key plug was no longer needed.

When installing the VT18X into an early VT100, you must remove the key plug from connector P1 of its dc power harness or it will not fit on the edge of the new expansion backplane. Use needlenose pliers and pull the key plug out of the connector.

3.4.4 Install the Card Guides

Install a card guide at the top and at the bottom of the card cage so they are lined up with connector J2 of the expansion backplane. (See Figure 3-15.)

NOTE

The tabs on the card guide break easily; use a steady vertical pressure when installing them.

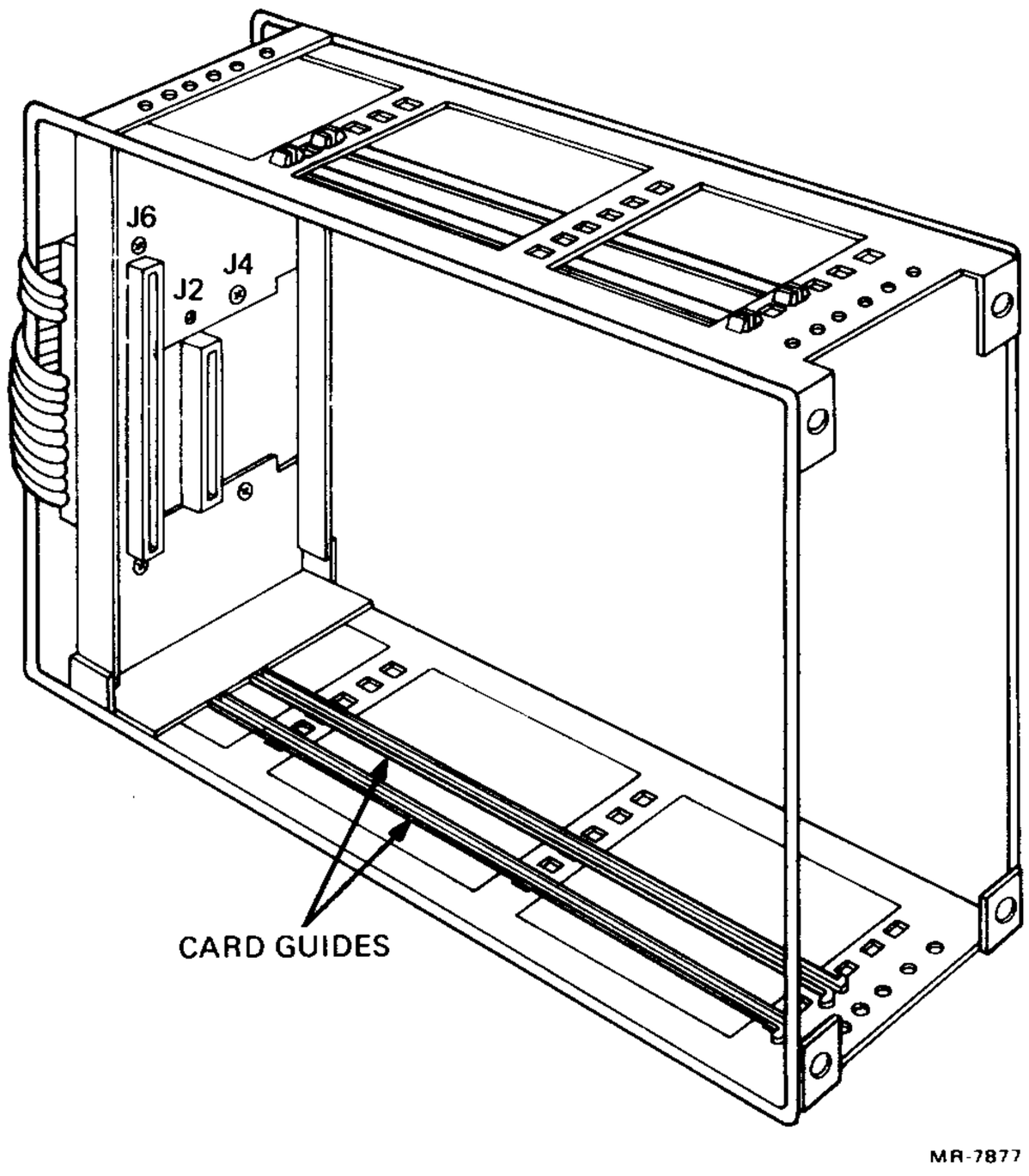


Figure 3-15 Installing Card Guides

3.4.5 Install the RF Shield

Use the following procedure to add the RF shield to the video terminal.

NOTE

Set the chassis on a protective material to protect the terminal's parts and the surface on which you are working.

1. Set the chassis on end with the card cage up (Figure 3-16).

2. Remove the four ¼ inch hex-head screws from the card cage – two on the top and two on the bottom.

3. Slide the RF shield on the card cage (Figure 3-16).

4. Using a scriber, line up the screw holes and install the same four hex-head screws.

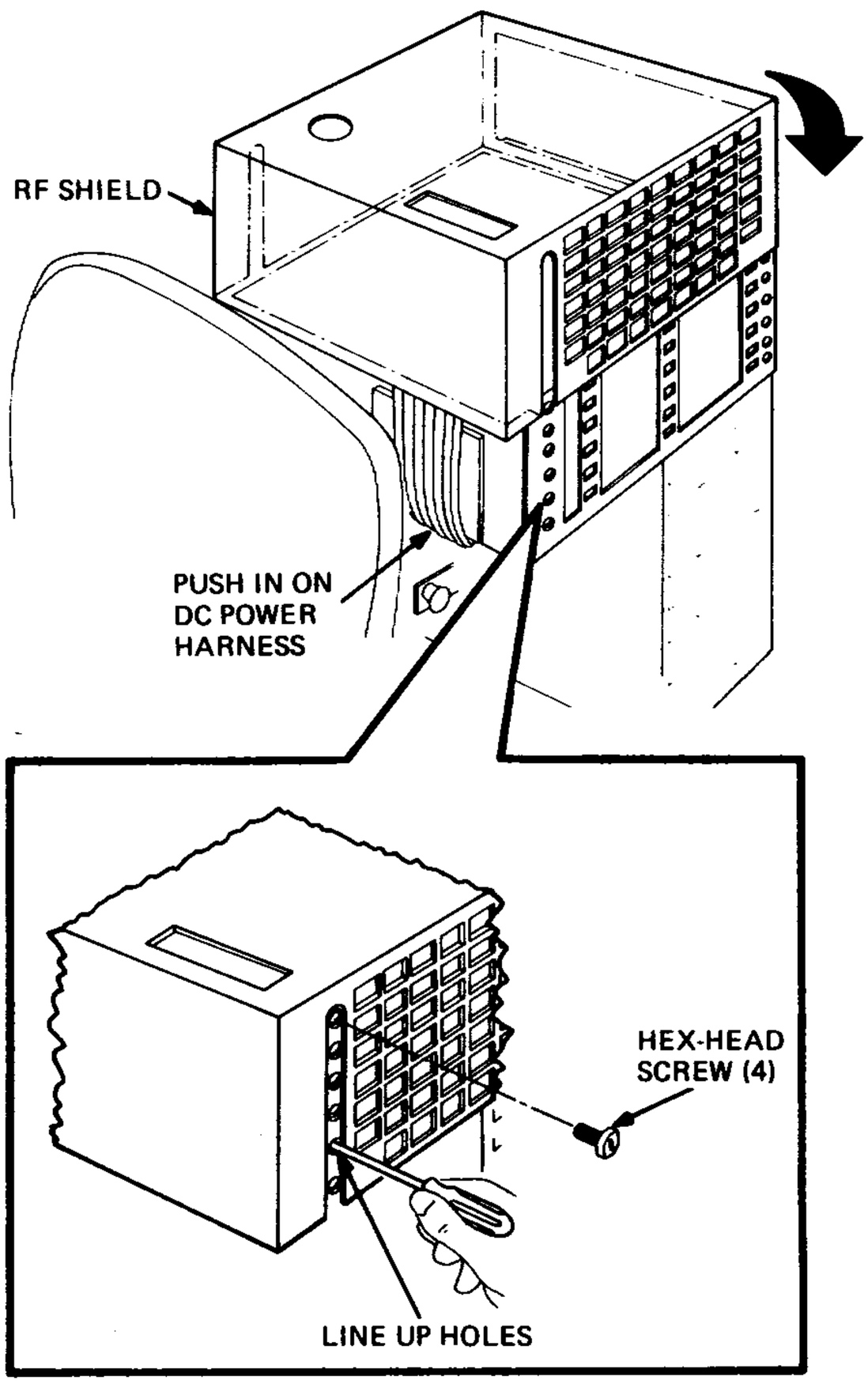


Figure 3-16 Installing the RF Shield

3.4.6 Install the Terminal Controller Module

Install the terminal controller module in its original slot (J6) in the left side of the card cage (Figure 3-15).

3.4.7 Install the VT18X Control Module

Use the following procedure to install the VT18X control module.

1. Check the communications switches on the VT18X control module (Figure 3-17) for the correct positions, which are listed in Table 3-2. The switches, as set, allow you to run the VT180 with most full- and half-duplex communications modems with application software. Table 3-2 shows the standard configuration and the function enabled by each switch.

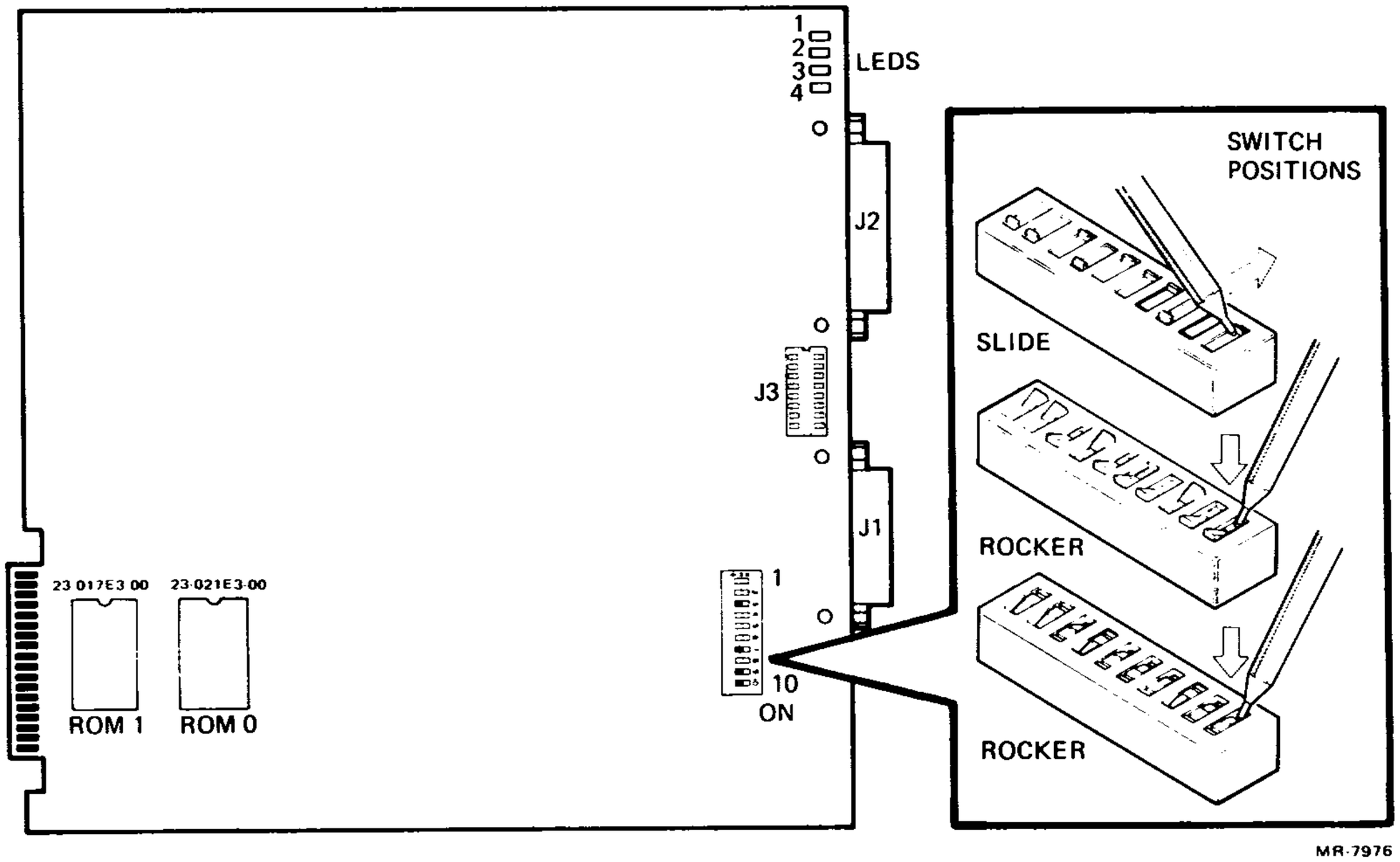


Figure 3-17 Setting the VT18X Control Module Switches

Table 3-2 VT18X Control Processor Module Communication Switches

Switch	Standard Setting	Name	Function Enabled	Source	Comm Port (J1) Pin Assignment	Circuit CCITT/ EIA
1	On	RTS	Request to send	From VT180	4	105/CA
2	On	CTS	Clear to send	To VT180	5	106/CB
3	Off	SCTS	Secondary clear to send	To VT180	13	121/SCB
4	On	SI (SRLSD)	Speed indicator (FDX) (Secondary carrier detect) (HDX)	To VT180	12	112/CI (109/CF
5	On	SRTS	Secondary request to send	From VT180	11	120/SCA
6	On	TXD	Transmitted data	From VT180	2	103/BA
7	Off	STXD	Secondary transmitted data	From VT180	14	118/SBA
8	On	SRTS	Secondary request to send	From VT180	19	120/SG
9			Not used			
10	Off	SPDS	Speed select (HDX)	From VT180	23	111/CH

2. Next, slide the VT18X control module partially in the card guides for J2 of the backplane. (S Figure 3-15.)

3. Attach the 16-conductor ribbon cable from the VT180 paddle board to the IC connector J3 the VT18X control module. Do not invert the cable; the red line on the cable should be on top, shown in Figure 3-18.

4. Slide the VT18X control module into connector J2 of the backplane (Figure 3-15).

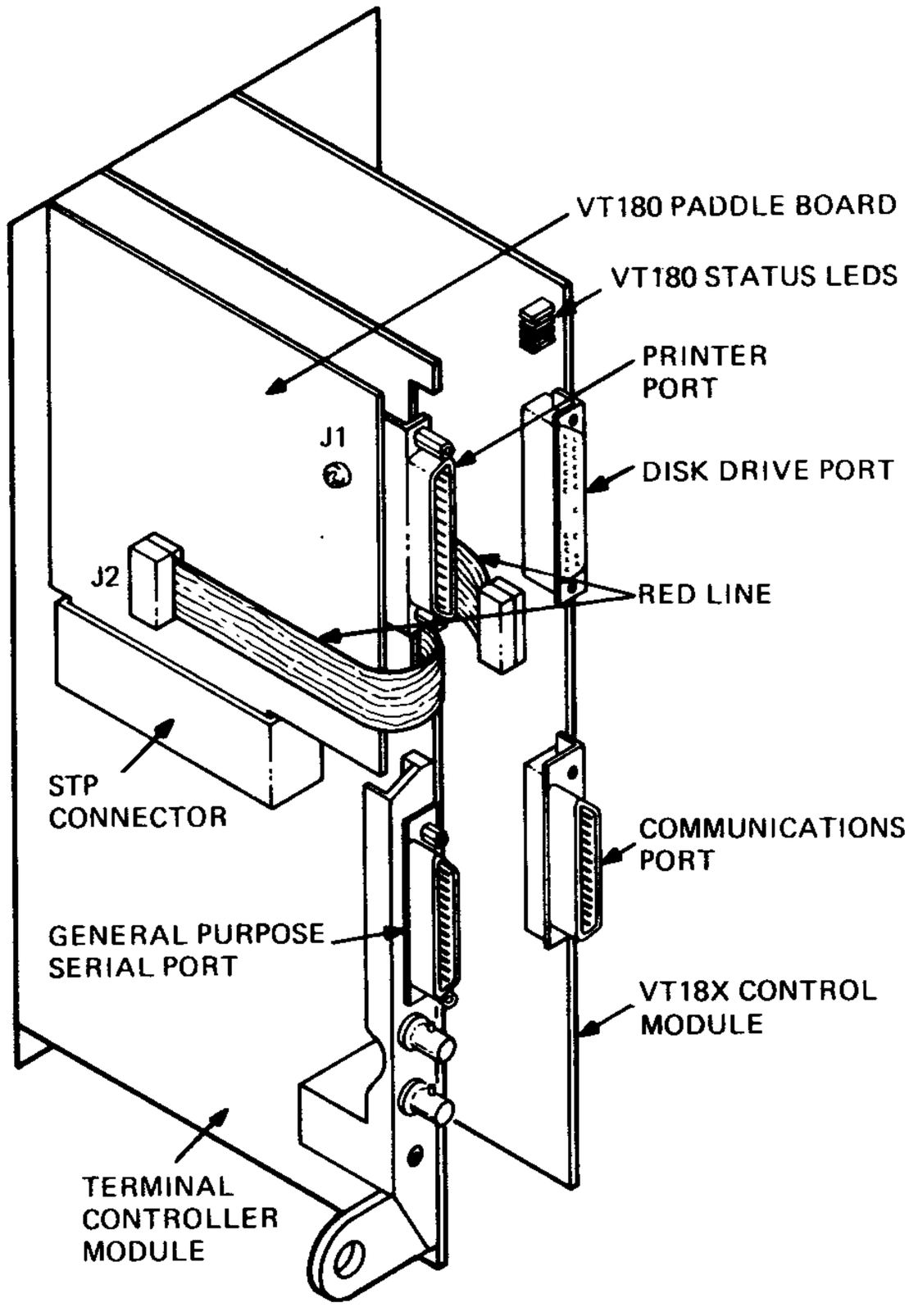


Figure 3-18 Installing the VT18X Control Module

3.4.8 Install the Chassis in the Bottom Cover

Place the chassis in the bottom cover and fasten the bottom cover with the four pop fasteners. If the terminal is to be sent to another location, turn the terminal on its left side and install the screws previously removed from the bottom (Figure 3-11).

3.4.9 Install the VT180 Logo

Use the following procedure to install the VT180 logo.

1. With a small screwdriver and pliers, remove the two retaining rings that hold the VT100 logo to the inside of the top cover. (See Figure 3-19.)

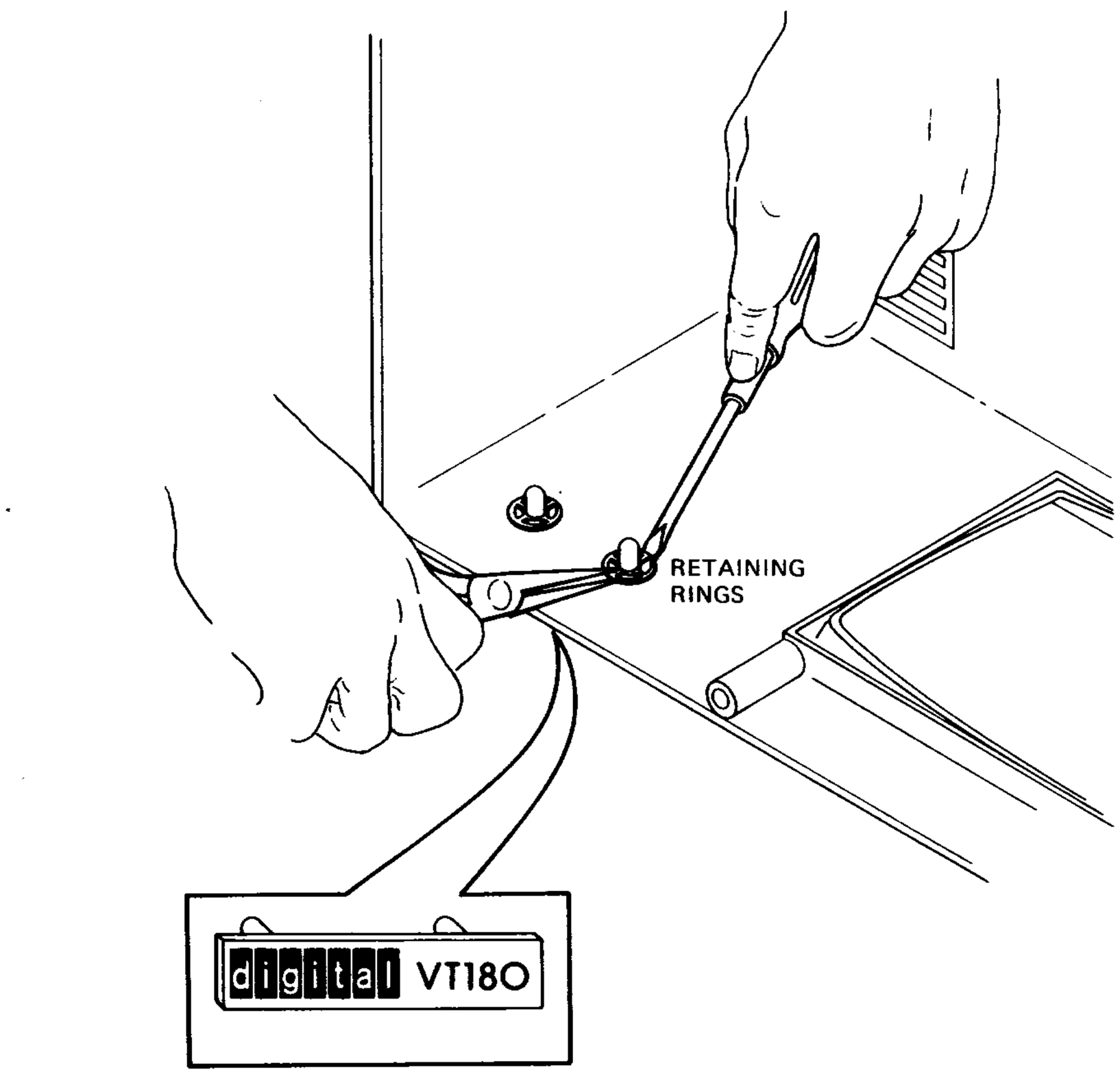


Figure 3-19 Removing the VT100 Logo and Installing the VT180 Logo

2. Remove the VT100 logo and place the VT180 logo in its place.

3. Secure the VT180 logo with the two retaining rings found in the small parts box.

3.4.10 Install the Top Cover

Place the top cover on the chassis and fasten it to the bottom cover with four pop fasteners. Press up on the fasteners until they click (Figure 3-10).

3.4.11 Install the New Metal Module Access Cover (Rear Shield)

Install the new metal module access cover over the module access opening, aligning its holes with the connectors on the modules. Install this cover as follows.

1. Place one 1⅛ inch hex standoff (90-00001-12) in each of the four corners of the cover, grounding the cover to the chassis. (See Figure 3-20.)

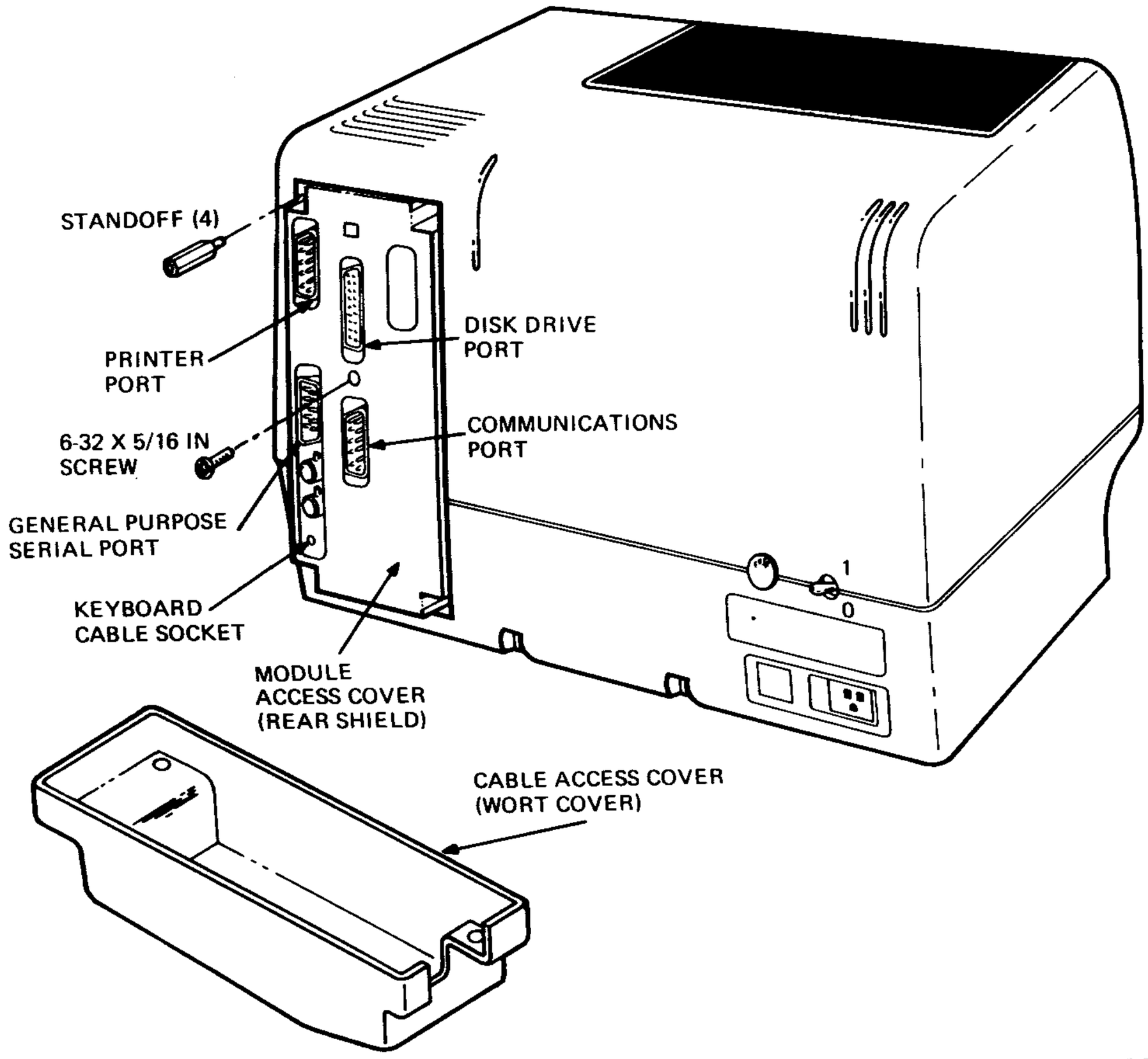


Figure 3-20 Installing the Module Access Cover (Rear Shield)

2. Place one 6-32 by 5/16 inch screw in the center of the cover, grounding the VT18X control module to the cover.

3. Do not install the cable access cover (wort cover) at this time. It will be installed after the cables are connected to the terminal.

3.4.12 Checking the RX180 Drive Select Switches

The RX180 disk drive unit contains drive select switches that are used to configure the drives as A and B or C and D. The VT18X upgrade kit includes the RX180-AB dual disk drive unit configured as drives A and B. If the system includes a second dual disk drive unit, it will be configured as drives C and D. The dual disk drive unit also contains an IC socket on each drive, which is used to terminate the I/O bus with a terminator resistor pack. The terminator resistor pack is always installed in the socket on drive A. The drive select switches and terminator resistor must be checked before the disk drive unit(s) are cabled into the system.

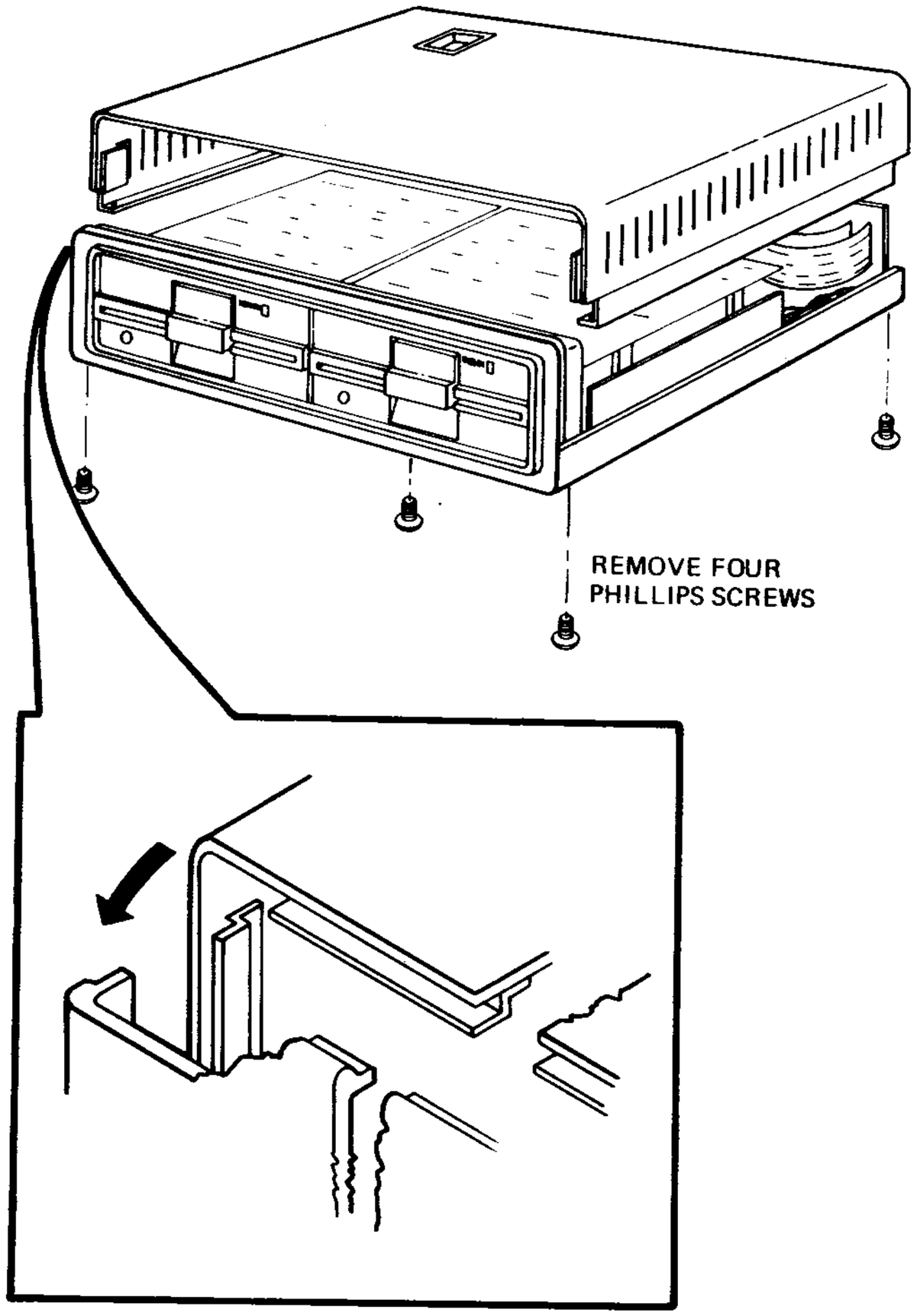


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Figure 3-21 Disk Unit Top Cover Removal

3.4.12.1 Disk Drive Unit Top Cover Removal – Perform the following steps to remove the disk drive unit top cover (Figure 3-21).

1. Turn the disk drive unit on its side.

2. Remove the four Phillips head screws and washers from the four corners of the bottom of the disk drive unit.

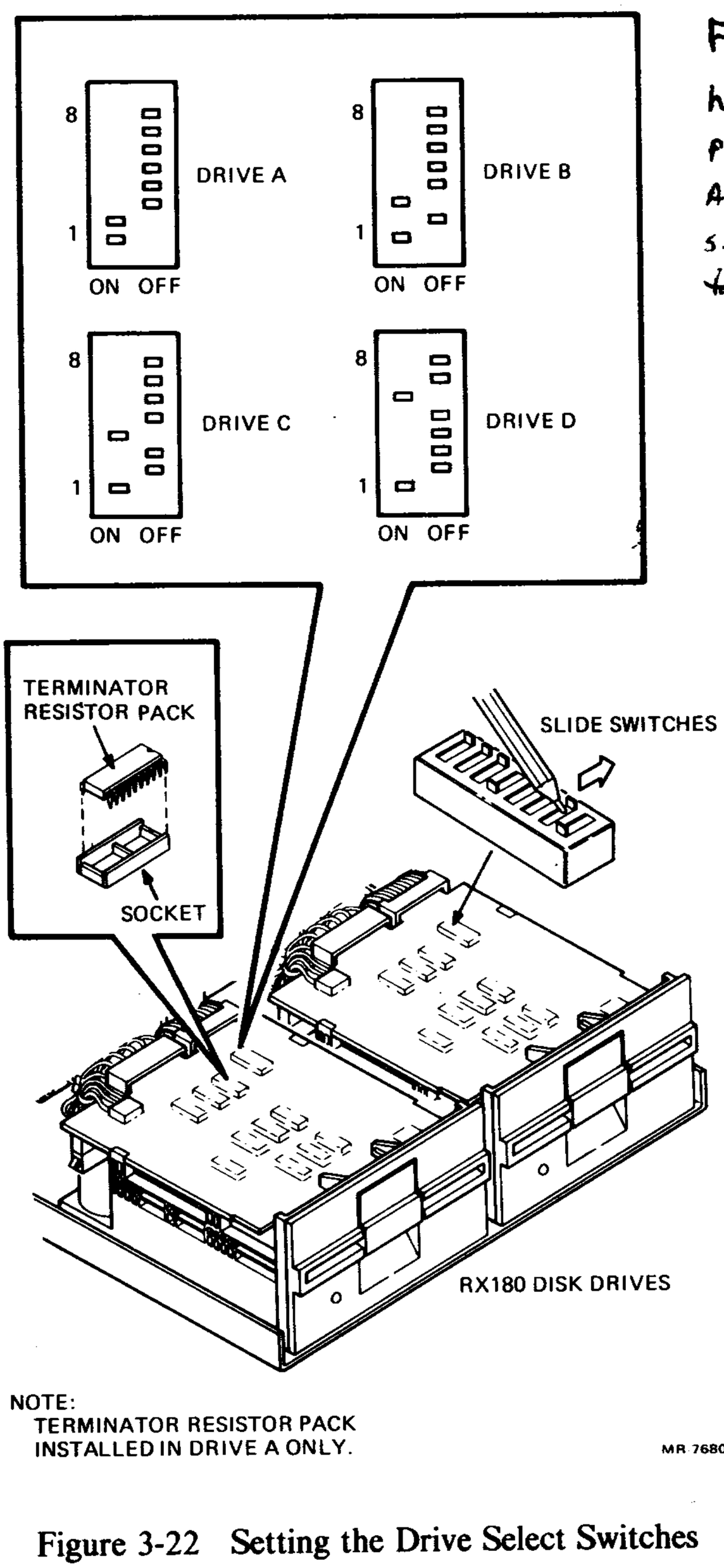
3. Using both hands, tip the unit back on its base, facing you.

4. Facing the front of the unit, grasp the rear corners of the top cover and guide the rear of the top cover up so as to clear the ON/OFF switch opening. Slide the cover backwards and store it in a safe place.

3.4.12.2 Setting the Drive Select Switches – Find the switch pack on the disk drive unit. Two switches are set on the switch pack for each disk drive, as shown in Figure 3-22.

1/10/89
AB units are Shugart
Model # 400L

CD units are TEAC
FD-50A-03-U
have 6 dip switches
positions 1-6
Appear to require
switch 5 ON in all positions
to those shown



NOTE:
TERMINATOR RESISTOR PACK
INSTALLED IN DRIVE A ONLY.

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Figure 3-22 Setting the Drive Select Switches

3.4.12.3 Terminator Resistor Pack – Check the IC socket (Figure 3-22) on drive A to make certain a terminator resistor pack is installed. This resistor pack terminates the I/O bus. The IC socket on drives B, C, and D should not have a terminator resistor pack installed.

3.4.12.4 Disk Drive Unit Top Cover (Reinstallment) – Perform the following steps to reinstall the disk drive unit top cover.

1. Set the top cover on the base so the cover clears the front of the two disk drives.

2. Place the disk drive unit assembly on its back panel and slide the lower front edge of the top cover under the disk drives.

3. Turn the unit upside down and align the four holes in the top cover with the four holes in the base. Secure the top cover to the base with four Phillips head screws and star washers.

4. Make sure all screws in the base of the unit are tight.

5. Place the unit on its base and make sure the plastic insert for the 1/0 switch is correctly in place.

3.4.13 ROM Removal and Installation

If you need to replace one ROM to update your terminal or if you need to replace all four ROMs on the terminal controller module (when removing a printer port option), use the following procedure.

1. Find the ROM part numbers on the terminal controller module (Figure 3-6).

2. If a printer port option is removed, remove the ROMs on the terminal controller module and replace them with the ROMs you saved when you installed the printer port option.

ROM Socket	Remove ROMs	Install ROMs
ROM 0	23-095E2	23-061E2
ROM 1	23-096E2	23-032E2
ROM 2	23-139E2	23-033E2
ROM 3	23-140E2	23-034E2

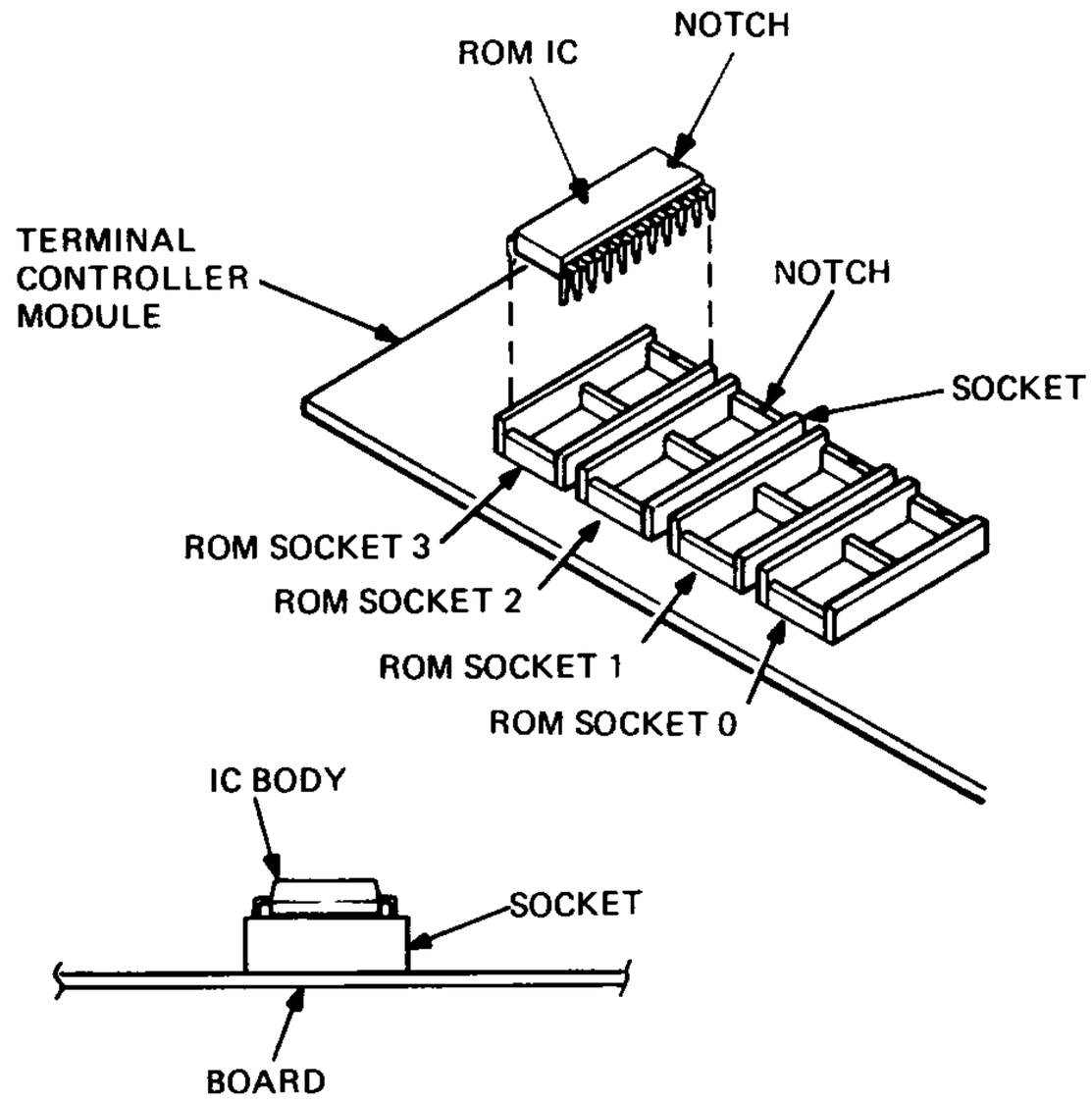
If necessary, new ROMs can be ordered using the above part numbers. Contact your local Digital Sales office.

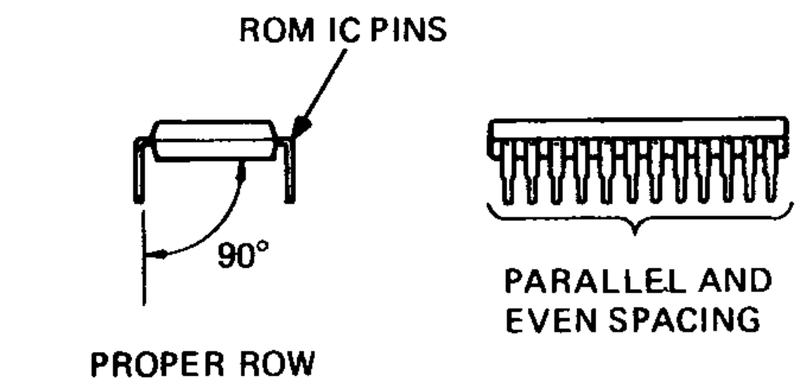
3. Unpack the ROM from its container, but do not remove the ROM from the conductive foam. Press the foam against the surface of the terminal controller module to remove static charges. Then remove the ROM from the conductive foam.

4. Referring to Figure 3-23, align the ROM so the notch on the end of the ROM is on the same side as the notch on the IC socket. Check that all ROM pins are equally spaced and straight before inserting the ROM into the IC socket.

5. Using even pressure, press the top of the ROM until it is completely in the socket. If you notice friction, remove the ROM and check for correct pin alignment.

6. After the ROM is inserted, check to see that all ROM pins are correctly installed in the socket.





NOTE:
CHECK ALIGNMENT BEFORE INSTALLING.

MR-7052

Figure 3-23 ROM Installation

3.4.14 Word Processing Option

A VT100 word processing terminal (VT100-WA or -WB) can be upgraded to a VT180. A word processing terminal has one ROM installed in the ROM A position on the advanced video option (AVO). (See Figure 3-7 or 3-8.) The ROM part number and the jumpers installed (or the switches set) on the AVO are as follows.

ROM A Part Number	Jumpers Installed	Switches Set
23-069E2	1 and 7 (See Figure 3-7)	2 and 8 on switch pack 2 (See Figure 3-8)

3.5 SYSTEM INTERCONNECTIONS

Place the terminal, keyboard, and disk drive unit(s) on a desk or table top in the desired positions (Figure 3-2). The only tools necessary for installing the VT180 is a 3 mm (⅛ inch) blade screwdriver and a number 1 Phillips screwdriver. More tools may be necessary when installing accessories or options.

3.5.1 Terminal Installation

Perform the following steps to install the terminal.

1. Make sure the unit is not connected to the power source.

2. Attach the BC26K terminal-to-disk I/O cable (17-00297) to the disk port on the module access cover (Figure 3-24). Seat and secure the connection by gently tightening the hold-down screws using a 3 mm (⅛ inch) screwdriver.

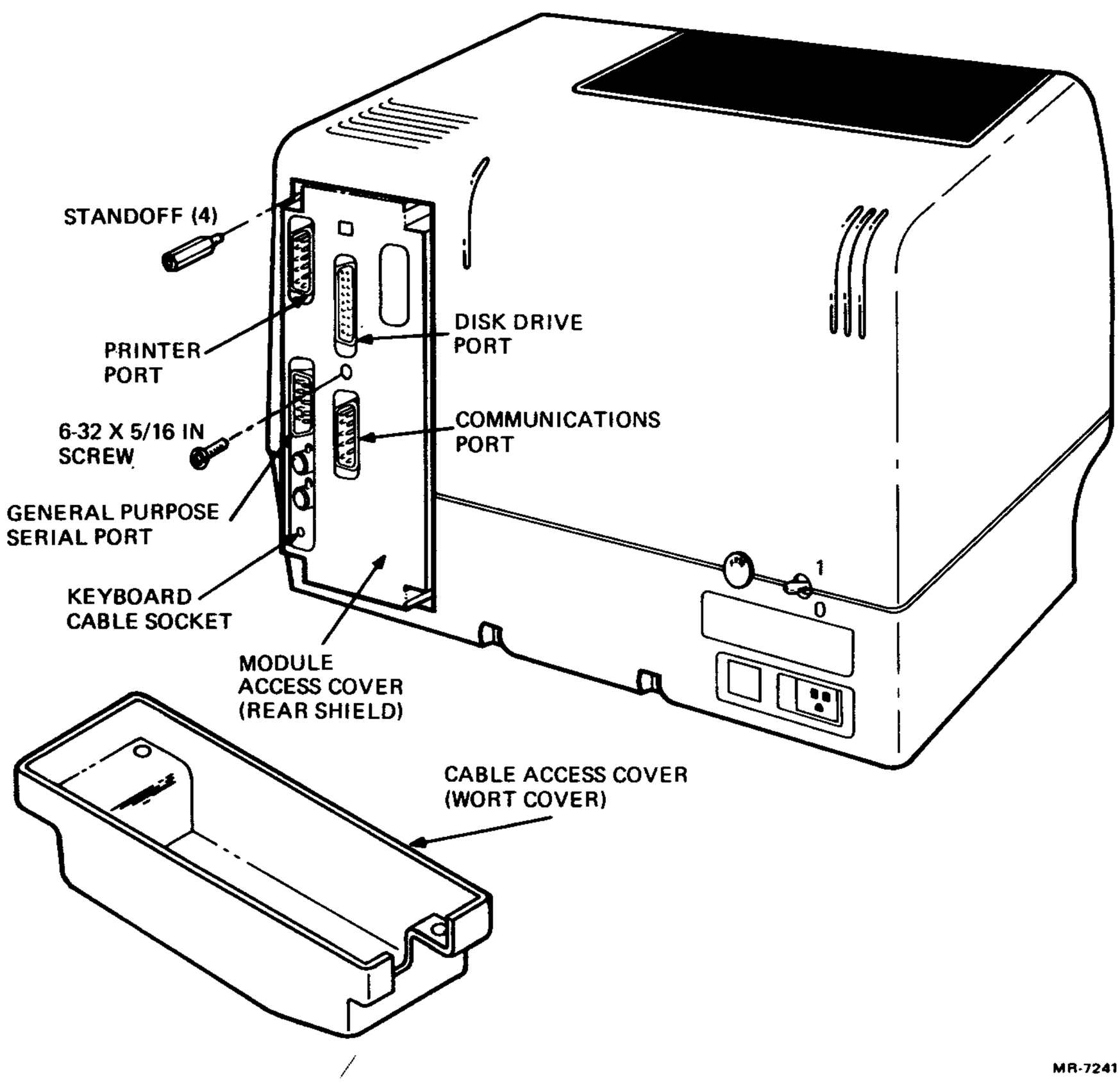


Figure 3-24 Terminal Cable Connectors

3. Plug the keyboard cable into the keyboard cable socket on the terminal controller module.

4. Check the terminal for the correct voltage range selection. The terminal can operate with either 115 Vac or 220–240 Vac input power.

CAUTION

Failure to select the correct voltage range will damage the terminal.

A label over the power receptacle indicates the factory selected input voltage range. Check this label, the voltage selector switch, and the fuse in order to be sure that the voltage range of the terminal is the same as your local ac power source.

Remove the fuse holder cap by pressing it in and turning it counterclockwise. Check the fuse for a rating of 3 A (PN 90-07217). Replace the fuse by pressing it in and turning it clockwise.

5. Turn the power ON/OFF switch to the off (0) position.

3.5.2 Install the RX180 Disk Drive Unit(s)

Use the following procedure to install one or two dual disk drive units.

CAUTION

If you have two disk drive units, they are not interchangeable unless the drive select switches are reset and the resistor terminator pack is installed as explained in Paragraph 3.4.12.3. RX180-AB is factory configured as drives A and B; RX180-AD is factory configured as drives C and D.

1. Check the voltage selector switch on the back of each disk drive unit. The voltage selector switch must be set to match the local ac power source. Make certain that the installed fuse is rated at 3 A (PN 90-07217). The voltage selector switch and fuse locations are shown in Figure 3-25.

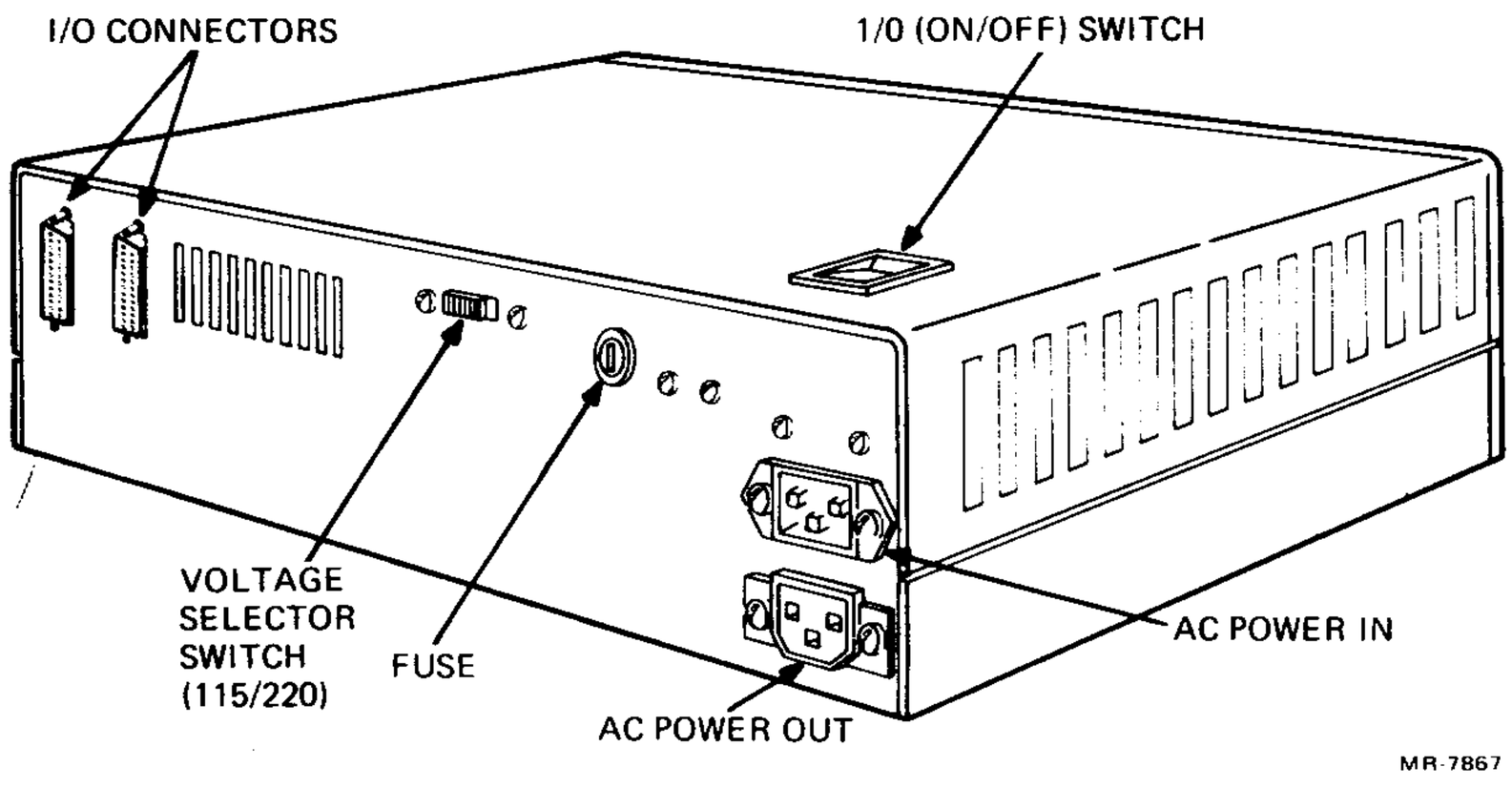


Figure 3-25 RX180 Dual Disk Drive Unit (Rear View)

CAUTION

If you connect 220 V to a disk drive unit that is set for 115 V, you will blow its fuse and may damage its power supply.

2. If you have one disk drive unit, place it on the top or on either side of the video terminal. (See Figure 3-2.)

NOTE

If placing the disk drive unit on top of the video terminal, do not cover the ventilation openings on top of the terminal.

3. If you have two disk drive units, place RX180-AB (drives A and B) on top of RX180-AD (drives C and D). Set the power ON/OFF switch on RX180-AD (drives C and D) to the on (1) position.

4. Attach the BC26K cable from the terminal's disk port to the left conductor (as viewed from the back) of the bottom (or only) disk drive unit. See Figures 3-26 and 3-27.

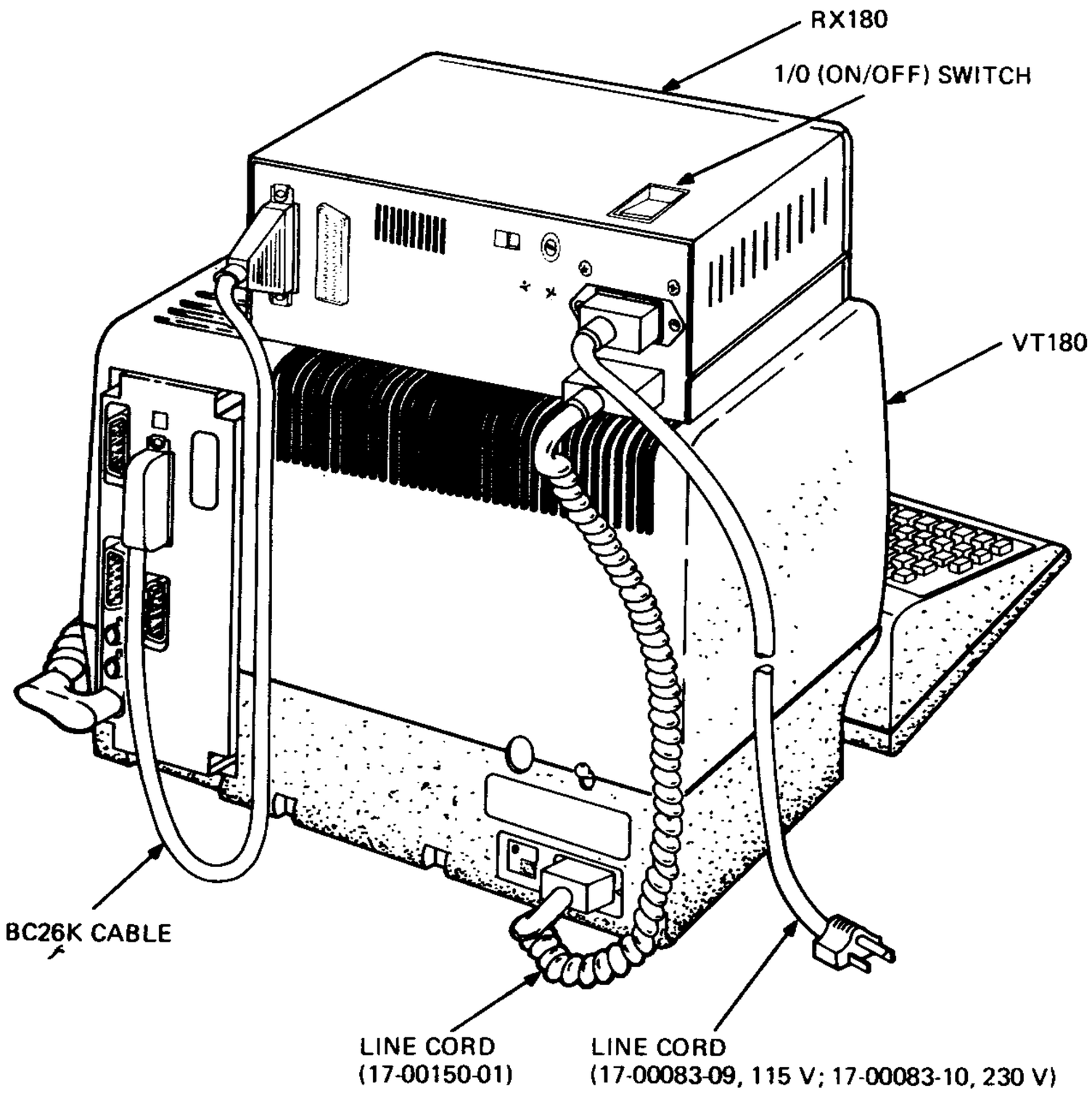


Figure 3-26 VT180 Cable Connections with One Disk Drive Unit

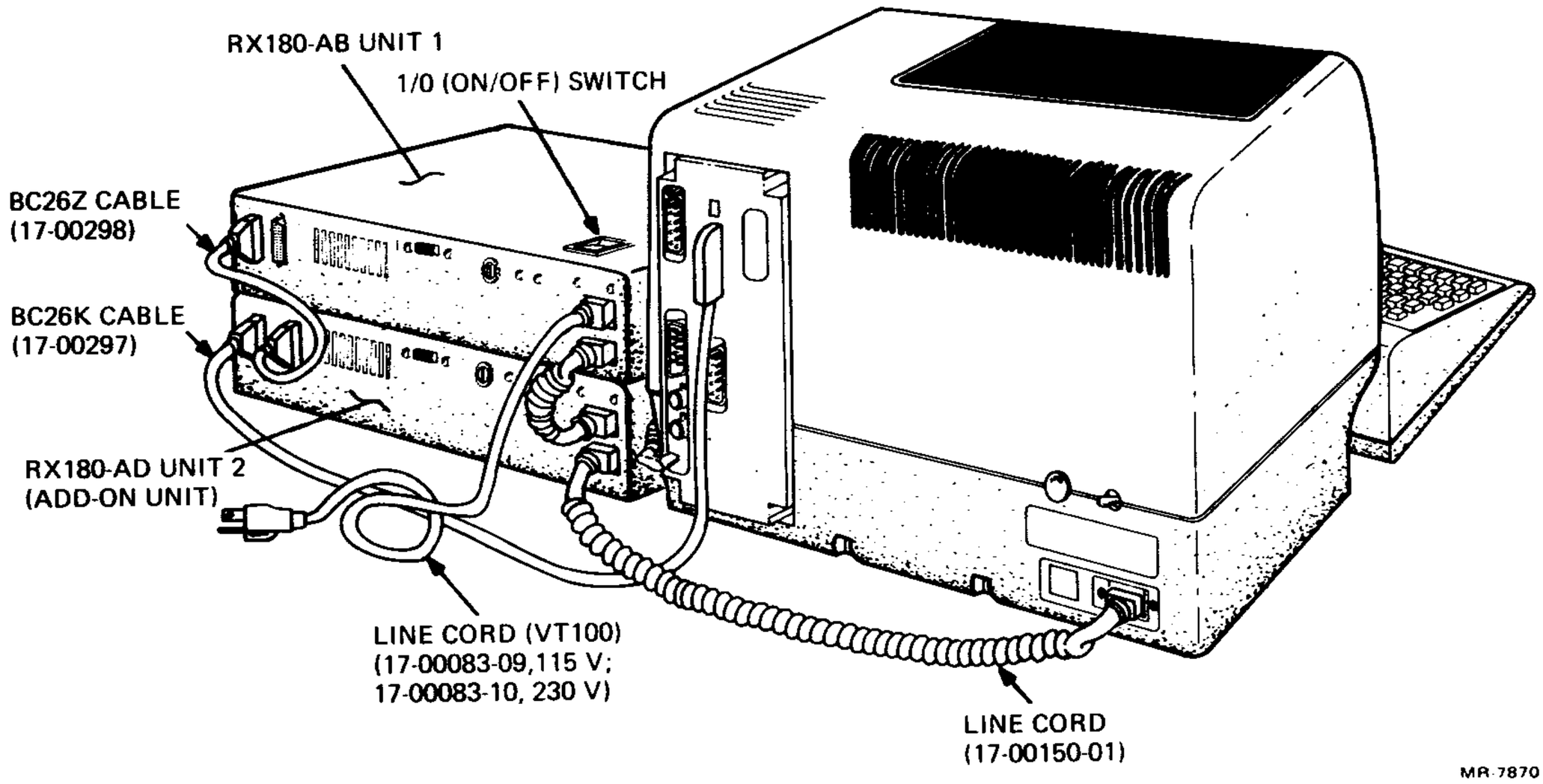


Figure 3-27 VT180 Cable Connections with Two Disk Drive Units

5. If you have two disk drive units, attach the BC26Z 20 cm (8 inch) disk-to-disk I/O cable (17-00298) from the right connector on the bottom disk drive unit (drives C and D) to the left connector on the top disk drive unit (drives A and B).

6. Find the ac line cord previously removed from the video terminal and attach this ac line cord to the ac input of the top or only disk drive unit. (See Figure 3-26.) Do not plug the other end of this cable into an ac wall receptacle at this time.

7. If you have two disk drive units, plug the end of a coiled line cord with prongs in the ac output of the top disk drive unit and the other end without prongs in the ac input of the bottom disk drive unit (Figure 3-27).

8. Plug the end of a coiled line cord with prongs into the ac output of the bottom (or only) disk drive unit; plug the other end with prongs in the ac input of the video terminal.

When the VT180 has been correctly cabled, it should look like either Figure 3-26 or 3-27.

3.5.3 Serial Port Connections

Connections to the printer, communications, and general purpose ports (Figure 3-22) will depend on the specific system configuration. These ports permit the VT180 to communicate with a remote host computer and a large variety of external devices.

3.5.3.1 Printer Port – If a printer such as Digital's LA120 or LA34 is used with the VT180, attach a null modem cable (BC26U or the equivalent) to the 25-pin printer connector. This cable terminates at both ends with an RS-232 female connector. Attach the other end of the cable to the printer I/O connector. Make sure the connectors are completely seated and secure the connections on both ends of the cable by gently tightening the captive screws on the top and bottom of the connectors (Figure 3-28).

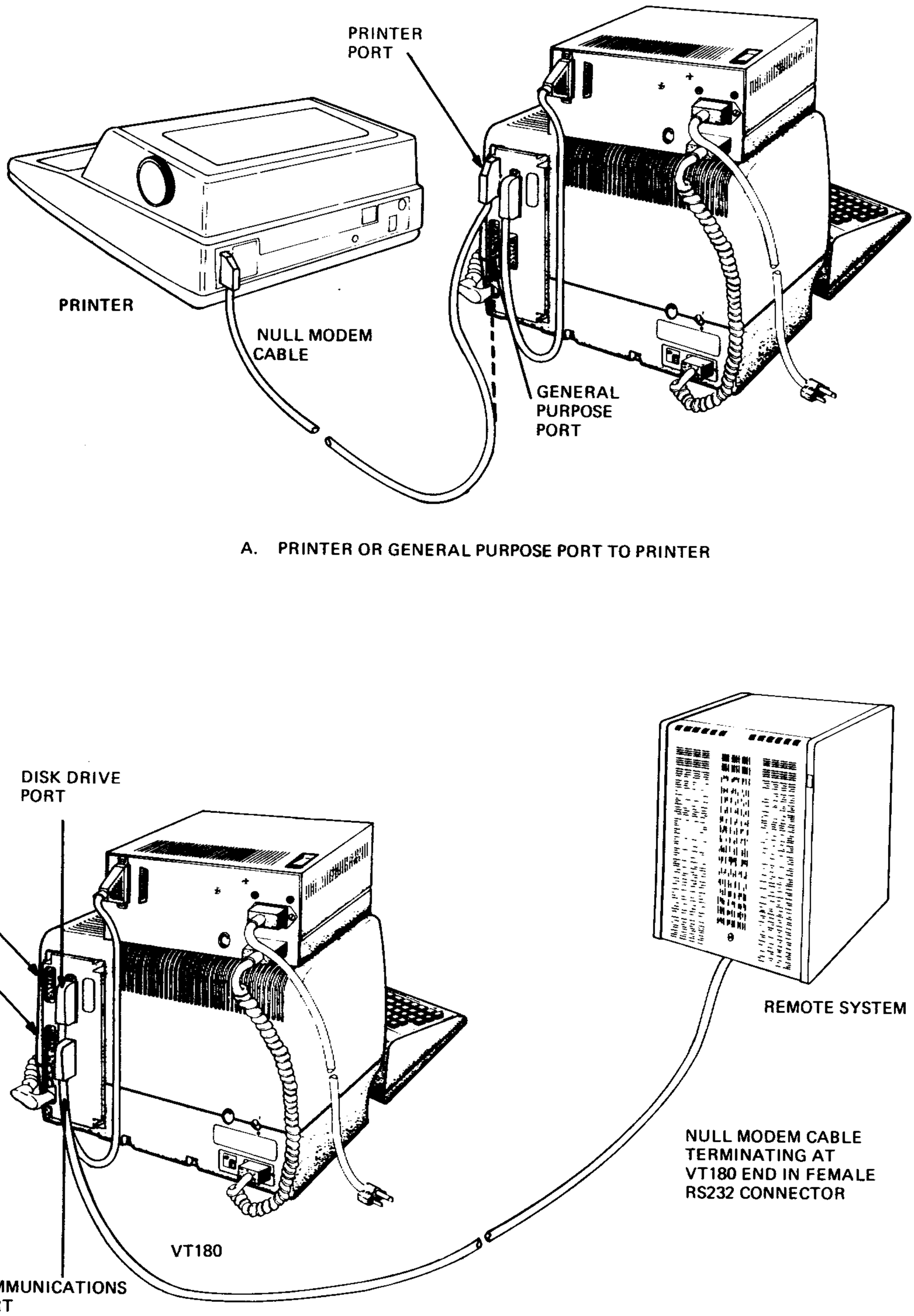


Figure 3-28 Connecting Devices to the Serial Ports

3.5.3.2 Communications Port – This port is used to communicate with an external host computer when the VT180 is operated in terminal mode. Connect the RS-232 female connector end of a null modem cable (BC26R, BC22B, or the equivalent for asynchronous modems or BC22C for synchronous modems) to the communications port connector. Make sure the connector is fully seated and secure the connection by gently tightening the hold-down screws on the connector. Connect the other end of the cable to the host computer and secure the connection (Figure 3-28).

3.5.3.3 General Purpose Port – CP/M allows this serial port, like the printer port, to be assigned as the console device. With such an assignment, a keyboard printer like the LA34 could be used as a hard copy console and the normal printer port could be used to communicate with a LQP02 letter quality printer. If the LA34 printer is to be used as a hard copy console, connect the null modem cable (BC26U or the equivalent) to the general purpose port connector. Make sure the connector is completely seated and secure the connection by gently tightening the hold-down screws on the connector (Figure 3-28).

Using four Phillips head screws, install the cable access cover (Figure 3-24) to the rear of the VT180 terminal after all cable connections are secured. All cables must be aligned with the opening at the bottom of the cable access cover.

3.6 POWER-UP PROCEDURE

A power-up self-test verifies correct operation of the VT180 each time it is powered up or reset by a reset command (pressing the 0 key while in SET-UP A). The self-test program does the following.

1. It waits until the VT100 terminal successfully executes its own self-test. (This means that if the VT100 detects faults in its own operation, VT100 error characters may appear on the screen, but nothing further will happen.)

2. When the system self-test program receives acknowledgment of a successful VT100 self-test, it executes a fast test of all major system components. This test confirms:

   a. That the VT180 computer can communicate with the terminal (the T+ characters appearing at the beginning of the start-up dialog are a part of this test)

   b. That the computer can correctly execute machine language instructions

   c. That data can be written to and accurately retrieved from memory

   d. That the computer can identify and transmit control information to the serial ports

   e. That the computer can identify and transmit control information to the disk drives.

The ROM-based self-test program runs in two modes: a short mode when the system is powered up (or reset) and a long mode when the self-test option S is selected after the start-up message appears on the screen. The long mode S tests more VT180 features and takes more time than the short mode.

Perform the following procedure to power up the terminal and run the power-up self-tests.

CAUTION
Do not leave diskettes in the RX180 during power-up or power-down.

1. First, make sure the power is off by setting the 1/0 switch on the top disk drive unit to 0 (off). See Figure 3-25.

2. Plug the ac line cord from the back of the top disk drive unit into a wall receptacle.

3. Set the 1/0 switch on the back of the video terminal to 1.

4. Set the 1/0 switch on the bottom disk drive unit (if installed) to 1.

NOTE

If two disk drive units are installed, the 1/0 switch on the bottom disk drive unit should stay at 1 (on). Power for the entire system is turned on and off by the 1/0 switch on the top disk drive unit.

5. Set the 1/0 switch on the top disk drive unit to 1 (on). The 1/0 switch for each disk drive unit should light up. The system takes approximately 15 seconds to warm up, complete its self-tests. and display the start-up messages. The following indicators will be noted during power-up.

   a. The self-test start beep sounds.
   b. The keyboard ON-LINE LED is turned on.
   c. The red LED on the left front of the disk drive unit is turned on and then off.
   d. The red LED on the right front of the disk drive unit is turned on and then off.
   e. The red LED on the left front of the disk drive unit is turned on.
   f. The self-test complete beep sounds.
   g. The start-up message appears on the screen as follows.

```
T+
  VT18X Version 2.1 28-JUN-82
Copyright 1982 Digital Equipment Corp
Press A, B, C, D, S, or T

A = Start System (drive A)
B = Start System (drive B)
C = Start System (drive C)
D = Start System (drive D)
S = Execute Self-test
T = Enter Terminal Mode
```

NOTE

If an illegal character is typed, a question mark (?) is printed and the message is repeated.

3.6.1 Self-Test Error Messages

If the power-up self-test program encounters an incorrect system condition as it executes, the program stops automatically and the screen displays an error message. In general, error messages issued at system start-up come either from the VT100 terminal or the VT180 read-only memory. Error messages coming from the VT100 consist of one-character displays appearing at the upper left corner of an otherwise blank screen. These messages may include the numerals 0 through 9, the alphabetic characters A through O, and the symbols :, ;, <, =, ?, and @. An error condition may also be indicated by an error code on the keyboard L1–L4 LEDs.

Error reporting as a result of a fault in the VT18X control module or disk drive units appears in two forms: a message in English that points to the defective circuit appears on the screen and the LEDs on the VT18X control module display the error in hex code. If an error is indicated on power-up, refer to Chapter 7 for more information about self-test errors, error codes, and their meaning.

If the VT180 powers up correctly, select the desired set-up features as described in Chapter 2 and proceed with the system checkout.

3.7 SYSTEM CHECKOUT

System checkout is performed after the power-up self-tests are successfully completed and the set-up features have been selected. System checkout consists of running the ROM-based self-tests in long mode S while formatted diskettes are installed in the disk drives and then running the diskette-based diagnostics for a more complete system checkout.

The VT180 diagnostic tests to be run during system checkout are of two types.

1. A ROM-based diagnostic that is run automatically on power-up or, optionally, on reset (pressing 0 while in SET-UP A).

2. A VT18X diskette-based diagnostic that you run by starting the diskette in either disk drive. The procedure for formatting diskettes is described in Paragraph 4.5.

3.7.1 ROM-Based Diagnostic

The ROM-based diagnostic runs automatically on power-up and checks the internal logic of the VT180 modules. This diagnostic assumes that no diskette is loaded. If the ROM-based diagnostic runs successfully, the Main System menu prints on the video terminal as shown in Paragraph 3.6.

If an error occurs and the video terminal is working, the error will be reported by an error message on the video terminal that points to the location of the failure. Refer to Chapter 7 for additional information.

3.7.2 VT18X Diskette Diagnostic

The VT18X diskette diagnostic resides on one diskette (BJ-T040B-MV). The diagnostic is loaded from this diskette; then it requires two formatted diskettes to perform the read/write tests on each disk drive. During testing, the contents of the formatted diskettes are destroyed.

You select the diagnostic to run in one of three modes.

1. Initial test – This is the disk drive test that checks out each disk drive. The test takes 5½ minutes for a dual disk drive system and 11 minutes for a four disk drive system.

2. Extended test – This selection runs the disk drive test above, a RAM test, and the basic communications test. This extended test takes 10 minutes for each dual disk drive unit.

3. Individual test – This selection allows you to run the previous tests one at a time on the drive you select. In addition, there are tests to check the communications ports, a printer (if installed), and a synchronous communications test. Run time for these tests depends on the tests you select.

The starting procedure, tests performed, and the error messages for this diagnostic are found in Chapter 7.

3.7.3 Hardware Installation Complete

When the initial test and the extended test of the VT18X diskette diagnostic run successfully one time, the VT18X hardware installation is complete. If you have a printer on your system, the printer confidence test should also run successfully.

Refer to the *VT180 User's Guide* to copy diskettes and to run the CP/M software.

3.8 INTERFACE INFORMATION

The VT180 operates on full-duplex, asynchronous communication lines to communicate with the external host computer and a variety of external devices via three EIA RS232C serial line connectors. The interface to the disk drives is provided by a 37-pin, D-type connector. Two female BNC connectors are used to interface to external video devices. The following paragraphs describe the signals on these interface connectors.

3.8.1 Communications Interface Connector

This port is used to communicate to another computer. It has full modem support and supports the same signals as the VT131. United States and European full- and half-duplex modems can be supported by this port. The port has ASYNC as well as BISYNC modes with a RS232C (V.24/V.28) physical interface conforming to CCITT V.21, V.22, and V.23. Break detection by this port is supported.

The transmit and receive baud rates for this port are derived from the baud rate clocks on the terminal controller module. Therefore, the transmit and receive baud rates selected in the VT180's set-up mode are the transmit and receive baud rates used for this port. Baud rates supported are 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 9600, and 19,200.

Any and all protocols to be supported by this port, other than pass-through mode, are run as applications under CP/M.

The recommended cable for this port under asynchronous communications is a BC26R-XX. Other cables that will work are BC22B-10 and BC22B-15. A BC22C-10 must be used for bisynchronous operation. This 25-pin, D-type EIA connector resides on the VT18X control module and is covered by the wort cover. Table 3-3 lists the signals for the communications interface connector.

3.8.2 Printer Interface Connector

This is a general purpose printer port that provides an RS232C serial interface compatible with Digital printers. EIA signals supported are transmit data, receive data, and data terminal ready. Software programmable baud rates to be supported are 75, 150, 300, 600, 1200, 2400, 4800, and 9600. Software programmable character formats supported are 5, 6, 7, and 8 bits/character with 1, 1½, and 2 stop bits/character. Software should support XON/XOFF restraint protocol for this port. The 25-pin, D-type EIA printer connector physically resides on the VT180 paddle board. The recommended cable for this port is a BC26U-15. A BC22A will also work but is a second choice. Table 3-4 lists the signals for the printer interface connector.

Table 3-3 Communications Interface Connector

Pin Number	Signal Description	Mnemonic
1	Protective ground	PROT GND
2	Transmitted data	TXD
3	Received data	RXD
4	Request to send	RTS
5	Clear to send	CTS
6	Data set ready	DSR
7	Signal ground	SGND
8	Receive line signal detector (carrier detect)	RLSD
9	Not used	N/U
10	Not used	N/U
11	Not used	N/U
12	Speed indicator/secondary receive line signal detector	SI/SRLSD
13	Secondary clear to send	SCTS
14	Secondary transmit data	STXD
15	Transmitter clock	TSET
16	Not used	N/U
17	Receive clock	RSET
18	Not used	N/U
19	Secondary request to send	SRTS
20	Data terminal ready	DTR
21	Not used	N/U
22	Ring indicator	RI
23	Speed select	SPDS
24	Not used	N/U
25	Not used	N/U

Table 3-4 Printer Interface Connector

Pin Number	Signal Description	Mnemonic
1	Protective ground	PROT GND
2	Transmitted data	TXD
3	Received data	RXD
6	Data set ready	DSR
7	Signal ground	GND
20	Data terminal ready	DTR

3.8.3 General Purpose Serial Interface Connector

This port is provided as a general purpose RS232C interface. Signals supported are transmit data, receive data, and data terminal ready. Software programmable baud rates to be supported are 75, 150, 300, 600, 1200, 2400, 4800, and 9600. Software programmable character formats supported are 5, 6, 7, and 8 bits/character with 1, 1½, and 2 stop bits/character. Signals are passed through a ribbon cable to the VT180 paddle board from the VT18X control module. The recommended cable to be used on this port is a BC26S-XX. Another cable that would suffice would be a BC22A-10 or -25. Table 3-5 lists the signals for the general purpose serial interface connector.

Table 3-5 General Purpose Serial Interface Connector

Pin Number	Signal Description	Mnemonic
1	Protective ground	PROT GND
2	Transmitted data	TXD
3	Received data	RXD
4	Request to send	RTS
6	Data set ready	DSR
7	Signal ground	GND
20	Data terminal ready	DTR

3.8.4 RX180 Disk Port Connector

This is an interface designed to control up to four 4¼ inch disk drives. The controller supports double-density drives using MFM recording. Only soft-sectored, single-sided diskettes are supported. The interface adheres to drive capability and signal definition of the ANSI standard interface for disk drives. The connector to the drives is a 37-pin, D-type connector, which physically resides on the VT18X control module and is covered by the cable access cover. Table 3-6 lists the signals for the RX180 disk port connector.

3.8.5 External Video Connections

In addition to the EIA interface, the VT180 can easily interface to external video devices. These video devices may act either as a slave to the VT180 when connected to the composite video output or provide synchronized video to the VT180 video section when connected to the video input. The external video connectors are the two female BNC connectors found on the back of the terminal just below the general purpose serial interface connector. The upper BNC connector (J8) is the video input while the lower BNC connector (J9) is the video output.

Table 3-6 RX180 Disk Port Interface Connector

Pin Number	Signal Description	Mnemonic
1	Ground	GND
2	Not used	N/U
3	Ground	GND
4	Not used	N/U
5	Ground	GND
6	Select 3	SEL3 L
7	Ground	GND
8	Index	INDEX L
9	Ground	GND
10	Select 0	SEL0 L
11	Ground	GND
12	Select 1	SEL1 L
13	Ground	GND
14	Select 2	SEL2 L
15	Ground	GND
16	Motor on	MOTOR ON L
17	Ground	GND
18	Direction	DIR L
19	Ground	GND
20	Step	STEP L
21	Ground	GND
22	Write data	WRT DATA L
23	Ground	GND
24	Write gate	WG L
25	Ground	GND
26	Track 00	TK00 L
27	Ground	GND
28	Write protect	WRT PRT L
29	Ground	GND
30	Read data	RD DATA L
31	Ground	GND
32	Reserved	N/U
33	Ground	GND
34	Drive ready (opt)	READY L

3.8.5.1 Composite Video Output Connector (J9) – The composite video output provides EIA RS170 output generated by combining the video signal with a composite sync signal. The output contains all video data appearing on the VT180 screen except that video that comes from J8. The output has the following nominal characteristics (Figure 3-29).

1. Output impedance = 75 ohms, dc-coupled.

2. Sync level = 0 V.

3. Black level = approximately 0.3 V when loaded with 75 ohms.

4. White level = approximately 1.0 V with a 75 ohm load.

5. The composite sync waveform conforms to EIA RS170 standards. The vertical interval is composed of six equalizing pulses, six vertical synchronizing pulses, and six more equalizing pulses. The timing is as follows.

Equalizing pulse width	= 2.33 μs ±50 ns
Vertical pulse width	= 27.28 μs ±200 ns
Horizontal pulse width	= 4.771 μs ±50 ns
Horizontal blank width	= 11.84 μs ±50 ns/80-column mode
	= 12.34 μs ±50 ns/132-column mode
Front porch	= 1.54 μs ±50 ns

3.8.5.2 Video Input Connector (J8) – An analog signal applied to the video input is ORed with the internal video signal such that the beam intensity at any point on the screen corresponds to the intensity of that signal, which tends to make the beam brighter at that point. A video signal on this input affects only the internal screen and does not appear on the composite video output. This input has the following nominal characteristics.

1. Input impedance = 75 ohms, dc-coupled.
2. Black level = 0 V.
3. White level = 1.0 V.
4. Maximum continuous input = ±2.0 V.

The external video source must be synchronized to the VT180; it may do this by referencing the composite sync on the composite video output. This means that the VT180 video input will not synchronize with any composite video source including the composite video output of another VT180.

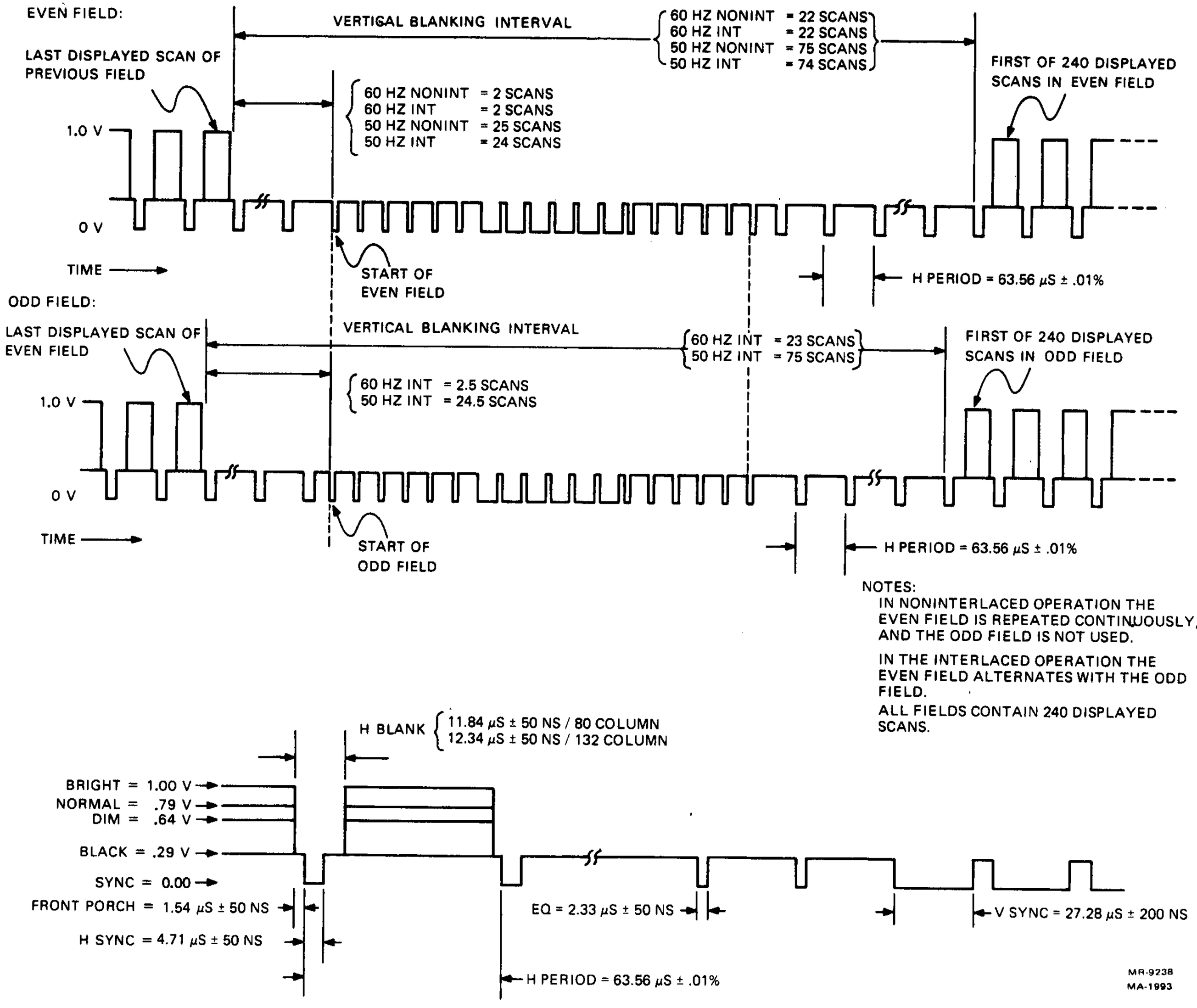


Figure 3-29 Composite Video Output