MICROVAX 3100
VAXSERVER 3100

Maintenance Advisory
EK-M3100-MA.001

Contents

Tables

1

About This Advisory

1.1 Introduction

This advisory provides Field Service engineers with information about the differences between the VAXstation 3100 on the one hand and the new MicroVAX 3100 and VAXserver 3100 systems on the other hand. It provides a product overview and a feature-by-feature description of all the major components that differ between the MicroVAX 3100 and VAXstation 3100 systems.

1.2 Goals

Once you have completed this advisory, you should be able to:

- Successfully support the MicroVAX 3100 and the VAXserver 3100 with the aid of reference materials

- Distinguish the differences between the VAXstation 3100 and the MicroVAX 3100/VAXserver 3100

This advisory consists of the following topics:

- Product description

- Overview of Factory Loaded Software (FLSw)

- Physical differences

- Overviews of the:
  - Back panel
  - CPU module
  - SCSI/SCSI Controller
  - Distribution module
  - Communications option
  - Cabling

- Product Comparison

1.3 Prerequisites

Before reading this advisory, you should have completed the *VAXstation 3100 Operations and Servicing IVIS* course (EY-9822E-IV).

1.4 Related Documentation

The following documents provide detailed information on the MicroVAX 3100 and VAXserver 3100 systems:

Name	Order Number
MicroVAX 3100 and VAXserver 3100 Planning and Preparation	EK-A0373-PC
MicroVAX 3100 and VAXserver 3100 Owner's Manual (Model 20)	EK-A0371-OM
MicroVAX 3100 and VAXserver 3100 Owner's Manual (Model 10)	EK-A0370-OM
MicroVAX 3100 and VAXserver 3100 Maintenance Guide	EK-A0372-MG
MicroVAX 3100 and VAXserver 3100 Illustrated Parts Breakdown	EK-A0372-IP

2
Product Overview

2.1 Product Description

The MicroVAX 3100 series includes the *MicroVAX 3100* and the *VAXserver 3100* systems (Figure 2-1). The *MicroVAX 3100* system is a desktop VAX computer that supports a maximum of eleven users. The *VAXserver 3100* system is a desktop server designed to provide operating system services for dedicated applications or devices.
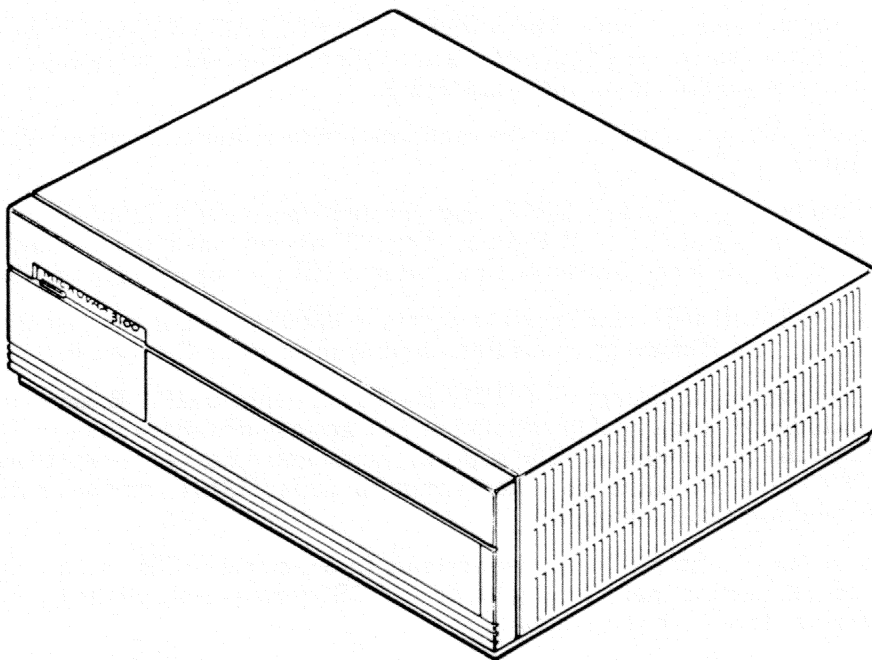
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Figure 2–1   MicroVAX 3100

The MicroVAX 3100 series is available in a *Model 10* and a *Model 20* version. The Model 20 provides a larger storage capacity with a six-inch-high enclosure and top drive-mounting storage plate. The Model 10 provides a four-inch-high enclosure, but no top drive storage plate. Both systems can be used either independently or in a work group with other VAX systems.

Independent systems or work groups can also be connected to a network for communication with other systems. These systems target commercially oriented applications in small business and distributed data processing environments, especially where a low-cost solution is required in the remote branches of large corporate networks.

The MicroVAX 3100 series is a general purpose MicroVAX system complementary to the specialized desktop and technical workstation system provided by the VAXstation 3100. Either VMS or ULTRIX software can be used with the systems. The VAXserver 3100 may be used either as a satellite system and a server at the same time or as a server only. The MicroVAX 3100 unit is contained in an enclosure similar to that of the VAXstation 3100 system unit, the differences being in the back panel and lower shelf.

Developed from the VAXstation 3100 Serverstation, the MicroVAX 3100 series is designed to support VT type terminals rather than high-resolution graphics. System highlights include:

- *Memory* - The system can be expanded to include a maximum of 32 megabytes (Mb) of internal random access memory (RAM).

- *TZ30 Tape Drive* - The TZ30 tape cartridge tape drive stores a maximum of 95Mb of data per tape cartridge. The TZ30 is compact enough to fit neatly into the system enclosure with other devices.

- *Thinwire and standard ethernet connectibility* - Connection to either standard ethernet networks or thinwire ethernet networks is available.

- *RZ23 Disk Storage* - A maximum of five RZ23 (104Mb) hard disk drives, one of which functions as the system disk. In VAXserver 3100 systems, the storage disks can be shared by diskless users of a work group.

- *Two operating systems to choose from* - VAX/VMS or ULTRIX-32 (Digital Equipment Corporation's version of the UNIX operating system). The VMS operating system software is factory installed on the system disk.

- *RZ23 Diskette Drives* - Systems can be configured with either one or two RZ23 1.2Mb diskette drives.

- *Communication ports* - Three DEC423 asynchronous ports (with MMJ connectors for VT type terminals) and one MODEM port (RS232) are provided as standard. The MODEM port can be made available as a fourth MMJ port using adapter H8571-A.

  The baud rate for all four serial ports is preset to 9600 baud, but can be changed to 19.8 Kbaud (or 38.4 Kbaud) by repositioning jumper wires on the system module.

- *Additional communications option DSH32-B* - The optional DSH32-B communications module (included in some configurations) adds eight asynchronous lines and one synchronous line to the system. The eight asynchronous lines can be made available as eight MMJ ports by connecting the harmonica cable (H3104) supplied with the DSH32-B communications module.

- *SCSI connectibility* - Small Computer Systems Interconnect (SCSI) is an industry standard for connecting mass storage devices. SCSI ports permit you to connect other manufacturers' devices to the system.

- *Add-on Storage Devices* - The RRD40 compact disk drive (600Mb capacity), RZ55 hard disk drive (332Mb capacity), and the TK50Z tape drive (95Mb capacity) are the external expansion boxes that are available to provide extra storage capability.

The MicroVAX 3100 series provides 2.4 VAX Units of Performance (VUP). (1 = VAX-11/780.) The MicroVAX 3100 is an "off floor," Q-busless, and CVAX-based MicroVAX system. Both offer 525MBs of SCSI internal storage. The MicroVAX 3100 series targets the under-25-thousand-dollar market and replaces the MicroVAX 2000. These systems are Digital's first VAX systems designed and manufactured in Europe. They are adapted from the VAXstation 3100 product set for low-cost, general-purpose multiuser needs and for low-cost, dedicated device and application server needs. Figure 2-2 shows diagrams of the MicroVAX 3100 and the VAXstation 3100.

MICROVAX 3100 BLOCK DIAGRAM
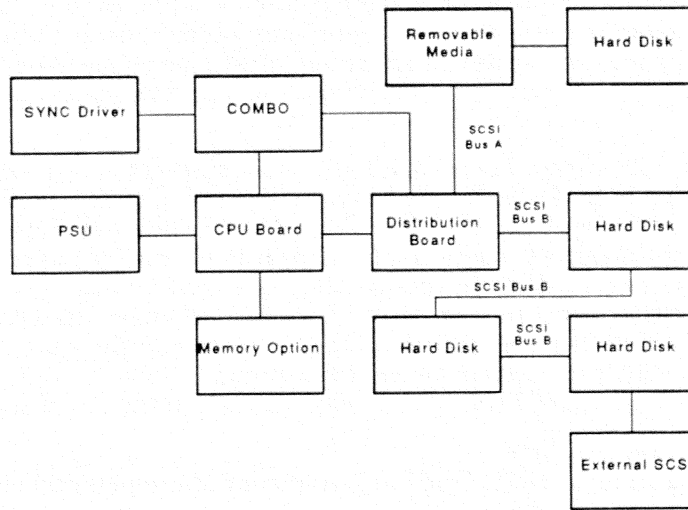
VAXSTATION 3100 BLOCK DIAGRAM
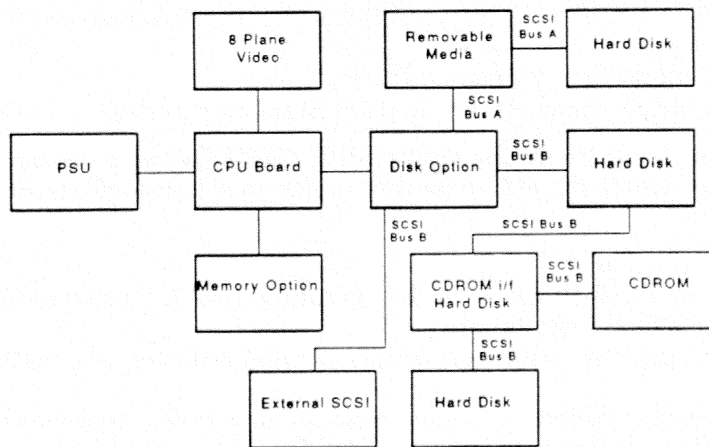
Figure 2–2   MicroVAX 3100 and VAXstation 3100 Block Diagrams

2.2   Factory Loaded Software

The MicroVAX 3100 series systems are shipped with VMS Factory Loaded Software (FLSw) on the disk. ULTRIX is loaded by traditional methods. Base operating system and networking software is loaded onto the disk in the manufacturing location rather than at the customer's site. The FLSw accounts for the transferring of a software binary image onto the disk, but excludes any special installation procedures that may be necessary to make use of the software.

Final installation procedures such as password generation, integrated software installation, and product authorization key introduction must be carried out by the customer when the system is first booted. Layered and other software that is not included as part of the operating system distribution must also be loaded and installed by the customer via conventional installation techniques using tape, optical disk, diskette, or network.

FLSw is seen only the first time a MicroVAX 3100 series system is powered up. The use of FLSw avoids the need to load standalone backup. The use of FLSw avoids the various save sets and reboots of the system that occur during a conventional installation. To provide a preloaded (not installed) operating system, it is necessary to preset some variables that the customer is asked to confirm during a conventional installation procedure. It is necessary to ensure that, with FLSw, the customer has access to these variables to change them as required to suit system security and the environment. FLSw does not diminish the ability of VMS to be customized and tailored to suit a particular environment. The introduction of FLSw is intended to achieve the following goals:

- Reduce system installation time
- Reduce turnaround time of OEM (Original Equipment Manufacturer) and VAR (Value Added Reseller) customer systems
- Increase customer satisfaction
- Reduce Digital's Field Service installation costs
- Augment customer confidence in Digital's procedures
- Provide MicroVAX 3100 and VAXserver 3100 systems with a feature already available in competitive products
- Offer both VMS operating systems via FLSw
- Provide extra quality verification at the point of manufacturing

The operating system loaded onto the system disk via FLSw must provide all the functionality *when it is first started up* as that of one that is loaded via conventional techniques:

- The system boots normally.
- Any software normally included with the operating system hardware kit is available to the end user for final installation.
- All procedures permitting system customization and tailoring are available to the customer.
- Any operating system loaded via FLSw must conform to the appropriate Software Product Description (SPD), but there is no implied warranty or guarantee if the customer does not obtain the hardware kit of the operating system.

Software that is delivered on a system disk is not covered by warranty. It is provided as a convenience to the customer. The customer is solely responsible for completing the installation of the software.

For this reason, Digital encourages all customers to purchase the VMS Media and Documentation kit, which includes complete installation instructions. No other change in Digital's current software warranty policy is implied by the preloading of the VMS distribution kit onto the system disk at the factory.

For detailed procedures, refer to the *MicroVAX 3100 and VAXserver 3100 Owner's Manual*.

3
Product Differences

3.1 Physical Differences

The MicroVAX 3100 has the same basic design architecture as that of the VAXstation 3100 Model 40 server/workstation and it incorporates a similar complement of modules and options. The MicroVAX 3100, being a timeshare system, is different in that it has the following:

- One RS232 port with modem control

- Three RS432 ports without modem control

- DSH32 DEC Multi-Controller 581 communication options

- Dual SCSI busses integrated onto the system module

- No second-level cache

- No bit-mapped graphics capabilities

- No console monitor or mouse

3.2 Multipurpose Versus Application Description

Multipurpose (MicroVAX 3100)
The timesharing (multiuser) version of the CPU module has a PROM that permits multiple simultaneous logins to the VMS operating system.

*Application Description (VAXserver 3100)*
The server (two-user) version of the CPU module has a PROM that permits two simultaneous logins to the VMS operating system.

NOTE
An H3200 loopback connector must be inserted into the modem port (25 pin D-SUB) on the back of the MicroVAX system to enable the Field Service mode diagnostics. Other loopbacks may be needed to fully test some options. Please refer to the *MicroVAX 3100 and VAXserver 3100 Maintenance Guide* for details.

3.3 Back Panel

Figure 3-1 shows the positions of the various ports and switches on the MicroVAX 3100.
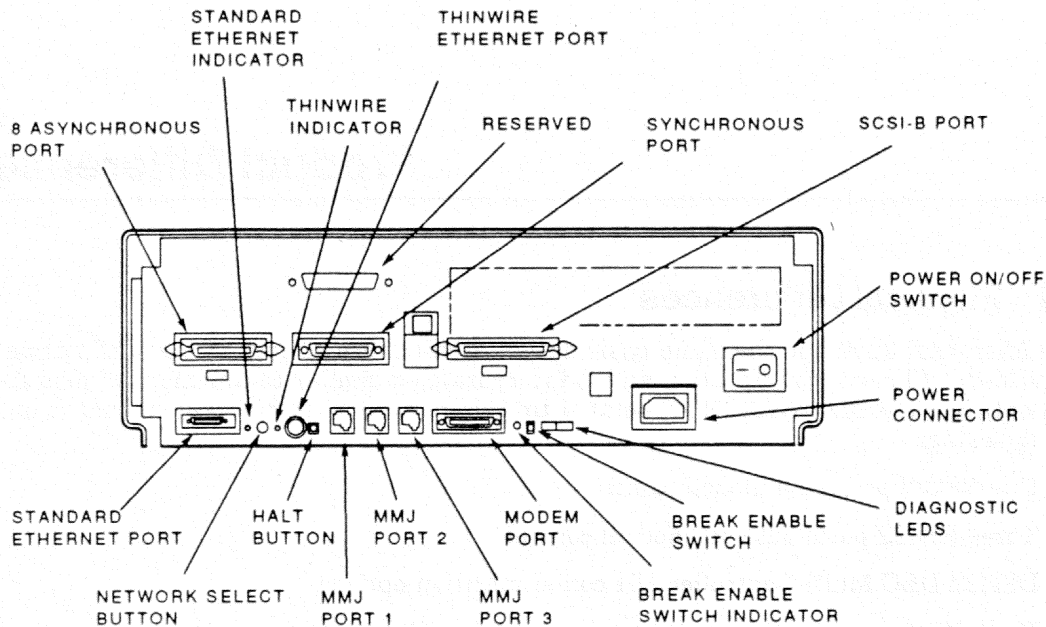
Figure 3–1   MicroVAX 3100 Back Panel

The back panel of the MicroVAX 3100 series (Figure 3-1) contains the various ports and switches necessary to connect it to the accompanying hardware. *MMJ ports 1, 2, and 3* allow connection to VT terminals. A fourth VT terminal can be connected if an adapter (H8571-A) is fitted to the modem port (RS232). To connect more terminals, the system must have a DSH32-B communications module with a harmonica cable connected to the eight asynchronous ports. The harmonica cable provides an additional eight MMJ ports. Alternatively, printers or modems can be connected to these MMJ ports.

Connection to the Ethernet is done through either the *ThinWire Ethernet port* or the standard *Ethernet port*, depending on which type of Ethernet network is available. The position of the Ethernet switch determines which of the Ethernet ports provides IEEE 802.3 network communications. An LED is lit beside the enabled port.

The external *SCSI port* is used to connect external mass-storage devices to the system.

The *Break Enable switch* determines the function of MMJ port 3. When the switch is down, the port functions as a normal communications port. When the switch is up, the port functions as an alternative console port to which a special attached terminal can be connected. When the switch is up, the LED lights up and enables the BREAK key on the special attached terminal. Pressing this key allows direct entry to console mode.

Section 1 of the *MicroVAX 3100 and VAXserver 3100 Maintenance Guide* provides a detailed description of the back panel. Diagnostic LEDs are referenced in Appendix G of that document.

3.4 CPU Module

The MicroVAX 3100 CPU module is a reworked version of the VAXstation
Server/Workstation CPU module, as Figure 3-2 shows.
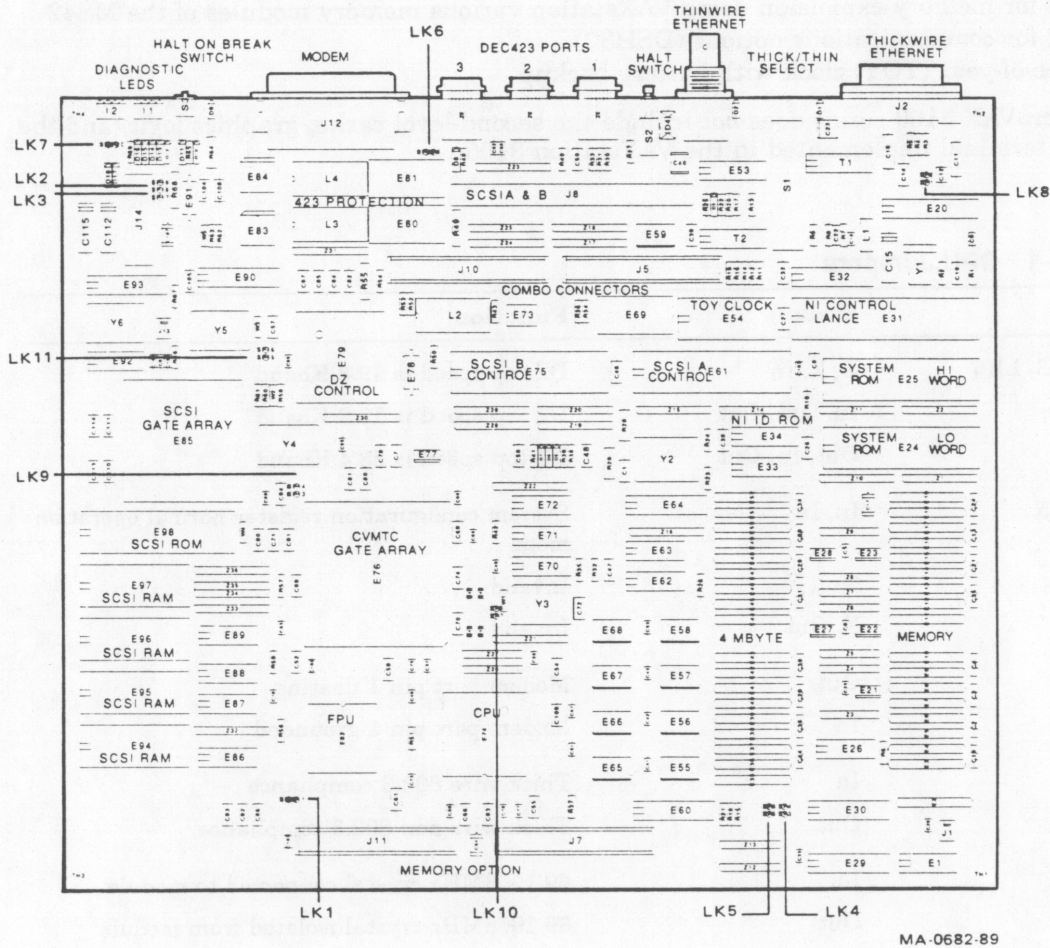
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Figure 3–2   CPU Module

The MicroVAX 3100 series *CPU module* contains:

*   CVAX CPU/FPU chip set and 4MB memory
*   ThinWire and standard Ethernet controller
*   Boot/self-test ROM
*   Dual SCSI bus controller
*   Three DEC423 asynchronous lines and one RS232 asynchronous line with modem control
*   Slot for memory expansion using VAXstation various memory modules of the MS42
*   Slot for communications options (DSH32)
*   Time-of-year (TOY) clock with battery backup

The MicroVAX 3100 series does *not* include the second-level cache, graphics logic, and the console terminal implemented in the VAXstation 3100.

Table 3–1   CPU Jumpers

| Jumper	State	Function
LK2, LK3, LK6	X, X, In	DZ top speed is 19.8 Kbaud
	In, Out, Out	DZ top speed is 19.2 Kbaud
	Out, In, Out	DZ top speed is 38.4 Kbaud
LK4, LK5	In, In	System configuration register normal operation mode
	Out, X	Invalid
	X, Out	Invalid
LK7	Out	Modem port pin 1 floating
	In	Modem port pin 1 grounded
LK8	In	Thick wire 802.3 compliance
	Out	Thick wire non 802.3 compliance
LK9	In	69.1968MHz crystal connected to module
	Out	69.1968MHz crystal isolated from module
LK10	In	44.4MHz crystal connected to module
	Out	44.4MHz crystal isolated from module

3.5   SCSI/SCSI Controller

The *SCSI/SCSI Controller*, which is located on the CPU module for the VAXstation 3100, provides the MicroVAX series with two SCSI ports. One of the two SCSI ports is dedicated to service the system (VMS/ULTRIX) disk and the TZ30/RZ23. The second port services the user disks and it allows the attachment of external SCSI mass-storage devices to the system. The number of external SCSI mass-storage devices allowed depends on the number of internal storage devices. The total number of devices permitted on the SCSI bus is seven.

The system module allows the attachment of a DHS32 option module, itself supporting 8 asynchronous lines and 1 to 2 synchronous lines. The drivers for these lines are contained on the Distribution and Synchronous driver modules.

3.6 Distribution Module

Figure 3-3 shows the distribution module.
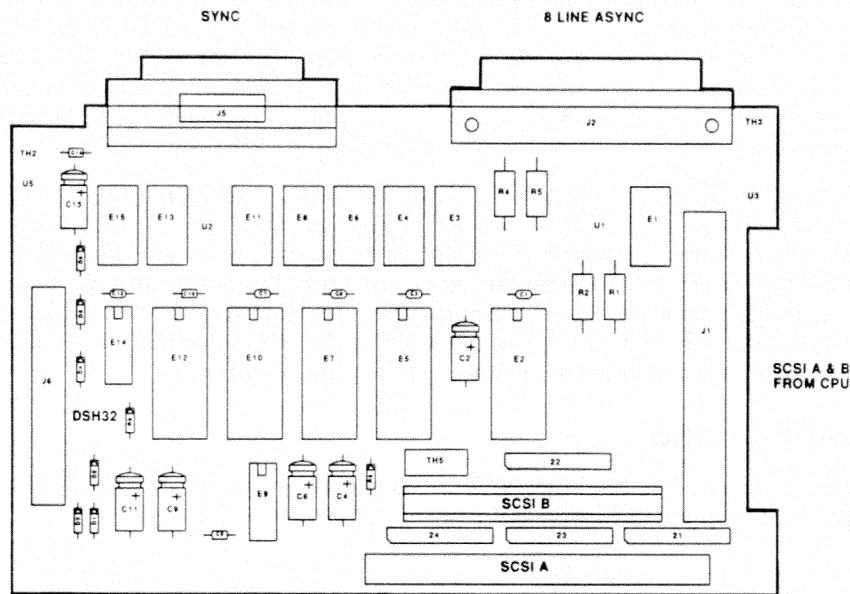
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Figure 3–3   Distribution Module

The *distribution module* comprises three subsystems:

* Synchronous driver/receiver subsystem

* Asynchronous driver/receiver subsystem

* SCSI bus A and B subsystem

The *synchronous driver/receiver subsystem* is the interface between the DSH32 and the synchronous port. The system adapts to different kinds of EIA/CCITT standards by sensing the cable code in the adapter cable.

The fundamental idea behind the communication port design is that, when the user connects the adapter cable, the system recognizes the type of cable that is connected to the port during power-up. The driver circuit used in this module depends totally on which adapter cable is used. When the RS-422 adapter cable is used, the uA96172 driver chip is active in the circuit. This chip supports only the data lead for the TxD, CTS, DTR, and clock. The remainder of the control pins still use the 5170. When either RS-232 or RS-423 adapter cable is used, the uA96172 is not active.

The "conn_test H" signal on the DSH32 synchronous connector helps to test the data in the RS-232 loopback mode when the 50-pin loopback connector is used. If conn_test equals low, then all the RS-422 data and the control function loops back *through the loopback connector*. When it goes high, the RS-232 mode turns on so that the RXD, DCD, CTS, RX_CLK loops back through all the test pins.

The receiver chips use the Unitrode 5180 for all the control lines and the data lines. The grounding and the balance circuit is implemented by the adapter cable. The adapter cable has different ways to tie different pins together so that the EIA-ground and balance is correctly implemented.

For EOS protection, every pin is protected by a transient suppresser diode; and the other side of this diode is connected to the chassis ground to make sure that the EOS test is successful.

The *asynchronous driver / receiver system* adds eight serial lines to the system box of the MicroVAX 3100 series. The 68-pin Honda connector (J3), pins 35 through 68, connects the asynchronous driver/receiver to the DSH32 module containing the SLU system. The driver/receiver gets all of its power and data lines through this connector. The DSH32 module receives all of its power, ground, and data/address from the system module, which supplies all the power for the entire SLU system. The 36-pin connector (J2) is used with an eight-line "harmonica" adapter to connect a maximum of eight terminals.

The *SCSI bus A and B subsystem* comprises three SCSI connectors mounted on the distribution module. The 100-pin Honda connector (J6) connects the system module to the distribution module (pins 1 through 50 assigned to SCSI bus B; and pins 51 through 100 assigned to SCSI bus A). The signals are sent out on SCSI bus A on pins 51 through 100 and return on SCSI bus A on pins 1 through 50. The control/data signals terminate in the resistor banks E8, E9, and E10. The 50-pin connector (J5) sends out SCSI bus B, which terminates either on the sidecar option or on a plug terminator.

3.7 Communications

The communications option for the MicroVAX 3100 series is the DSH32 DEC Multi-Controller 581 module, shown in Figure 3-4.
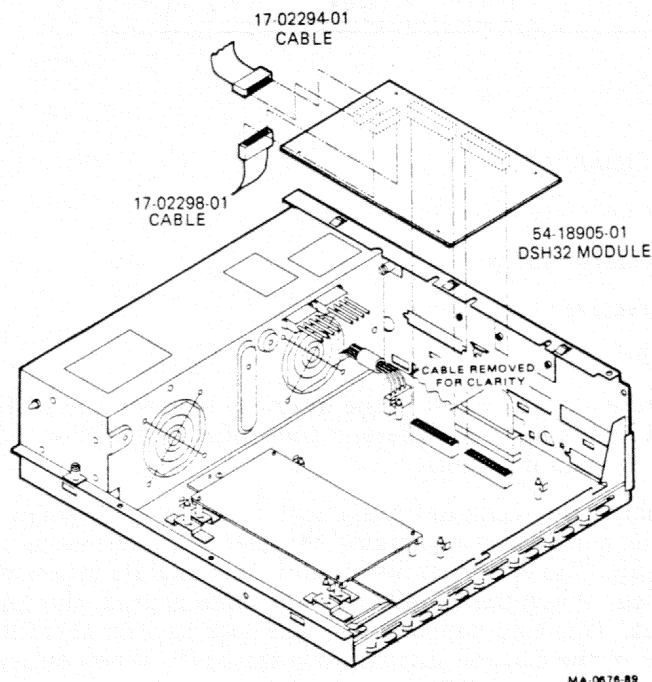
Figure 3–4   DSH32 Module

The DSH32 is a synchronous/asynchronous option that provides eight data-only asynchronous lines, one synchronous line supporting HDLC (LAPB/LAPBE), and SDLC protocols. The DSH32 combines the functionality of the single synchronous line (DST32) and the eight asynchronous line (DHT32). Only one of these communications devices can be installed in a MicroVAX 3100 system.

3.8 Cabling

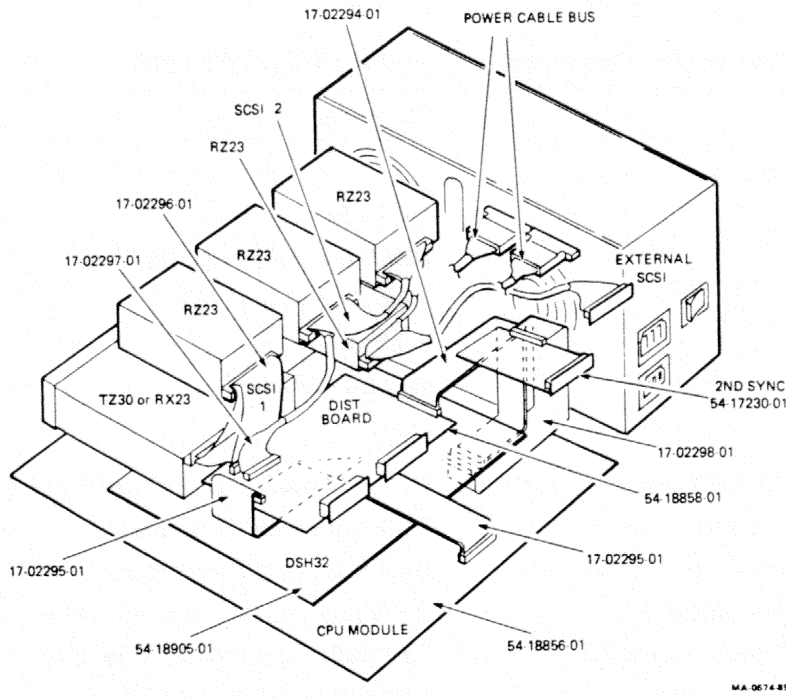Figures 3-5 and 3-6 show the cabling for the MicroVAX 3100.

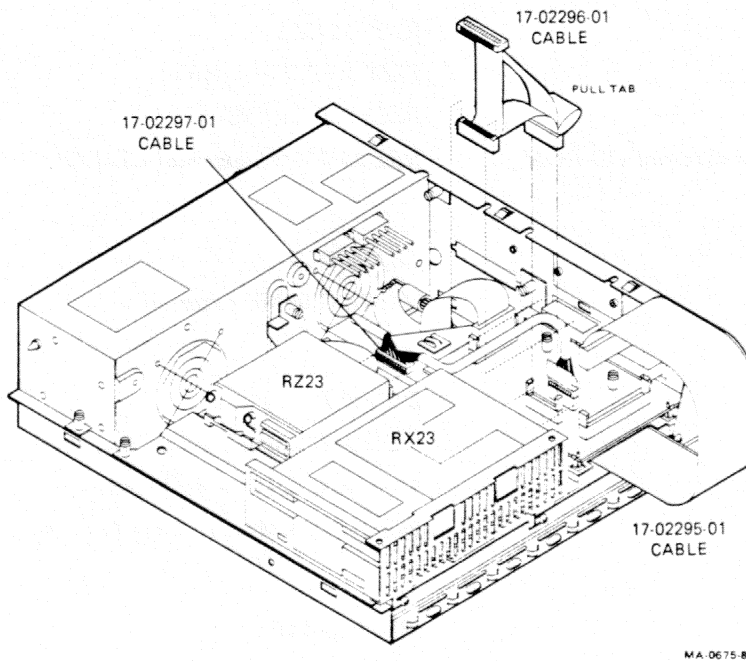**Figure 3–5   MicroVAX 3100 Cabling**

Figure 3–6   Top Drive Plate Removed

3.9   Product Comparison

In Table 3-2, differences of the VAXstation 3100 and the MicroVAX 3100 appear in italic type.

Table 3–2   Comparison of the VAXstation 3100 and the MicroVAX 3100

VAXstation 3100	MicroVAX 3100
Product Functionality	
3.4 VUPs	*2.4 VUPs*
32MB maximum memory	32MB maximum memory
1.3 GB maximum disk	*1.5 GB maximum disk*
95MB tape	95MB tape
3 user comms	*4-12 user comms*
System Module	
DC341 CVAX and DC513 CFPA floating point	DC341 CVAX and DC513 CFPA floating point
4 Mbytes parity check memory	4 Mbytes parity check memory
Dual SCSI controllers (separate module)	Dual SCSI controllers (on module)
Thick and Thin ethernet connection	Thick and Thin ethernet connection
2 DEC423 asynch serial lines (data only)	*3 DEC423 asynch serial lines (data only)*
N/A	*1 RS232 asynch serial line with modem control*
Mass Storage—Disks	
RZ23 104MB	RZ23 104MB
RZ55 330MB external	RZ55 330MB external
RZ23 3.5" 1.47MB	RZ23 3.5" 1.47MB
RRD40 600MB internal or external CD-ROM	*RRD40 600MB external CD-ROM*
Mass Storage—Tape	
TZ30 95MB	TZ30 95MB
TK50Z-G 95MB external	TK50Z-G 95MB external
Comms Options	
N/A	*DSH32-B*
N/A	*8 DEC423 asynch serial lines (data-only)*
N/A	*1 synch serial line (full-modem)*
N/A	*2nd synch add-on to large box later*
Memory Expansion	
MS42-A 4MB	MS42-A 4MB
MS42-B 12MB	MS42-B 12MB
MS42-C 16MB *	MS42-C 16MB *
* Can be used with either 4 or 12 MB modules	