



VAXstation 4000 Model 60
Optional Devices Service Information

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Preface

This manual is a support and reference document for Digital Services personnel who perform maintenance on the VAXstation 4000 Model 60 workstation. It is also intended for Digital customers who have a self-maintenance agreement with Digital.

Organization of This Manual

This manual contains the following chapters:

- Chapter 1 describes the optional mass storage devices that can be configured with the system, and explains how to install the devices.
- Chapter 2 describes the optional system modules that can be configured with the system. Installation procedures for each module are also in this chapter.
- Chapter 3 describes the optional monitors that can be configured with the system.
- Chapter 4 describes the optional printers that can be configured with the system.

Associated Documentation

The following documents provide additional information about the VAXstation 4000 Model 60 workstation:

| Document | Part Number |
|--|--------------------|
| <i>VAXstation 4000 Model 60 Documentation Kit</i> | EK-V4666-DK |
| <i>VAXstation 4000 Model 60 Service Information</i> | EK-V466B-SV |
| <i>VAXstation 4000 Model 60 Pocket Service Information</i> | EK-V466H-PS |
| <i>VAXstation 4000 Model 60 Quick Installation Card</i> | EK-PMARI-IN |

| Document | Part Number |
|---|--------------------|
| <i>VAXstation 4000 Model 60 Owner's and System Installation Guide</i> | EK-PMARI-OM |
| <i>VAXstation 4000 Model 60 Options Installation Guide</i> | EK-PVAX2-IG |
| <i>VAXstation 4000 Model VLC Service Information</i> | EK-V48VB-SV |
| <i>BA46 Storage Expansion Box Owner's Guide</i> | EK-STEXP-IG |
| <i>BA46 Storage Expansion Box Maintenance Guide</i> | EK-VBA46-SV |
| <i>BA42 Storage Expansion Box Maintenance Guide</i> | EK-BA42A-MG |

Conventions

The following conventions are used in this guide.

| Convention | Description |
|-------------------|--|
| WARNING | Contains important information that relate to personal safety. |
| CAUTION | Contains information to prevent damage to the equipment. |
| NOTE | Contains general information. |
| PN | Part number |

1

Mass Storage Devices

This chapter describes the optional mass storage devices that can be configured in the VAXstation 4000 Model 60 system unit. The devices are:

- Section 1.1 RZ23L, RZ24, and RZ25 Hard Disk Drives
- Section 1.2 RRD42 Compact Disc Drive
- Section 1.3 RX26 Diskette Drive
- Section 1.4 TZK10 Tape Drive

NOTE

The system unit can hold one device from which the storage medium is removable, such as the RRD42, RX26, or TZK10 drives. To add more than one removable media device, you need an expansion box.

1.1 RZ2x Hard Disk Drive

The RZ23L, RZ24, and RZ25 hard disk drives provide memory storage for applications and user files. The RZ2x drives store information on a non-removable disk. Table 1-1 lists the storage capacities for the RZ2x drives.

Table 1-1 Capacities of RZ23L, RZ24, and RZ25 Drives

| Drive | Capacity |
|-------|----------|
| RZ23L | 121 MB |
| RZ24 | 209 MB |
| RZ25 | 426 MB |

1.1.1 RZ2x Hard Disk Drive SCSI ID

Before you install the RZ23L, RZ24, or RZ25 drive in the system, you need to verify the SCSI ID setting as follows:

1. Turn the RZ23L, RZ24, or RZ25 drive so that the bottom of the drive is facing you. Find the SCSI ID jumpers, which are removable electrical connectors, that allow you to select a unique ID number for each SCSI device:
 - If you have an RZ23L or RZ24 drive, find jumpers E1, E2, and E3.
 - If you have an RZ25 drive, find jumpers P1, P2, and P3.

NOTE

If your hard disk drive was not factory installed, it could have been shipped with all the jumpers attached (to prevent loss of jumpers when shipping and unpacking). In this case, the SCSI ID is set to 7, and you may need to change it.

2. Verify that the jumpers are set to the appropriate positions for SCSI ID 0, 1, or 2. These are the positions that the RZ2x drive normally uses. If you have one RZ23L, RZ24, or RZ25 drive that was factory installed, verify that the jumpers are set for SCSI ID 3. If you have two RZ23L, RZ24, or RZ25 drives that were factory installed, verify that the jumpers on one of them are set for SCSI ID 3, and that the jumpers on the other are set to either SCSI ID 0, 1, or 2. Any RZ2x drive can be set to SCSI ID 0, 1, 2, or 3, if no other drive uses that ID. See Table 1-2 (for RZ23L and RZ24 drives) or Table 1-3 (for RZ25 drives) for the correct jumper positions for each of these SCSI IDs.

NOTE

Settings should be changed only when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment.

If you are adding an RZ23L, RZ24, or RZ25 drive, the SCSI ID could need changing. Drives not factory installed could have all jumpers in place (set for position 7) to prevent misplacing the jumpers during shipping and unpacking.

Figure 1-1 shows the location of the RZ2x drive SCSI ID jumpers.

Figure 1-1 RZ23L SCSI ID Jumper Location

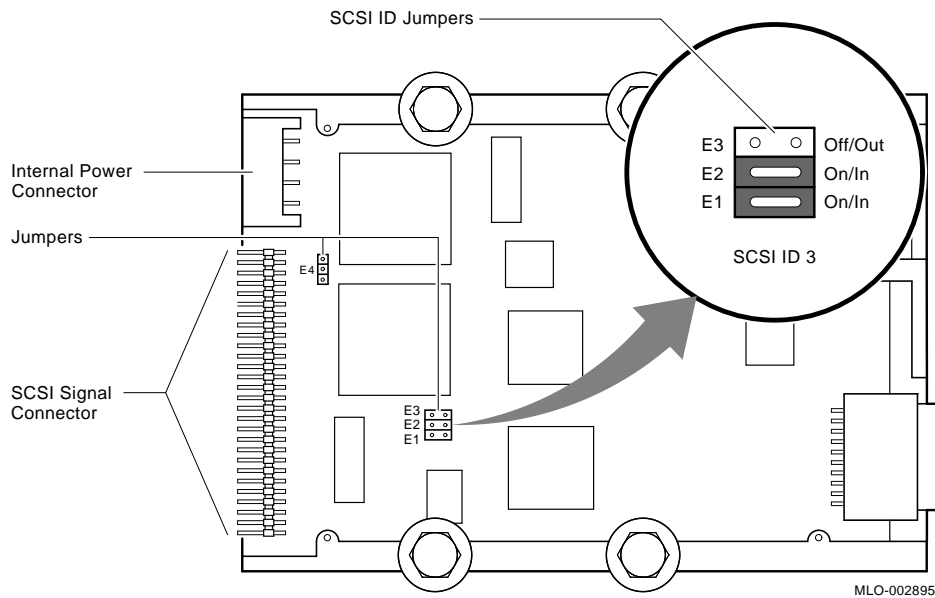


Table 1-2 RZ23L/RZ24 SCSI Jumper Settings

| Device | Recommended SCSI ID | Jumper Positions | | |
|--|------------------------|------------------|-----|-----|
| | | E1 | E2 | E3 |
| RZ23L/RZ24/RZ25 | 0 | Out ¹ | Out | Out |
| RZ23L/RZ24/RZ25 | 1 | In ¹ | Out | Out |
| RZ23L/RZ24/RZ25 | 2 | Out | In | Out |
| RZ23L/RZ24/RZ25 (factory-installed) | 3 | In | In | Out |
| RRD42 | 4 | Out | Out | In |
| RX26/TZK10 | 5 | In | Out | In |
| SCSI controller | 6 | Out | In | In |
| High-priority device | 7 | In | In | In |

¹Out = Removed; In = attached

Table 1-3 RZ25 SCSI Jumper Settings

| Device | Recommended SCSI ID | Jumper Positions | | |
|--|------------------------|------------------|-----|-----------------|
| | | P1 | P2 | P3 |
| RZ23L/RZ24/RZ25 | 0 | Out ¹ | Out | Out |
| RZ23L/RZ24/RZ25 | 1 | Out | Out | In ¹ |
| RZ23L/RZ24/RZ25 | 2 | Out | In | Out |
| RZ23L/RZ24/RZ25 (factory-installed) | 3 | Out | In | In |
| RRD42 | 4 | In | Out | Out |
| RX26/TZK10 | 5 | In | Out | In |
| SCSI controller | 6 | In | In | Out |
| High-priority device | 7 | In | In | In |

¹Out = Removed; In = attached

For information on installing the RZ2x disk drives, refer to the *VAXstation 4000 Model 60 Options Installation Guide* (PN EK-PVAX2-IG).

1.1.2 RZ2x Hard Disk Drive Specifications

Table 1-4 and Table 1-5 list the specifications for the RZ23L hard disk drive. Table 1-6 and Table 1-7 list the specifications for the RZ24 hard disk drive.

Table 1-4 RZ23L Disk Drive Operating Environment

| | |
|------------------------------|--|
| Temperature range | 10° C to 60° C (50° F to 110° F) |
| Relative humidity | 8% to 80% |
| Altitude | -304 m to 3048 m (-1000 ft to 10,000 ft) |
| Maximum wet bulb temperature | 25.6° C (78° F) |
| Heat dissipation | 8 W (typical) (27.36 Btu/hr) 9 W max. (30.8 Btu/hr) |
| Temperature gradient | 11° C/hr (20° F/hr) |

Table 1-5 RZ23L Disk Drive Physical Dimensions

| Height | Width | Depth | Weight |
|------------------------|-----------------------|------------------------|-----------------------|
| 41.28 mm (1.625 in) | 101.6 mm (4.00 in) | 146.05 mm (5.75 in) | .826 kg (1.82 lbs) |

Table 1-6 RZ24 Disk Drive Operating Environment

| | |
|------------------------------|--|
| Temperature range | 10° C to 55° C (50° F to 99° F) |
| Relative humidity | 8% to 80% |
| Altitude | -304 m to 4573 m (-1000 ft to 15,000 ft) |
| Maximum wet bulb temperature | 25.6° C (78° F) |
| Heat dissipation | 6.6 W (seeking) (22.57 Btu/hr) 6.8 W (read/write mode) (23.26 Btu/hr) |
| Temperature gradient | 11° C/hr (20° F/hr) |

Table 1-7 RZ24 Disk Drive Physical Dimensions

| Height | Width | Depth | Weight |
|------------------------|-----------------------|------------------------|-----------------------|
| 41.28 mm (1.625 in) | 101.6 mm (4.00 in) | 146.05 mm (5.75 in) | .780 kg (1.72 lbs) |

1.2 RRD42 CDROM Disc Drive

The RRD42 CDROM compact disc drive is a storage device that reads data from removable compact discs. The drive has a storage capacity of 600 Mbytes. The RRD42 drive can be used to install the VMS operating system and other software, and to access read-only databases, such as online documentation sets. The drive has audio output capabilities, allowing the use of headphones for listening to audio information recorded on the compact disc.

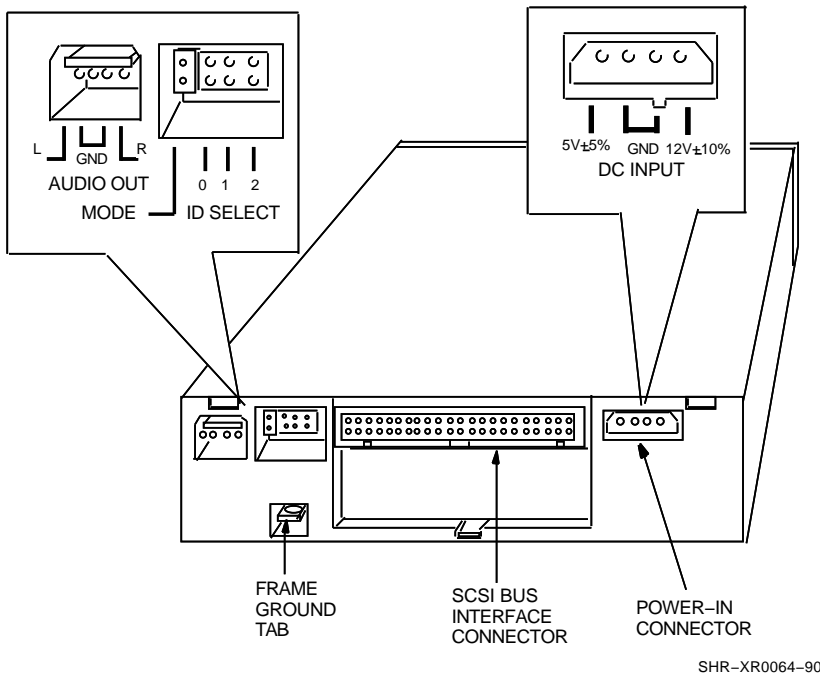
1.2.1 RRD42 CDROM Disc Drive SCSI ID

Before installing the RRD42 drive, verify the SCSI ID on the drive as follows:

1. Turn the RRD42 drive so that the rear of the drive is facing you. Find SCSI ID jumpers 0, 1, and 2, on the rear of the drive, as shown in Figure 1-2. Jumpers are removable electrical connectors that allow you to select a unique ID number for each SCSI device.
2. Verify that the jumpers are set as follows:
 - Jumper 0 = Out (removed)
 - Jumper 1 = Out (removed)
 - Jumper 2 = In (attached)

These are the positions for SCSI ID 4, which is the default SCSI ID for the drive.

Figure 1-2 RRD42 CDROM Disc Drive Jumper Location



NOTE

Default settings should be changed only when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment.

If you want to use a different ID, choose a new ID from Table 1-8, and carefully remove or replace jumpers accordingly, using tweezers or another small tool.

NOTE

Save any SCSI jumpers you remove for later use, if necessary.

CAUTION

Never set two devices to the same SCSI ID; the system cannot communicate with devices set to the same ID.

1-8 Mass Storage Devices

Table 1-8 lists the jumper settings for the RRD42 disc drive.

Table 1-8 RRD42 CDROM Disc Drive Jumper Settings

| Device | Recommended SCSI ID | Jumper Positions | | |
|--------------------------------------|------------------------|------------------|-----|-----|
| | | 0 | 1 | 2 |
| RZ23L/RZ24/RZ25 | 0 | Out ¹ | Out | Out |
| RZ23L/RZ24/RZ25 | 1 | In ¹ | Out | Out |
| RZ23L/RZ24/RZ25 | 2 | Out | In | Out |
| Factory-installed RZ23L/RZ24/RZ25 | 3 | In | In | Out |
| RRD42 | 4 | Out | Out | In |
| RX26/TZK10 | 5 | In | Out | In |
| SCSI controller | 6 | Out | In | In |
| High-priority device | 7 | In | In | In |

¹Out = Removed; In = Attached

To install the RRD42 drive, refer to the *VAXstation 4000 Model 60 Options Installation Guide* (PN EK-PMARI-IG).

1.2.2 RRD42 CDROM Disc Drive Specifications

Table 1-9 lists the operating environment for RRD42 disc drive.

Table 1-9 RRD42 Disc Drive Operating Environment

| | |
|------------------------------|-----------------------------------|
| Temperature range | 5° C to 50° C (41° F to 122° F) |
| Relative humidity | 10% to 90%, non-condensing |
| Altitude | 2400 m (8000 ft) at 36° C (96° F) |
| Maximum wet bulb temperature | 29° C (84° F) |

NOTE

Be sure the "Mode" jumper is in. This jumper must be in place to use the drive with the VMS operating system.

CAUTION

Each device must have a unique SCSI ID. Never set two devices to the same SCSI ID; the system cannot communicate with devices set to the same ID.

1.3 RX26 Diskette Drive

The RX26 is a half-height diskette drive that can be used for selective file backup, load applications, and transporting files between non-networked systems. The RX26 drive has a storage capacity of 4 Mbytes. It can be used to read and write on 4 Mbyte standard floppies, and to read only 700 KB standard floppies.

1.3.1 RX26 Diskette Drive SCSI ID

Before installing the RX26 drive in the system, verify the SCSI ID setting.

1. Turn the RX26 drive so that the left side of the drive is facing you. Find the SCSI ID switches 1, 2, and 3 on the drive, as shown in Figure 1-3.
2. Use a pen or small pointed object to move the switches up or down.

CAUTION

Do not use a pencil to move switches. Graphite particles can damage the SCSI switches.

Digital recommends that the SCSI ID switches be set to 5 as follows:

- Switch 1 = Down (on)
- Switch 2 = Up (off)
- Switch 3 = Down (on)

NOTE

Default settings should be changed only when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment.

If you need to use a different ID, choose a new ID from Table 1-10. Use a small pointed instrument (but **not** a pencil), set the switches accordingly.

CAUTION

Never set two devices to the same SCSI ID; the system cannot communicate with devices set to the same ID.

To install the RX26 drive, refer to the *VAXstation 4000 Model 60 Options Installation Guide* (PN EK-PMARI-IG).

Figure 1-3 RX26 Diskette Drive SCSI ID Switch Location

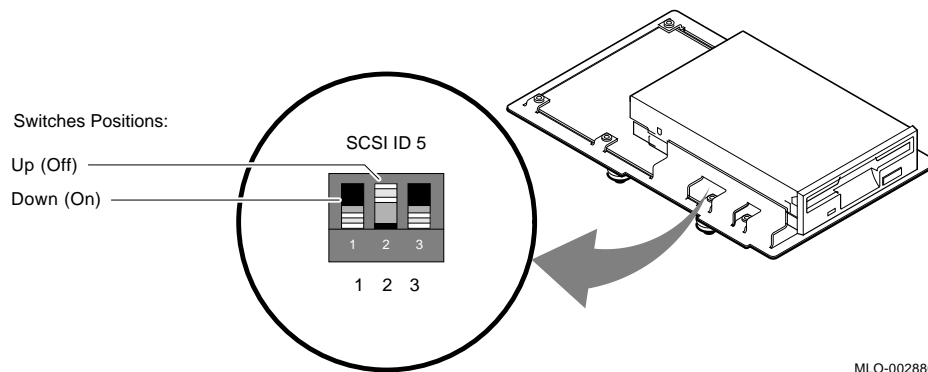


Table 1-10 RX26 Diskette SCSI ID Switch Setting

| Device | Recommended SCSI ID | Switch Positions | | |
|--------------------------------------|------------------------|------------------|------|------|
| | | 2 | 1 | 0 |
| RZ23L/RZ24/RZ25 | 0 | Up | Up | Up |
| RZ23L/RZ24/RZ25 | 1 | Down | Up | Up |
| RZ23L/RZ24/RZ25 | 2 | Up | Down | Up |
| Factory-installed RZ23L/RZ24/RZ25 | 3 | Down | Down | Up |
| RRD42 | 4 | Up | Up | Down |
| RX26/TZK10 | 5 | Down | Up | Down |
| SCSI controller | 6 | Up | Down | Down |
| (High-priority device) | 7 | Down | Down | Down |

1.3.2 RX26 Diskette Drive Specifications

Table 1-11 RX26 Environmental Specifications

| | |
|--------------------------|--|
| Operating temperature | 5° C to 50° C (40° F to 122° F) |
| Nonoperating temperature | -20° C to 66° C (-4° F to 151° F) |
| Operating humidity | 8% to 80%, wet bulb @ 25.6° C (78.0° F), no condensation |
| Nonoperating humidity | 5% to 95%, wet bulb @ 46° C (115.0° F), no condensation |
| Operating altitude | -304 m to 3,048 m (-1000 ft to 10,000 ft) |
| Nonoperating altitude | -304 m to 12,192 m (-1000 ft to 40,000 ft) |

Table 1-12 Diskette and Format Information

| | |
|----------------------------|-----|
| Number of cylinders | 80 |
| Number of tracks | 160 |
| Number of read/write heads | 2 |

1.4 TZK10 (QIC) Tape Drive

The TZK10 tape drive is a half-height device that uses industry standard quarter-inch cartridge (QIC) tapes for loading applications and doing file backups. The formatted capacity of the QIC tape is 320 Mbytes or 525 Mbytes, depending on the tape used.

1.4.1 TZK10 Tape Drive SCSI ID

Before installing the TZK10 drive, verify the SCSI ID on the drive as follows:

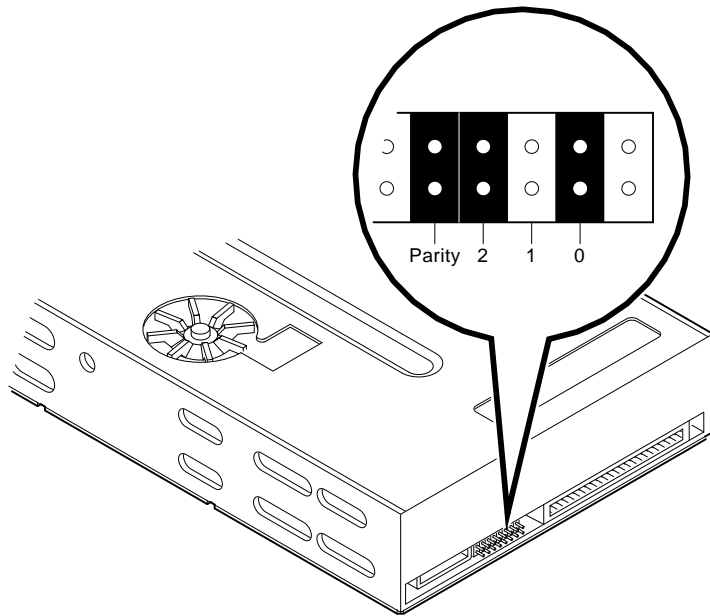
1. Turn the TZK10 drive so that the rear of the drive is facing you. Find SCSI ID jumpers 0, 1, and 2. Jumpers are removable electrical connectors that allow you to select a distinct ID for each SCSI device.
2. Verify that the jumpers are set as follows:
 - Jumper 0 = In (attached)
 - Jumper 1 = Out (removed)
 - Jumper 2 = In (attached)

These are the positions for SCSI ID 5, which is the setting that the TZK10 drive normally uses.

NOTE

Default settings should be changed only when a system is configured with more than one of a particular device. You are responsible for the SCSI ID settings on your equipment.

Figure 1-4 Verifying the TZK10 Tape Drive SCSI ID



If you want to use a different ID, choose a new ID from Table 1–13 and carefully remove or replace jumpers accordingly. Use tweezers or another small tool to remove or replace jumpers.

NOTE

Save any SCSI jumpers you remove for later use, if necessary.

Table 1–13 TZK10 Tape Drive SCSI Jumper Settings

| Device | Recommended SCSI ID | Jumper Positions | | |
|--------------------------------------|------------------------|------------------|-----|-----|
| | | 2 | 1 | 0 |
| RZ23L/RZ24/RZ25 | 0 | Out | Out | Out |
| RZ23L/RZ24/RZ25 | 1 | Out | Out | In |
| RZ23L/RZ24/RZ25 | 2 | Out | In | Out |
| Factory-installed RZ23L/RZ24/RZ25 | 3 | Out | In | In |
| RRD42 | 4 | In | Out | Out |
| RX26/ TZK10 | 5 | In | Out | In |
| SCSI controller | 6 | In | In | Out |
| High-priority device | 7 | In | In | In |

NOTE

Be sure the "Mode Select" jumper is in. This jumper must be in place to use the drive with the VMS operating system.

CAUTION

Each device must have a unique SCSI ID. Never set two devices to the same SCSI ID; the system cannot communicate with devices set to the same ID.

For information on installing the TZK10 (QIC) tape drives, refer to the *VAXstation 4000 Model 60 Options Installation Guide* (PN EK-PVAX2-IG).

1.4.2 TZK10 Tape Drive Specifications

Table 1-14 TZK10 Cartridge Tape Drive Dimensions

| Height | Width | Depth | Weight |
|--------------------|----------------------|---------------------|---------------------|
| 4.4 cm (1.7 in) | 14.6 cm (5.25 in) | 20.8 cm (8.2 in) | 1.1 kg (2.4 lbs) |

Table 1-15 TZK10 Cartridge Tape Drive Operating Environment

| | |
|---------------------------------|-----------------------------------|
| Temperature range | 5° C to 40° C (41° F to 122° F) |
| Relative humidity | 10% to 90%, non-condensing |
| Altitude | 0 m to 2400 m (0 ft to 13,000 ft) |
| Maximum wet bulb temperature | 26° C (79° F) |
| Minimum dew point | 2° C (36° F) |

2

Optional System Modules

This chapter describes the optional modules that can be installed in the VAXstation 4000 Model 60 system. The optional modules are:

- Section 2.1 MS44 Memory Module
- Section 2.2 DSW21 Synchronous Communications Adapter

2.1 MS44 Memory Module

The MS44 memory module is designed to provide expandable memory for the VAXstation 4000 Model 60 system. The memory array consists of 36 DRAMs organized as one bank of four- to nine-bit bytes. Timing and addressing of the array are provided by the system module and are buffered on the memory module. Data lines are unbuffered on the module and are driven on bi-directional lines to and from the DRAMs. All data and control lines receive one unit load per module.

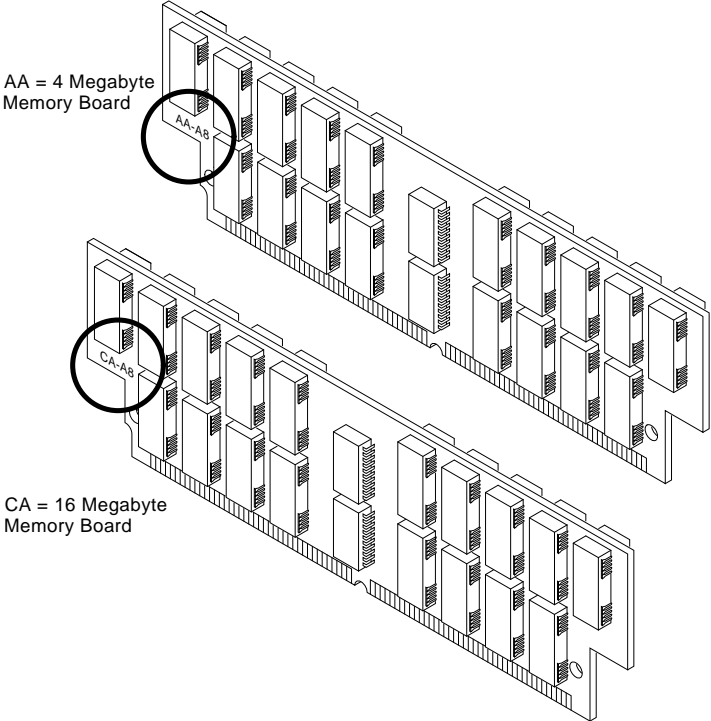
Three types of memory module are available: 4 Mbyte (MS44-AA), 4 Mbyte Reduced Cost (MS44-AL), and 16 Mbyte (MS44-CA). The VAXstation 4000 Model 60 can use any of the three memory modules. Memory modules must be installed in pairs; two 4 Mbyte modules for two 16 Mbyte modules.

To identify a memory module, locate the etch on the left side of the memory module. The 4 Mbyte modules have AA or AL on the etch board, and the 16 Mbyte modules have CA on the etch board. The memory modules are shown in Figure 2-1.

When the module pairs are configured together, the MS44-AA module pairs should be installed in the lower numbered areas. The maximum system memory configuration is 104 Mbytes for the Model 60.

For additional information on installing memory modules, refer to the *VAXstation 4000 Model 60 Service Information* (PN EK-V466B-SV).

Figure 2-1 MS44 Memory Module



2.1.1 MS44 Memory Module Specifications

The MS44 memory module specifications are listed next.

Total Memory Power Required

| | |
|----------------------|---------|
| Total DRAM Current | 2.45 A |
| Total Driver Current | 0.10 A |
| Total Current | 2.55 A |
| Total Active Power | 13.38 W |
| Total Standby Power | 1.25 W |

Total System Requirements

| | |
|----------------------|---------|
| Total Memory Current | 5.69 A |
| Total Memory Power | 29.86 W |

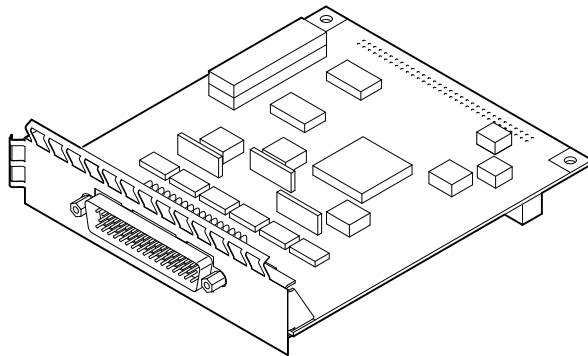
NOTE

The current specifications for the memory modules assume 24 Mbytes and QUADWORD operations with 2 memory modules active and 4 memory modules in standby.

2.2 DSW21 Synchronous Communications Adapter

The DSW21 adapter is a synchronous serial communications interface for the VAXstation 4000 Model 60 workstation. It has full modem control and multiple protocol support. Figure 2-2 shows the DSW21 communications adapter.

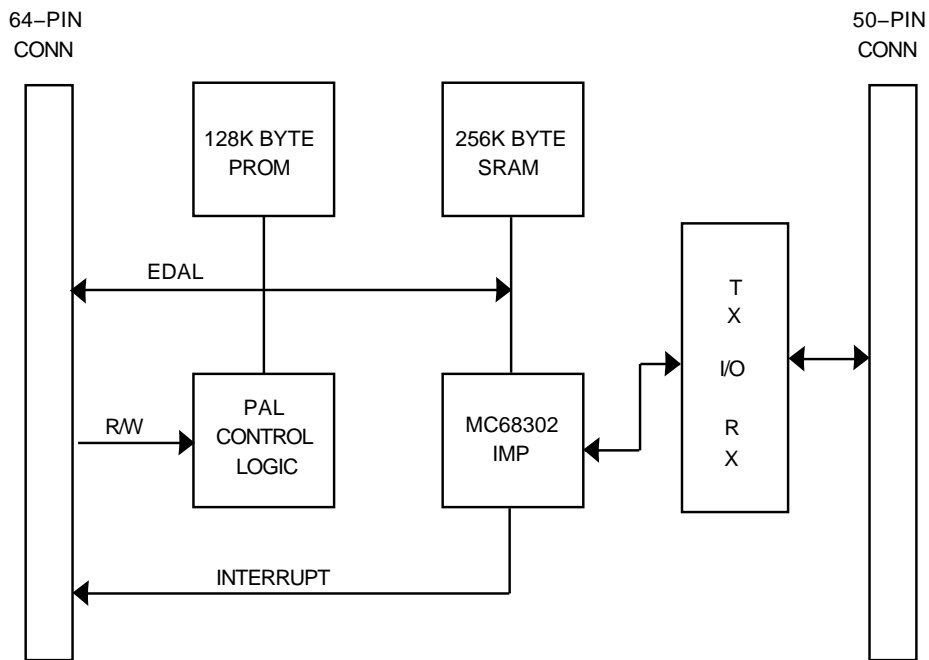
Figure 2-2 DSW21 Synchronous Communications Adapter



MLO-005915

The DSW21 adapter is an option board that connects internally to the CPU board via a 64-pin option connector. It consists of the EDAL interface, 128 KB UVEPROM, 256 KB Static RAM, the MC68302 Integrated Multi-Protocol Processor (IMP), and I/O receivers and drivers with static and lightning protection. The communications I/O connector is a 50-pin D-subminiature plug that goes directly through the back of the system cabinet. Figure 2-3 shows the DSW21 connections.

Figure 2-3 DSW21 Synchronous Communications Adapter



LJ-01668-GRA

2.2.1 DSW21 Synchronous Communications Adapter Cables

Adapter cables for the DSW21 communications adapter vary according to the option ordered. The following table lists the adapter cable variations.

Table 2-1 DSW21 Adapter Cables

| DSW21 Model | Adapter Cables |
|--------------------|---|
| DSW21-AA | 1 line sync comm, BC19V EIA-232/V.24 |
| DSW21-AB | 1 line sync comm, BC19W EIA-449/423/V.10 |
| DSW21-AC | 1 line sync comm, BC19U EIA-449/422/V.36 |
| DSW21-AD | 1 line sync comm, BC19X V.35 |
| DSW21-AE | 1 line sync comm, BC19Q EIA-530 |
| DSW21-AF | 1 line sync comm, BC20Q X.21 |
| DSW21-M | 1 line sync comm controller, no adapter cable |

2.2.2 Installing the DSW21 Adapter

This section describes how to install the DSW21 interface in the system unit.

NOTE

Refer to the system preparation instructions in the *VAXstation 4000 Model 60 Service Information* before installing any module in the workstation.

To install the communications interface, do the following:

1. Remove any rear panels or shields (if applicable) from the I/O panel.
2. Mount the DSW21 internally to the Model 60 via the 64-pin option connector. There are no clips or screws to hold the option connector.
3. Attach the 50-pin data connector, which protrudes through the rear of the enclosure and is held in place by the metal bracket.
4. Restore the system. Test the new configuration.

2.2.3 DSW21 Environmental Specifications

The DSW21 module assembly meets Digital Standard 102 class C environmental specifications.

Table 2-2 DSW21 Environmental Specifications

| Parameter | Range |
|---|---------------------------------|
| Operating temperature | 5°C to 50° C (41°F to 122 °F) |
| Nonoperating temperature | -40°C to 66° C (-40°F to 155°F) |
| Relative humidity (operating) | 10% to 95% (noncondensing) |
| Relative humidity (nonoperating) | 10% to 95% |
| Maximum wet bulb temperature (operating) | 32 °C (90°F) |
| Maximum wet bulb temperature (nonoperating) | 46 °C (115°F) |
| Minimum dew point temperature (operating) | 2 °C (36°F) |
| Head dissipation | 6.75 watts to 8.10 watts Btu/h |
| Altitude (operating) | 2400 m (8000 ft) |
| Altitude (nonoperating) | 4900 m (16000 ft) |

NOTE

De-rate the maximum operating temperature by 1.82 degrees Celsius for each 1000 meters of altitude above sea level. Reference: Standard Atmosphere, Standard Gravity.

This device is to operate in a non-caustic environment.

2.2.4 DSW21 Physical Specifications

The DSW21 adapter is a four layer circuit board assembly with the following specifications.

Table 2-3 Physical Specifications

| Parameter | Range |
|------------------|------------------|
| Height | 4.3 cm (1.7 in) |
| Width | 12.4 cm (4.9 in) |
| Depth | 14 cm (5.5 in) |
| Weight | .45 kg (1 lb) |

3

Optional System Monitors

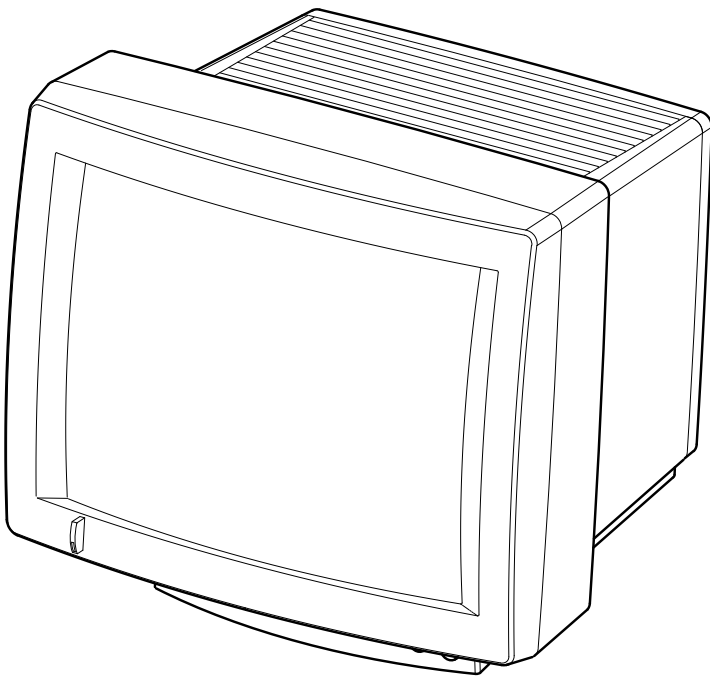
This chapter describes the optional monitors that can be connected externally to the VAXstation 4000 Model 60 system. The monitors are:

| | |
|-------------|--------------------------|
| Section 3.1 | VR319 Monochrome Monitor |
| Section 3.2 | VR320 Color Monitor |
| Section 3.3 | VR262 Monochrome Monitor |
| Section 3.4 | VR299 Color Monitor |
| Section 3.5 | VRT16 Color Monitor |
| Section 3.6 | VRT19 Color Monitor |

3.1 VR319 Monochrome Monitor

The VR319 monochrome monitor (Figure 3-1) has a 500 mm (20 in), direct-viewed, anti-glare CRT. The built-in tilt/swivel assembly allows you to adjust the screen for viewing.

Figure 3-1 VR319 Monochrome Monitor

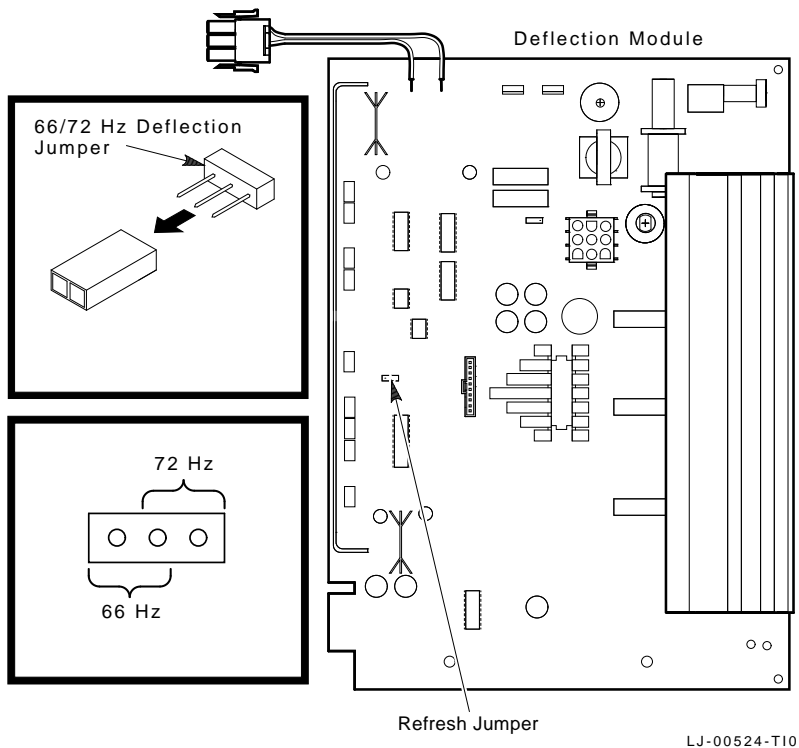


MA-0243-90.DG

3.1.1 Refresh Rate

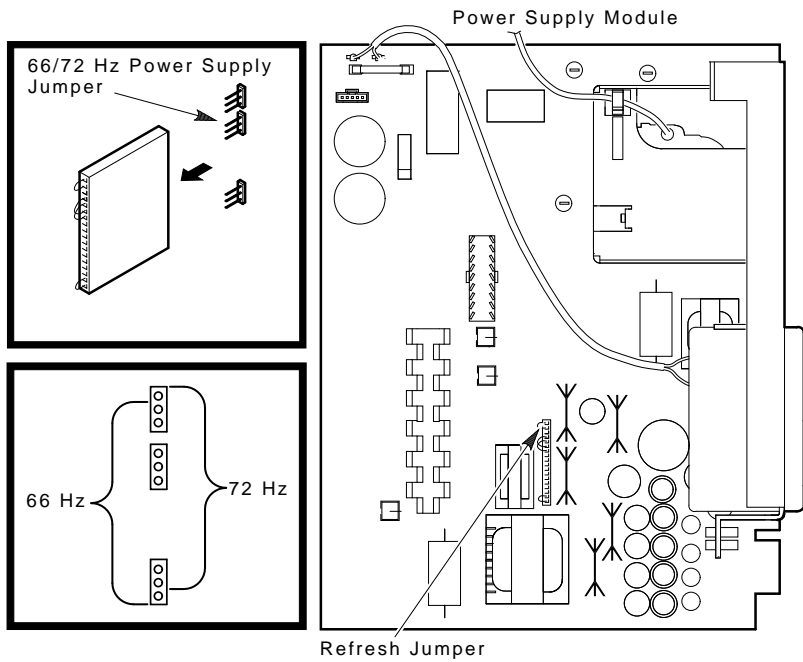
The VR319 monochrome monitor operates at either a 66 Hz or 72 Hz refresh rate. The refresh rate is preset for the system before the monitor is shipped. If you change the monitor to another system, check the refresh rate of the new system and then set the jumpers on the deflection module (Figure 3-2) and power supply module (Figure 3-3) to match the new system. For additional information, refer to the *VR319 Monitor Service Guide* (PN EK-VR319-SV).

Figure 3-2 Refresh Rate Jumper—Deflection Module



3-4 Optional System Monitors

Figure 3-3 Refresh Rate Jumper—Power Supply Module



LJ-00523-T10

3.1.2 VR319 Monochrome Monitor Specifications

The VR319 monochrome monitor specifications are listed next.

Power Requirements

| | |
|-------------------|---|
| Voltage | 88 to 132 Vac or 176 to 264 Vac auto-ranging, single phase, 3-wire |
| Frequency | 47 to 63 Hz |
| Power Consumption | 135 W maximum |

Operating Environment

| | |
|-------------------|---|
| Temperature Range | 10° C to 40° C (50° F to 104° F) |
| Relative humidity | 10% to 95% Maximum wet bulb = 32° C Minimum dew point = 2°C (noncondensing) |

Physical Characteristics

| | |
|----------------------------------|---|
| Height | 45.7 cm (18.0 in) |
| Width | 49.5 cm (19.5 in) |
| Depth | 40.1 cm (15.8 in) |
| Weight | 22 kg (48.0 lb) |
| Tilt Range | -5° forward to +15° backward |
| Swivel Range | ±90° (left and right) |
| Display - Cathode ray tube (CRT) | 48.3 cm (19 in) diagonal |
| Display area | 1280 pixels horizontal x 1024 lines vertical. Approximate picture size: 34.3 cm (13.5 in) x 27.3 cm (10.75 in) with a 5:4 aspect ratio. |
| Light transmission | 42% nominal |
| Video input | Composite video |

3.1.2.1 VR319 Monochrome Monitor Video Timing

The VR319 monochrome monitor video timing is listed in the following tables.

Video Timing-1280 x 1024 Resolution

| | Refresh Rate | |
|----------------------|---------------------|--------------|
| | 72 Hz | 66 Hz |
| Horizontal frequency | 77.17 kHz | 70.66 kHz |
| Vertical frequency | 72.55 Hz | 66.47 Hz |
| Pixel frequency | 130.81 MHz | 119.84 MHz |
| Pixel period | 7.64 ns | 8.34 ns |

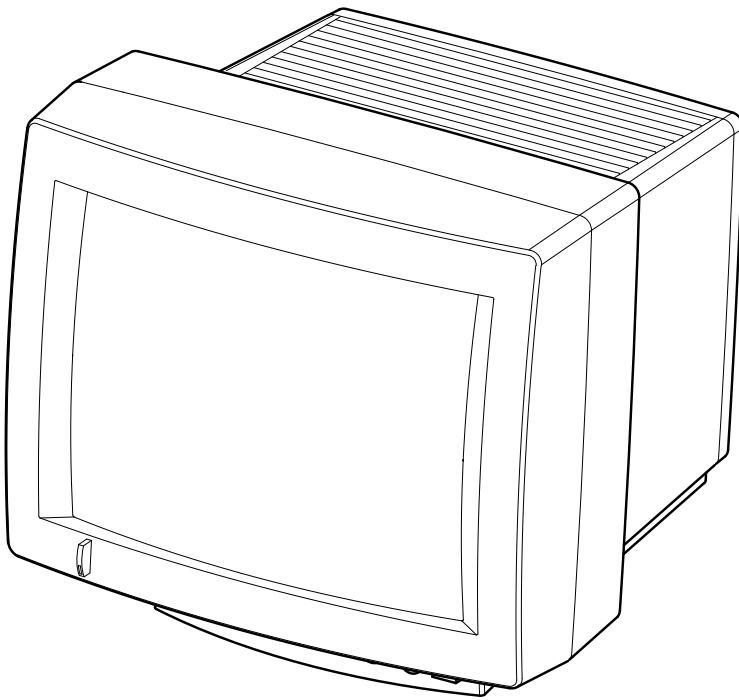
| Horizontal timing | No. Pixels | µs | µs |
|--------------------------|-------------------|-----------|-----------|
| Entire line | 1696 | 12.96 | 14.15 |
| Active visible line | 1280 | 9.79 | 10.68 |
| Blanking interval | 416 | 3.18 | 3.47 |
| Sync front porch | 32 | 0.24 | 0.27 |
| Sync pulse | 160 | 1.22 | 1.34 |
| Sync back porch | 224 | 1.71 | 1.87 |

| Vertical timing | No. Lines | ms | ms |
|-----------------------------------|------------------|-----------|-----------|
| Vertical period (Entire Frame) | 1063 | 13.78 | 15.04 |
| Visible raster | 1024 | 13.28 | 15.04 |
| Blanking interval | 39 | 0.506 | 0.552 |
| Sync front porch | 3 | 0.039 | 0.042 |
| Sync pulse | 3 | 0.039 | 0.042 |
| Sync back porch | 33 | 0.428 | 0.467 |

3.2 VR320 Color Monitor

The VR320 color monitor (Figure 3-4) has a direct-viewed, 485 mm (19 in), anti-glare CRT with contrast enhancement. The monitor has a built-in tilt and swivel assembly, allowing you to adjust the screen for viewing.

Figure 3-4 VR320 Color Monitor



MA-0244-90.DG

3.2.1 Refresh Rate

The VR320 color monitor operates at a refresh rate of either 66 Hz or 72 Hz. The refresh rate is preset for the system before the monitor is shipped. If you change the monitor to another system, check the refresh rate of the new system and then set the switch on the deflection module (Figure 3-5) and the jumpers on the power supply module (Figure 3-6) to match the new system. For additional information, refer to the *VR320 Monitor Service Guide* (PN EK-VR320-SV).

Figure 3-5 Refresh Rate Switch—Deflection Module

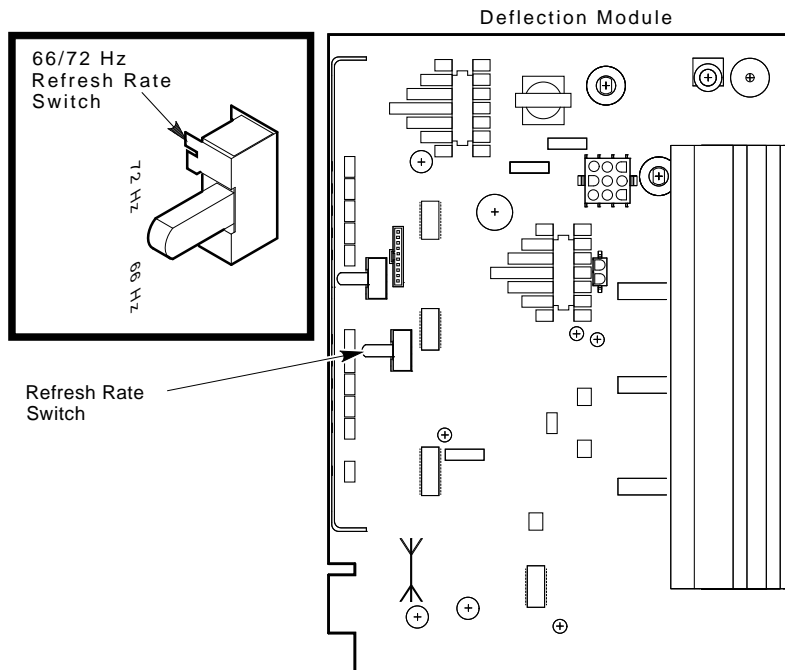
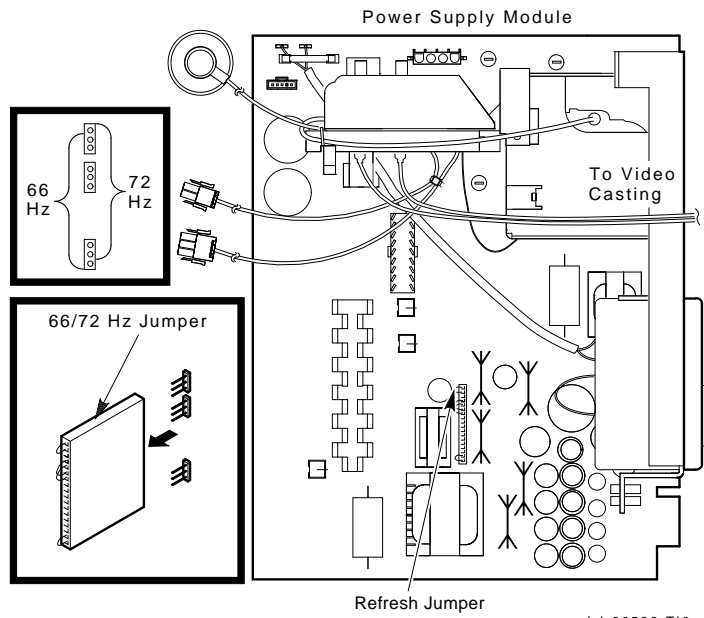


Figure 3-6 Refresh Rate Jumper—Power Supply Module



LJ-00526-T10

3.2.2 VR320 Color Monitor Specifications

The VR320 color monitor specifications are listed next.

Power Requirements

| | |
|-------------------|---|
| Voltage | 88 to 132 Vac or 176 to 264 Vac auto-ranging, single phase, 3-wire |
| Frequency | 47 to 63 Hz 47 to 63 Hz |
| Power consumption | 220 W maximum |

Operating Environment

| | |
|-------------------|---|
| Temperature range | 10° C to 40° C (50° F to 104° F) |
| Relative humidity | 10% to 95% Maximum wet bulb = 32° C Minimum dew point = 2° C (noncondensing) |

Physical Characteristics

| | |
|----------------------------------|--|
| Height | 45.7 cm (18.0 in) |
| Width | 49.5 cm (19.5 in) |
| Depth | 45.2 cm (17.8 in) |
| Weight | 29.0 kg (63.0 lb) |
| Tilt range | -5° forward to +15° backward |
| Swivel range | ±90° (left and right) |
| Display - Cathode ray tube (CRT) | 48.3 cm (19.0 in) diagonal |
| Display area | 1280 pixels horizontal x 1024 lines vertical Approximate picture size: 34.3 cm (13.5 in) x 27.3 cm (10.75 in) with a 5:4 aspect ratio. |
| Light transmission | 58% nominal |
| Video input | Red (with sync) 1 Vpp, 75 ohm, ac or dc coupled Green (with sync) 1 Vpp, 75 ohm, ac or dc coupled Blue (with sync) 1 Vpp, 75 ohm, ac or dc coupled |

3.2.2.1 VR320 Color Monitor Video Timing

The VR320 color monitor video timing is listed in the following tables.

Video Timing-1280 x 1024 Resolution

| | Refresh Rate | |
|----------------------|---------------------|--------------|
| | 72 Hz | 66 Hz |
| Horizontal frequency | 77.13 kHz | 70.66 kHz |
| Vertical frequency | 72.56 Hz | 66.47 Hz |
| Pixel frequency | 130.81 MHz | 119.84 MHz |
| Pixel period | 7.64 ns | 8.34 ns |

| Horizontal Timing | No. Pixels | μs | μs |
|--------------------------|-------------------|-----------|-----------|
| Entire line | 1696 | 12.97 | 14.15 |
| Active visible line | 1280 | 9.79 | 10.68 |
| Blanking interval | 416 | 3.18 | 3.47 |
| Sync front porch | 32 | 0.245 | 0.267 |
| Sync pulse | 160 | 1.22 | 1.34 |
| Sync back porch | 224 | 1.71 | 1.87 |

| Vertical Timing | No. Lines | ms | ms |
|-----------------------------------|------------------|-----------|-----------|
| Vertical period (Entire Frame) | 1063 | 13.78 | 15.04 |
| Visible raster | 1024 | 13.28 | 14.49 |
| Blanking interval | 39 | 0.506 | 0.552 |
| Sync front porch | 3 | 0.03889 | 0.04246 |
| Sync pulse | 3 | 0.03889 | 0.04246 |
| Sync back porch | 33 | 0.4279 | 0.4670 |

3.3 VR262 Monochrome Monitor

The VR262 monochrome monitor is compatible with the VR260 monitor. The VR262 monitor has a direct-viewed, 485 mm (19 in) diagonal antiglare screen with contrast enhancement. When connected to a host system, the VR262 monitor can display information sent to the host and information that the host system sends to you.

For installation and troubleshooting information, refer to *Installing and Using the VR262 Monochrome Monitor* (PN EK-VR262-IN).

3.3.1 VR262 Monochrome Monitor Specifications

Dimensions

| | |
|--------|----------------------------------|
| Height | 39.4 cm (15.5 in) including feet |
| Width | 45.5 cm (17.9 in) |
| Depth | 39.5 cm (15.4 in) |
| Weight | 18 kg (40 lbs) |

Horizontal Rate Timing (nominal)

| | |
|-------------------|------------------------|
| Frequency | 54.054 kHz |
| Front porch | 160 ns |
| Sync pulse | 1850 ns |
| Back porch | 1690 ns |
| Blanking interval | 3.70 μ s (maximum) |
| Active video time | 14.8 μ s |
| Horizontal period | 18.5 μ s |
| Pixels displayed | 1024 |

Vertical Rate Timing (nominal)

| | |
|-------------------|---------------------|
| Frequency | 60 Hz |
| Front porch | 0 horizontal lines |
| Sync pulse | 3 horizontal lines |
| Blanking interval | 37 horizontal lines |
| Active video time | 16.0 ms |
| Vertical period | 16.67 ms |
| Lines displayed | 864 |

Power

| | |
|---------------------------|---|
| Power supply type | Transistor, switch type ac to dc converter |
| AC input | Switch-selectable |
| 100 V to 120 V nominal | Single-phase, 3-wire 88 V to 132 V RMS, 47 Hz to 63 Hz line frequency |
| 220 V to 240 V nominal | Single-phase, 3-wire 185 V to 264 V RMS, 47 Hz to 63 Hz line frequency |
| Power consumption | 65 W |

Environment

| | |
|-------------|--|
| Temperature | 10° C to 40° C (50° F to 104° F) |
| Humidity | 10% to 90% maximum wet bulb of 28° C minimum dew point of 2° C |

3.4 VR299 Color Monitor

The VR299 is a 500 mm (20 in; 19 in viewable) color monitor for use on Digital workstation products.

The monitor features are:

- In-line gun with Dynamic Astigmatism and Focus (DAF) correction
- 90 degree color CRT (P22 phosphor)
- 1024 pixel x 864 line resolution
- 60 Hz refresh
- 54.0 kHz horizontal frequency
- 0.31 mm dot pitch
- Automatic degauss on power-up
- Integral tilt and swivel
- High efficiency anti-glare bonded panel

3.4.1 VR299 Color Monitor Specifications

Physical

| | |
|--------|--------------------|
| Height | 18.5 in (47.0 cm) |
| Width | 19.9 in (50.6 cm) |
| Depth | 20.7 in (52.7 cm) |
| Weight | 67.0 lbs (30.0 kg) |

Timing

| | |
|-----------------|-------|
| Vertical rate | 60 Hz |
| Horizontal rate | 54 Hz |

Power

| | |
|-------------------|---|
| AC input | DA model, 100 - 120 Vac 50/60 Hz D3, D4 models, 200 - 240 Vac 50/60 Hz |
| Power consumption | 150 W |

Environment

| | |
|-----------------------------|----------------------------------|
| Operating Temperature range | 10° C to 40° C (50° F to 104° F) |
| Humidity range | 10% to 95% non-condensing |

3.5 VRT16 Color Monitor

The VRT16 is a 406 mm (16 in), highly integrated color display monitor that is designed for displaying high-resolution graphics. The monitor features include:

- A silica coating on the screen that provides a glare-free display
- High-resolution with 1280 (horizontal) x 1024 (vertical) elements per frame, which allows for high-density color display
- Use of the 66.5 Hz non-interlace method to reduce flicker
- A display that can be turned plus or minus 45 degrees to the right or left, and can be tilted 15 degrees up or 5 degrees down
- A cylindrical screen that reduces distortion when viewed from the sides, sharpens the picture corners, and diminishes reflections

3.5.1 VRT16 Color Monitor Specifications

Physical

| | |
|--------|-------------------------|
| Height | 409 mm (16 in) |
| Width | 406 mm (16 in) |
| Depth | 453 mm (17 in) |
| Weight | 23.0 kg (50 lbs, 11 oz) |

Power Requirements

| | |
|----------|--|
| AC input | 100 - 120 Vac 60 Hz 220 - 240 Vac 50 Hz |
| Current | 100 - 120 Vac 3.7 A max 200 - 240 Vac 2.0 A max |

Environmental

| | |
|--------------------------|----------------------------------|
| Operating temperature | 10° C to 40° C (50° F to 104° F) |
| Nonoperating temperature | 0° to 60° |
| Operating humidity | 10% - 80% |
| Nonoperating humidity | 5% - 90% |

For additional information about the VRT16 monitor, refer to the *VRT16 Service Manual* (PN ER-VRT16-SM).

3.6 VRT19 Color Monitor

The VRT19 color monitor has a 474 mm (19 in) (diagonal), direct-viewed, anti-reflective coated screen with contrast enhancement. The monitor has a built-in tilt swivel assembly, allowing you to adjust the screen for viewing comfort.

The VRT19 color monitor is a highly integrated color display monitor that is designed for displaying high-resolution graphics.

The VRT19 color monitor features are the same as those of the VRT16 color monitor (refer to Section 3.5.)

3.6.1 VRT19 Color Monitor Specifications

Physical

| | |
|--------|-------------------------|
| Height | 474 mm (18.66 in) |
| Width | 480 mm (18.9 in) |
| Depth | 505 mm (19.9 in) |
| Weight | 32.5 kg (71 lbs, 11 oz) |

Power Requirements

| | |
|----------|--|
| AC input | 100 - 120 Vac 60 Hz 220 - 240 Vac 50 Hz |
| Current | 100 - 120 Vac 3.7 A max 200 - 240 Vac 2.0 A max |

Environmental

| | |
|--------------------------|----------------------------------|
| Operating temperature | 10° C to 40° C (50° F to 104° F) |
| Nonoperating temperature | 0° C to 60° C (32° F to 140° F) |
| Operating humidity | 10% - 80% |
| Nonoperating humidity | 5% - 90% |

4

Optional System Printers

This chapter describes the optional printers that can be connected to the VAXstation 4000 Model 60 system. The printers are:

| | |
|-------------|------------------------|
| Section 4.1 | LA75 Companion Printer |
| Section 4.2 | LA210 Letterprinter |
| Section 4.3 | LN03 Laser Printer |

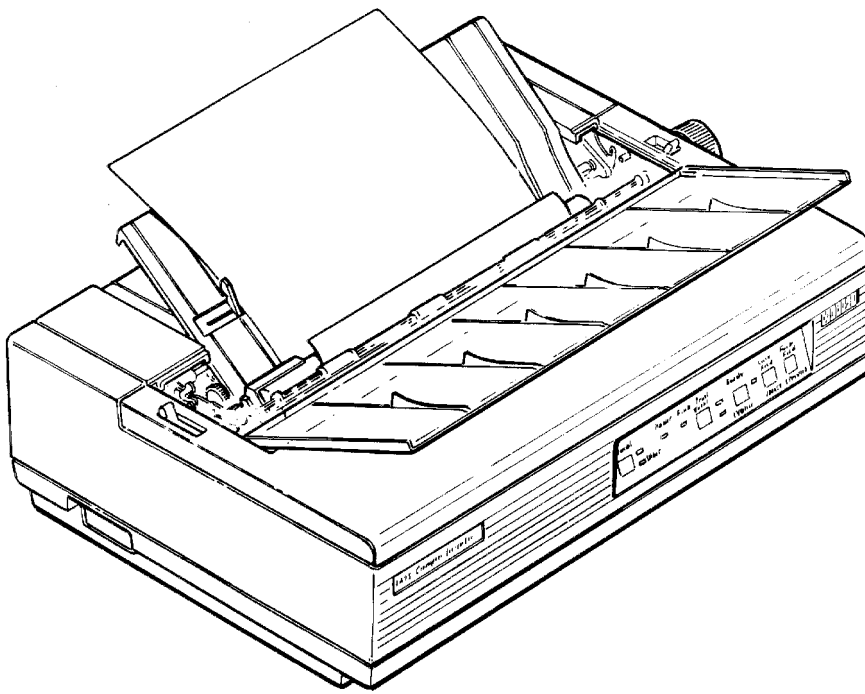
4.1 LA75 Companion Printer

The LA75 Companion Printer (Figure 4-1) is a versatile high-speed dot matrix printer that can print in five modes.

- Draft
- Memo
- Near-Letter quality
- Letter quality
- Bit-Map graphics

The LA75 Companion Printer has bidirectional printing and prints at a speed of 250 characters per second. The printer is available in both serial and parallel interface models.

Figure 4-1 LA75 Companion Printer



MA 0171-86

4.1.1 LA75 Companion Printer Configuration

The LA75 Companion Printer must be configured to ensure that the printer and the system communicate with each other correctly. You may need to change some of the printer's features and values depending on the hardware and software requirements for the system. Check the system's documentation to determine the requirements for baud rate, data bits and parity, and protocol. Table 4-1 lists the factory set configurations for the LA75 Companion Printer. For additional information, refer to *Installing and Using the LA75 Companion Printer* (PN EK-0LA75-UG).

Table 4-1 LA75 Factory Set Configurations

| LA75-S Code Version 1.0 | |
|--------------------------------------|----------------------------|
| Feature | Values |
| Baud rate | 7 4800 |
| Data bits and parity | 7 8-None |
| Protocol | 1 DEC |
| Form length | 2 11 inches |
| Character set (Digital) | 1 U.S. ASCII |
| Supplemental character set (Digital) | 1 DEC Supplemental |
| Print density (Digital) | 1 Draft |
| Printer ID (Digital) | 1 LA50 ID |
| Text mode right margin (Digital) | 1 Truncate |
| Auto LF on CR (Digital) | 2 NO Auto LF |
| Auto CR on LF (Digital) | 2 NO Auto CR |
| CAN Control code (Digital) | 1 Cancel control functions |
| 80 or 132 Columns (Digital) | 1 80 Columns |
| Paper out bell (Emulation) | 2 ON |
| Slashed zero (emulation) | 2 Zero without slash |
| Auto LF on CR (emulation) | 2 NO Auto LF |
| Active character set (emulation) | 1 Graphics set A |
| Auto CR on LF (emulation) | 2 NO Auto CR |
| Power-Up density (emulation) | 1 Draft |
| LQ or NLQ (emulation) | 1 Select NLQ |

4.1.2 LA75 Companion Printer Specifications

The LA75 Companion Printer specifications are listed in the following tables.

Power Requirements

Voltage/Frequency:

| | |
|---------|-------------------|
| LA75-A2 | 120 Vac, 50/60 Hz |
| LA75-A3 | 240 Vac, 50/60 Hz |
| LA75-A4 | 220 Vac, 50/60 Hz |
| LA75-A5 | 100 Vac, 50/60 Hz |

| | |
|-------------------|---------------------------------|
| Power cord | 2.0 m (6.7 ft), detachable |
| Power receptacle | Non-switched, 3-prong, grounded |
| Power consumption | 120 W maximum |

Operating Environment

| | |
|-------------------|----------------------------------|
| Temperature range | 10° C to 40° C (50° F to 104° F) |
| Relative humidity | 10% to 90% |

Physical Characteristics

| | |
|--------|-------------------|
| Height | 12.1 cm (4.8 in) |
| Width | 42.7 cm (16.8 in) |
| Depth | 34.5 cm (13.6 in) |
| Weight | 9.5 kg (21.0 lb) |

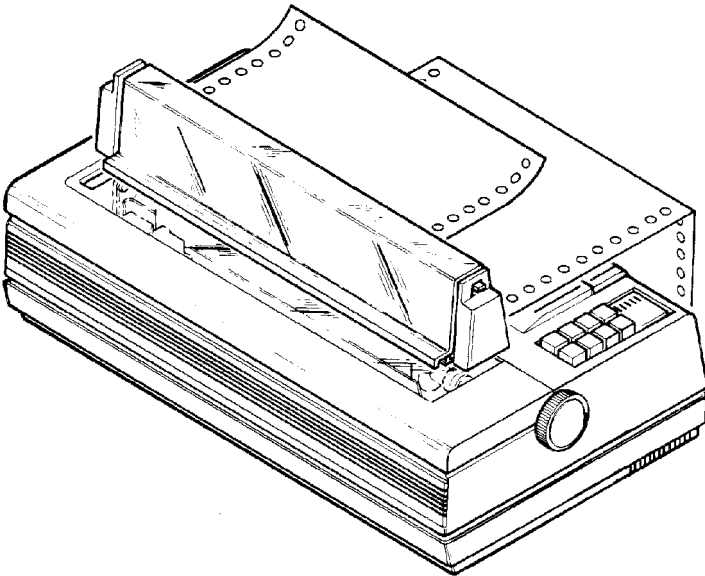
4.2 LA210 Letterprinter

The LA210 Letterprinter (Figure 4-2) is a dot-matrix, receive only (RO) printer. The printer operates in text or graphics mode. Letter quality or draft quality printing can be selected in text mode. In graphics mode, the system controls the dot printing elements.

Letter quality mode provides medium or high density printing at low speed (40 characters per second, maximum). Draft mode provides low density printing at high speed (240 characters per second, maximum).

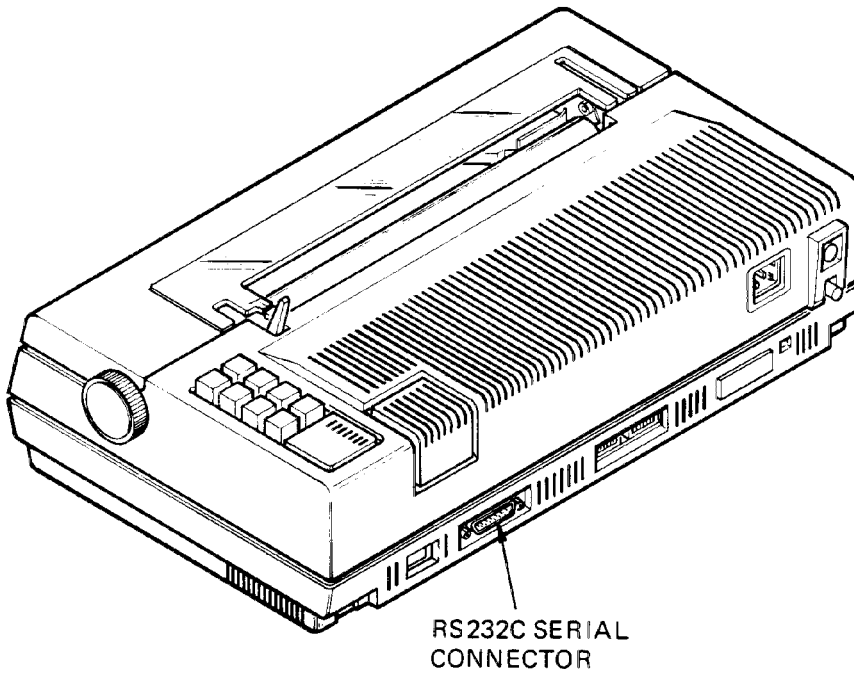
The LA210 Letterprinter contains the courier 10 U.S. ASCII, courier 10 multinational, and VT100 line drawing character sets. Up to two fonts can be plugged into the printer's font assembly.

Figure 4-2 LA210 Letterprinter



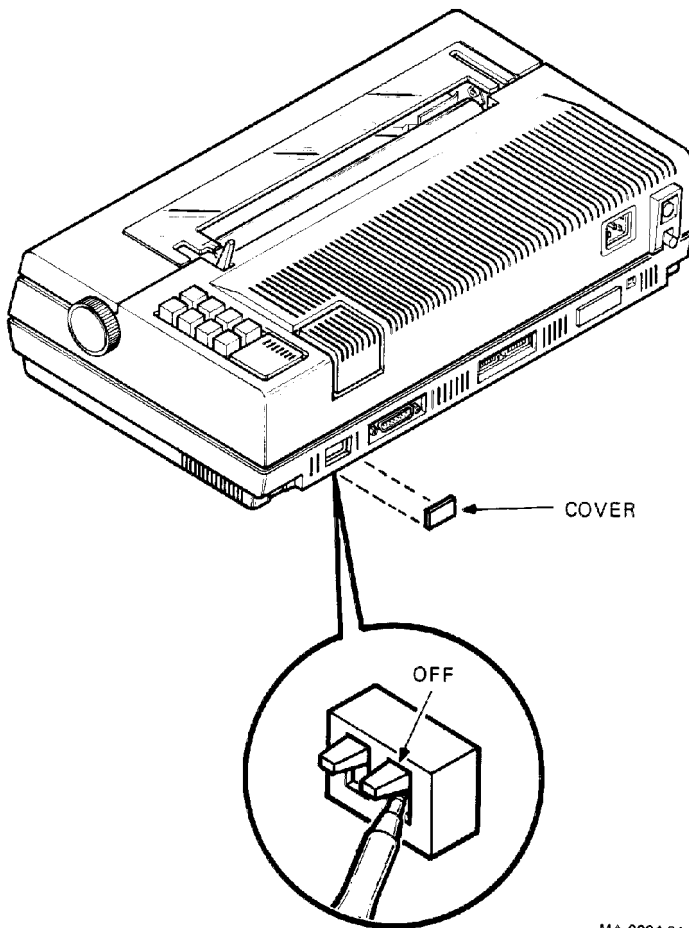
The LA210 Letterprinter has a standard RS232C serial interface. Figure 4-3 shows the location of the serial interface connector. Figure 4-4 shows the location of the optional parallel interface switches.

Figure 4-3 RS232C Serial Interface Connector



4-8 Optional System Printers

Figure 4-4 Parallel Interface Switches (Optional)



MA-0084-84

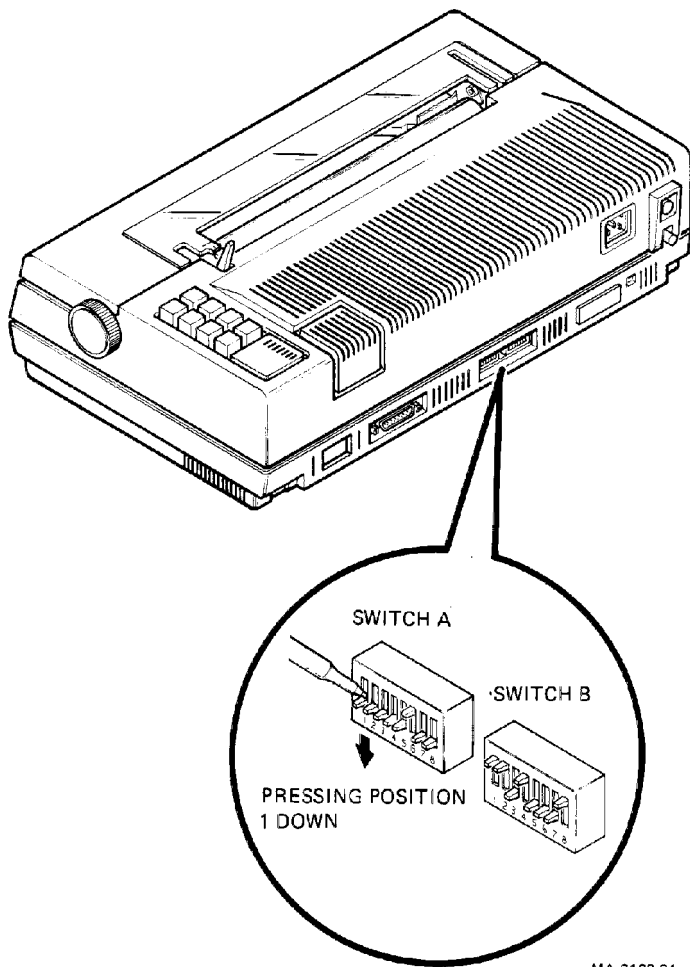
4.2.1 LA210 Letterprinter Configuration

The LA210 Letterprinter configuration switches are factory set for use with most Digital systems. Check the system requirements to see if any changes are necessary. If you set the configuration switches, do not change the settings unless there is a change to the communication system. Figure 4-5 shows the location of the configuration switches. For additional information, refer to the *LA210 Letterprinter User Guide* (PN EK-LA210-UG).

CAUTION

Never use a lead pencil to change the switch positions. Use a ballpoint pen or similar item.

Figure 4-5 LA210 Letterprinter Configuration Switches



4.2.2 LA210 Letterprinter Specifications

The LA210 Letterprinter specifications are listed in the next tables.

Power Requirements

| | |
|-------------------|---|
| Voltage | 120 Vac nominal (90 to 128 Vac) 240 Vac nominal (180 to 256 Vac), switch-selectable |
| Frequency | 47 to 63 Hz |
| Power receptacle | Non-switched, 3-prong, grounded |
| Power consumption | 154 W maximum |

Operating Environment

| | |
|-------------------|----------------------------------|
| Temperature range | 10° C to 40° C (50° F to 104° F) |
| Relative humidity | 10% to 90% |

Physical Characteristics

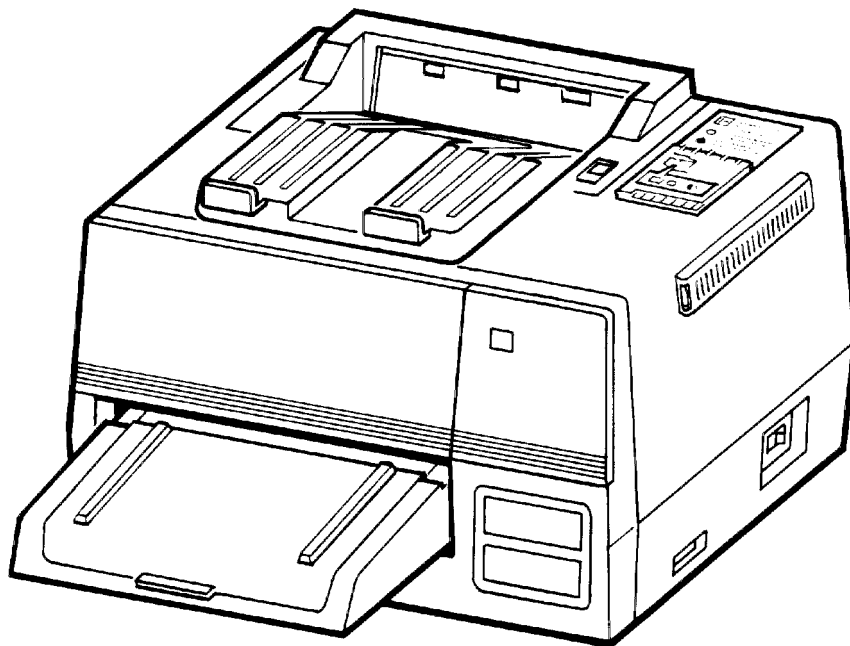
| | |
|--------|---|
| Height | 12.7 cm (5.0 in) without tractor 22.8 cm (9.0 in) with tractor |
| Width | 54.6 cm (21.5 in) |
| Depth | 34.3 cm (13.5 in) |
| Weight | 12.15 kg (27.0 lb) |

4.3 LN03 Laser Printer

The LN03 Laser Printer is a nonimpact printer that uses a laser diode and an electrophotographic printing process. The LN03 Laser Printer prints at a rate of eight pages per minute (text only) with print quality at 300 by 300 dots per inch.

The LN03 Laser Printer (Figure 4-6) has an RS232 serial interface that allows connection to systems for text printing, and graphics by way of the sixel standard protocol.

Figure 4-6 LN03 Laser Printer



MA-1303-84D

4.3.1 LN03 Laser Printer Configuration

The LN03 Laser Printer has two 6-position configuration switchpacks, located at the rear of the printer. The switchpacks are used to configure the printer operating requirements. Figure 4-7 shows the location of the switchpacks and the printer configuration factory settings. If necessary, change these settings to match the communication parameters of the system.

NOTE

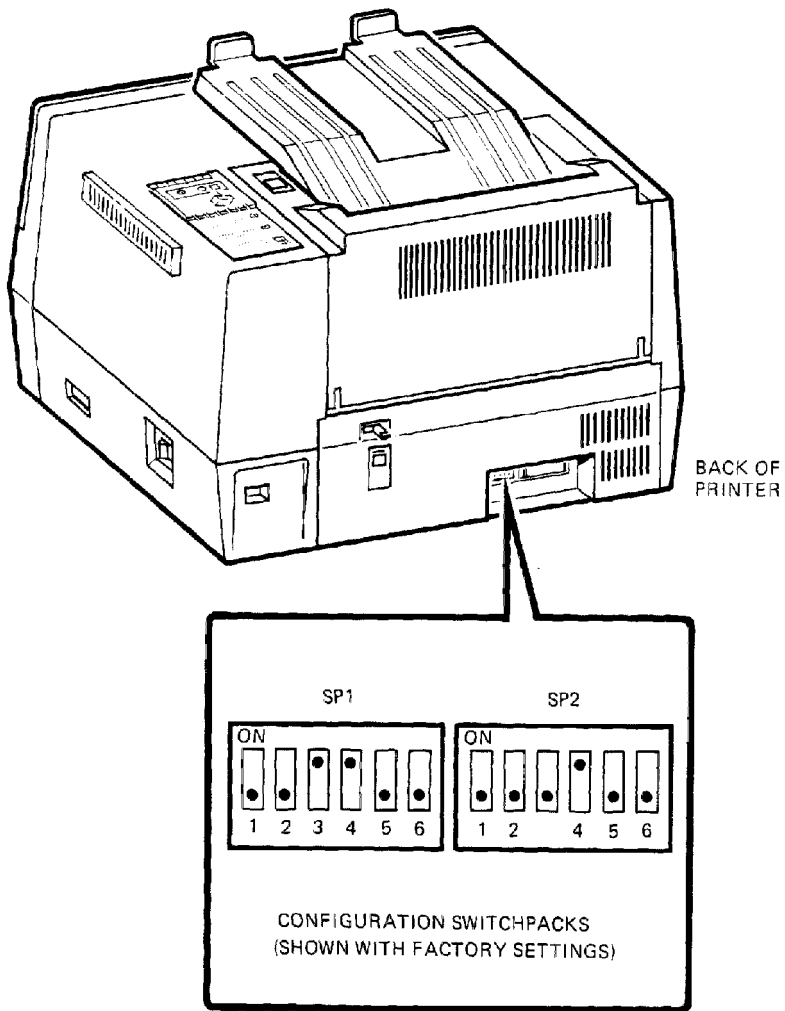
Turn off power to the printer before resetting the configuration switches. The new switch settings are invoked when you turn the power on again.

CAUTION

Never use a lead pencil to change the switch positions. Use a ballpoint pen or similar item to change the switch settings.

The switchpacks are marked 1 (ON) and 0 (OFF). For additional information, refer to the *LN03 Technical Manual* (PN EK-OLN03-TM).

Figure 4-7 LN03 Laser Printer Configuration Switches



4.3.2 LN03 Laser Printer Specifications

The LN03 Laser Printer specifications are listed next.

Power Requirements

| | |
|-------------------|---|
| Voltage | 120 Vac (85 to 132 Vac) 240 Vac (187 to 264 Vac) |
| Frequency | 50/60 Hz |
| Power cord | 3.0 m (10.0 ft) detachable |
| Power requirement | 1 kVA maximum |
| Power consumption | 120 Vac, 950 W maximum 240 Vac, 850 W maximum |
| Heat dissipation | 120 Vac, 3240 Btu/h 240 Vac, 2900 Btu/h |

Operating Environment

| | |
|-------------------|---------------------------------|
| Temperature range | 10° C to 32° C (50° F to 90° F) |
| Relative humidity | 20% to 80% |

Physical Characteristics

| | |
|--------|-----------------------------------|
| Height | 38.1 cm (15.0 in, with exit tray) |
| Width | 53.4 cm (21.0 in) |
| Depth | 59.7 cm (23.0 in, with tray) |
| Weight | 35 kg (77.0 lb) |

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