

Open Systems

AViiON 300 Workstations

Fact Sheet

The AViiON 300 Series of single-user workstations, designed for the technical professional, combine the performance and functionality of the traditional 32-bit, high-end workstation with the compact packaging, competitive pricing and ease-of-use of the high-end "386" PC range.

AViiON 300 systems represent the first in a series of personal productivity tools manufactured by Data General which utilize Motorola 88000 RISC (Reduced Instruction Set Computer) technology and the strength of Data General's pace-setting UNIX Operating System, DG/UX.

<i>Model No. Range</i>	<i>Description</i>
70000-11	4, 8 MB base units
70012-20	4, 8 MB packages
70021-28	8 MB packages w/mass storage
70029-30	12 MB servers

Customer Definition

Potential users for AViiON high-performance, graphics workstations have a need to design and manipulate objects in a manner that simulates reality as closely as possible. They are discovering the advantages of having a high-performance, dedicated, single-user CPU coupled with high-performance graphics hardware in the same package.

Of the many different uses for workstations, the majority of current users fall into the following categories:

- Software engineering
- Design and drafting (CAD)
- Design engineering/analysis (CAE)
- Technical management/support
- Scientific research and R&D

Currently, over 70% of all workstation sales are made by VARs and ISVs (Dataquest, 3/88). These will be our primary customers.

Complete Single-Board System Functionality

- Advanced, entry-level UNIX single-user computer:
 - Based on 32-bit Motorola 88K RISC processor
 - Runs at 16.67 or 20 MHz clock speed
 - Dhrystone benchmark: 17 or 20 MIPS
- Tightly coupled, on-chip floating point unit (FPU)
- Two 88200 cache and memory management units (CMMU) for data and instruction bus
- Industry-standard SCSI interface for disk and tape units
- Tightly coupled graphics processing
- 4 MB parity memory modules:
 - Expansion of up to seven 4 MB memory modules for a total of 28 MB
- Can operate as a diskless node in a network
- Attractive, compact desktop packaging:
 - 16"x16"x2.5" for the processor unit
- 3-button optical mouse with pad
- PC/AT-101 compatible keyboards

Graphics

- High-performance, bit-mapped graphics with dedicated, dual-ported display memory, choice of:
 - Color: 1280x1024x10
 - Monochrome: 1280x1024x1
- High-resolution, flicker-free monitors, choice of:
 - 20" monochrome, near-flat screen
 - 19" color, near-flat screen
- Tightly-coupled graphics architecture employs a 32-bit wide bus:
 - Optimal bit-mapped graphics and multi-windowing performance
- Standard MIT distribution of X11 r3
- X Server, Xlib, X Toolkit, X Clients
- Future support for OSF/Motif

External Mass Storage/Tape Back-Up

- External peripheral housing holds up to three 5.25" half-height devices
- Up to seven SCSI devices total can be supported in a maximum of three towers
- 322 MB Winchester 5.25" full-height SCSI (one drive per housing)

- 179 MB Winchester 5.25" half-height SCSI
- 150 MB QIC cartridge tape 5.25" half-height SCSI

Customer Environment/Use Characteristics

- Customer-installable and -maintainable
- Customer-installable add-on memory and peripherals
- 40db (quiet office) noise levels
- One-year, mail-in warranty on all systems

Communications

- Ethernet controller (without transceiver or drop cable)
- Thick or thin net transceivers available
- Async RS232C/422 interface (150 – 19,600 baud)
- Centronics/Data Products compatible line printer port

Description

The AViiON 300 Series Workstation offers true 32-bit standalone or distributed computing capabilities for single-user color or monochrome applications. The systems are designed around a single system board containing the 88100 processor chip with floating point, two 88200 Cache and Memory Management Units (CMMU) for data and instruction bus (M-Bus), the industry-standard SCSI bus (Small Computer System Interface), and tightly-coupled graphics processing.

The power and performance of a mainframe is offered in an extremely small, compact package: the main system board housing is only 16"x16"x2.5" high and the monitor sits on top of the CPU housing. This compact design fits in well with today's limited office space, yet offers customers unparalleled performance.

Four basic configurations are available: a monochrome or color system with memory and a choice of either 16.67 MHz or 20 MHz system clock. The system board can accommodate up to seven memory modules for a total 28 MB of main memory.

88K Architecture

The AViiON 300 Series is based on the 88000 series of RISC processors from Motorola. The 88000 series is comprised of the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. The 88000 series represents a major advance in RISC architecture with:

- Independent on-chip functional units, including floating point processor
- A dual-bus architecture that features integrated cache/MMU chips with expandable cache size
- A multiprocessor architecture

The 88100 RISC CPU includes special processing units: an integer processor, a floating point adder, and a floating point multiplier, which greatly increases the floating point performance through the use of parallel data paths. In addition, the design features an advanced, flexible pipeline architecture for improved performance.

The 88000 uses a combined, dual-bus cache and MMU for both the instruction and data bus. The dual-bus structure eliminates contention between instruction fetches and data loads/stores. The CMMU chips are designed to keep the RISC processor fed, providing single-cycle access to fast memory. The caches can run at processor speed, feeding the CPU a new instruction each cycle.

The CMMUs were designed for multiprocessing with both write-through and copy-back caching modes. To maintain multiple cache coherency, the chips each implement a "snooping" bus protocol that detects system bus writes or reads to a modified item in its cache. The unit will then update its cached item or main memory to insure that no processor is relying on stale data.

System Board

The AViiON 300 Series Workstation system board consists of a single 16"x16" multilayer PCB which includes the following:

- Either 16.67 or 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- Closely-coupled, integrated floating point unit
- Seven connectors capable of holding up to seven 4 MB memory modules
- Industry-standard SCSI interface for connecting peripherals such as disk and tape
- Industry-standard 802.3 Ethernet interface (without transceiver)
- Keyboard interface: AT-compatible or Japanese AX-compatible
- Mouse interface
- Color or monochrome graphics controller with up to 4 MB of display memory on the color unit
- Single, asynchronous interface: RS232 or RS422 with full modem support
- Parallel line printer interface (Centronics or Data Products)
- Time-of-boot clock and calendar
- Power-up diagnostics and auto netboot

Peripherals

An external SCSI bus connects mass storage devices. The SCSI bus exits the rear of the unit and terminates in a 50-pin DB connector. SCSI is an existing industry standard

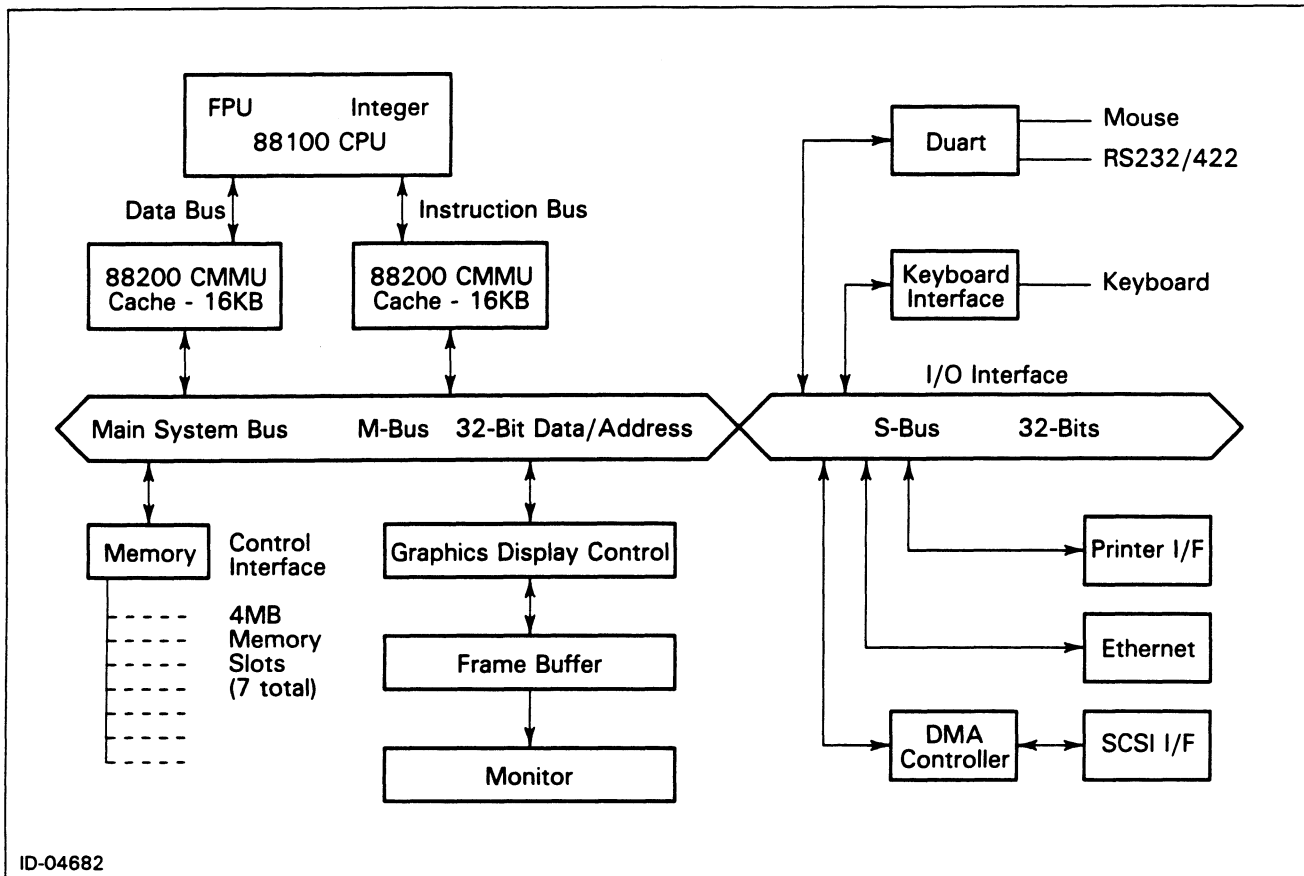


Figure 1. AViiON 300 Series Workstation system board.

for small computers. It features an 8-bit bus with parallel transfer of data and address information.

All Data General peripherals for the AViiON 300 Series Workstation will be mounted in a desktop peripheral housing which can accommodate a variety of storage and backup options. These options include:

- 322 MB 5.25" full-height Winchester disk with 16 ms access time
- 5.25" half-height 150 MB cartridge
- Tape drive conforming to the QIC 150 industry standard
- 179 MB 5.25" half-height Winchester disk with 18 ms access time

Each peripheral housing can accommodate one full-height and one half-height units or three half-height units. The SCSI bus has a maximum cable length of 6 meters and will support configurations of up to 3 housings per workstation. The housing contains an 125 watt power supply, internal fan, internal cabling, and SCSI bus terminator.

Graphics Hardware

Graphics hardware for the AViiON 300 Series Workstation consists of a monochrome or a color controller integrated on the main system board. Both connect directly to the M-bus for maximum performance. The monochrome unit includes the following:

- NEC uPD72120 Advanced Graphics Display Controller
- Eight 256K video RAMS
- RS343A monitor interface
- Video timing logic
- Addressable resolution of 1638 horizontal by 1024 vertical
- Viewable resolution of 1280x1024 with 614x1024 used for off-screen storage of fonts or menus

The color unit consists of a special high-density gate array for the display and control of the video display. The color unit includes the following:

- Eight 256K dual-ported video RAMS
- Optional 4 MB of standard RAM memory for support of the Japanese character set in off-screen video memory
- Video timing logic
- Color look-up table (LUT) for 256 displayable colors from a palette of 16.7 million combinations
- Addressable resolution of 1280x1536x8x2
- 2 bits of overlay

Japanese Language Versions

Both the color and monochrome units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard and the ability to add an additional 4 Mbits of memory on the monochrome controller, the AViiON 300 Series Workstation will allow customers to utilize the workstation for Japanese language applications and environments.

Market Summary

Market Definition

The single-user graphics workstation market is broken down into four broad categories based on the type of system and the level of performance required.

Entry-level systems:

- 32-bit PC or 32-bit workstation: 1 to 2 MIPS, less than .5 MFLOP
- Desktop system: \$5,000 to \$15,000 price range (qty 1)
- Simple graphics performance and limited configuration
- Apple MAC II, IBM PS/2 Model 80, Sun 386i, Sun 3/50, Apollo 3000

Mid-range systems:

- Traditional 32-bit workstations: 3 to 7 MIPS, .5 to 1 MFLOP
- Deskside or desktop systems: \$15,000 to \$50,000 price range
- Graphics performance better than low-end
- Apollo, Sun, DEC, HP, IBM, Silicon Graphics

High-end systems:

- Superworkstation: 8 to 14 MIPS, 1 to 9 MFLOPS
- Deskside systems: \$40,000 to \$80,000

- Systems built around RISC or proprietary CPUs with very expensive, very high performance 3D graphics. These systems offer greater flexibility in disk, memory, and backup options: Silicon Graphics GT series, SUN CXP, Apollo Prism, DEC VAXstation 8000, HP 835SRX.

Very high-end systems:

- Graphics supercomputers: 10+ MIPS
- Deskside system: \$100,000+
- Superminicomputer with integral graphics and very high floating point performance
- Ardent, Stellar, Alliant

As can be seen, the AViiON 300 Series Workstation, based on CPU and floating point *performance* alone, will be positioned against the *high end of the workstation market*. In terms of *price*, the workstation will compete in the *entry-level range*.

Market Trends

The overall market trend is declining prices and increased performance. Based on projections from both IDC and Dataquest, PC-based workstations or 32-bit traditional technical workstations with PC functionality and pricing will become the dominant workstation in the 1990s. The greatest growth will occur in the under \$20,000 workstation market (table 1).

<i>Workstation Category</i>	<i>Price</i>	<i>Percent of Annual Unit shipments</i>
Low-end (desktop)	Less than \$10K	69%
Mid-range	\$10K - \$40K	24%
High-end	more than \$40K	7%

Table 1. 1992 workstation market (IDC, 3/88).

Competition

The primary competition will, at first, be Sun and DEC, which together control almost 60% of the worldwide workstation market. In fact, Digital is expected to ship 54,000 workstations in 1988 (currently 5,000 per month), worth \$1.3 billion in revenues or over 10% of DEC's sales for calendar 1988 (CSN, 9/26/88).

Without a significant presence in the workstation market, Data General will face a formidable challenge in breaking

into the market at this date. The strength that we will initially bring to bear will be the superior price/performance of the AViiON 300 Series Workstation and the clear advantages of DG/UX Revision 4.1.

The overall trend within both the PC and workstation market has been blurring the distinction between the high-end PC and entry-level workstation. In the future, PCs will achieve greater performance from the advances in microprocessor technology, while the traditional workstations running UNIX will become easier for non-technical users to operate. With the AViiON 300 Series Workstation, Data General will be merging the pricing and packaging of the PC with the power and functionality of the traditional workstation. Long-term, DEC, IBM, and HP will be the competition to beat.

DEC

As Digital strengthens its position in the technical market, users with existing installations of VAX systems and networks will view DEC as one of the prime choices for workstations. The introduction of the DECstation 3100 (based on the R2000 RISC system from MIPS Computer) has marked Digital's entry into the mainstream for the workstation market. The extremely aggressive pricing (for DEC), performance beyond any VAX-based system, and what appears to be a coherent strategy, has marked Digital's emergence as a force to content with.

HP

HP continues to make advances even though they entered the market late, moved to a new architecture (RISC), and market workstations utilizing different technologies (68020/30 and RISC). From less than 1% market share in 1984, HP has captured 11% - 12% of the total workstation market. Especially at the high end of the market, HP's technology, sales strategy, market presence, and customer loyalty have made them a strong competitor.

Summary

Table 2 lists the current market leaders within the workstation market. Table 3 summarizes current (March 1989) monochrome desktop workstations; table 4, color desktop workstations.

<i>Vendor</i>	<i>Percent of 1987 Market Share (IDC, 8/88)</i>
Sun	28.9
DEC	20.3
Apollo	21.2
HP	11.5
Silicon Graphics	4.2
IBM	3.9

Table 2. Worldwide workstation market share by units (1987).

For more information on competitive products, please check Compete.

Configurations/Ordering

The AViiON 300 Series Workstations will be offered as base components, as packaged systems with or without peripherals, or as server configurations. This will allow customers more flexibility in configurations and ordering.

In addition, the open architecture design of the workstations allows customers to utilize existing keyboards and external peripherals which are compatible with the different industry standards supported. The keyboard controller will support either AT-compatible or Japanese AX-compatible keyboard, and the SCSI interface will support SCSI compatible peripherals (while Data General makes an effort to check the operation of as many keyboards and peripherals as possible, it is important to recognize that we cannot check every model).

Ordering

For ordering on DG/UX 4.1, please refer to the MAPS/PLUS article for DG/UX 4.1.

To order workstations:

1. Select the package that best fits your needs. Add the appropriate suffix for font and power.
2. Each license must be itemized on the Program License Schedule 501 and purchase order.
3. Order appropriate software distribution and services packages.

A transceiver (Model 4540, 4540-A or 4619) and drop cable (Model 1329) **must be** ordered for each workstation to be connected to Ethernet (see table 9).

For additional information, see the Price Book (MAPS/PLUS Volume IV).

AVX

Vendor Model	Sun SPARCstation 1	Apollo DN3500	DEC 3100	HP 360M	IBM RT/PC	DGC AUX 300
MIPS	12.5	4	14	4	6	17
Monitor size	17	19	19	19	17	19
Resolution	1152x900	1280x1024	1024x864	1024x768	1024x768	1280x1024
Memory:						
Minimum:	8	4	4	4	4	4
Maximum:	16	8	24	32	32	28
4 MB expansion	NA	\$ 3250	\$ 3000	\$ 4000	\$ 3750	
List price	\$8995	\$12240	\$12900	\$14400	\$20011	
Price/MIP	\$ 720	\$ 3060	\$ 921	\$ 3600	\$ 3335	

Table 3. Sample of monochrome desktop workstations (April 1989).

Vendor Model	Sun SPARCstation 1	Apollo DN3500	DEC 3100	HP 360M	IBM RT/PC	DGC Color AUX 3000
MIPS	12.5	4	14	2	2	17
Monitor size	16	15	19	16	12	19
Resolution	1152x900	1024x800	1024x864	1024x768	640x480	1280x1024
Color planes	8	8	4	8	4	8
Memory:						
Minimum:	8	4	4	4	1	4
Maximum:	16	8	6	16	16	28
4 MB expansion	NA	\$ 3250	\$ 3000	\$ 3000	\$ 2790	
List price	\$12495	\$15640	\$17900	\$28000	\$27911	
Price/MIP	\$ 999	\$ 3910	\$ 1278	\$ 6783	\$ 4356	

Table 4. Sample of color desktop workstations (April 1989).

The **base packages** consist of the base system board and a base chassis without monitor, keyboard, or mouse.

Each base package includes the following:

- Either a 16.67 MHz or 20 MHz system board
- 4 or 8 MB of main memory
- Integral industry-standard Ethernet LAN interface (IEEE 802.3)
- Industry-standard Small Computer Standard Interface (SCSI) for high-performance I/O
- One RS232C/422 async port with full modem control
- One parallel printer port (Centronix/Data Products compatible)
- Chassis and power supply

The **base packages**, listed in table 5, do not include a monitor, keyboard, or mouse.

OR DISK
=

Model	Description
70000	Base Unit 16 MHz - Mono 4 MB
70001	Base Unit 16 MHz - Color 4 MB
70002	Base Unit 16 MHz - Mono 8 MB
70003	Base Unit 16 MHz - Color 8 MB
70004	Base Unit 20 MHz - Mono 4 MB
70005	Base Unit 20 MHz - Color 4 MB
70006	Base Unit 20 MHz - Mono 8 MB
70007	Base Unit 20 MHz - Color 8 MB
70008	Japanese 16 MHz - Mono 4 MB
70009	Japanese 16 MHz - Color 4 MB
700010	Japanese 20 MHz - Mono 4 MB
700011	Japanese 20 MHz - Color 4 MB

Table 5. Model numbers for base packages without keyboard, mouse, or monitor.

The **packaged systems**, listed in tables 6 and 7, consist of the base packages with included monitor, keyboard, and mouse (without peripherals) or with these plus 179 MB disk and 150 MB QIC tape.

Model	Description
70012	4 MB Mono System 16 MHz
70013	8 MB Mono System 16 MHz
70014	8 MB Color System 16 MHz
70015	8 MB Mono System 20 MHz
70016	8 MB Color System 20 MHz
70017	Japanese 8 MB Mono 16 MHz
70018	Japanese 8 MB Color 16 MHz
70019	Japanese 8 MB Color 20 MHz
70020	Japanese 8 MB Color 20 MHz

Table 6. Model numbers for packaged systems with monitor, keyboard, and mouse.

Model	Description
70021	8 MB Mono System 16 MHz
70022	8 MB Color System 16 MHz
70023	8 MB Mono System 20 MHz
70024	8 MB Color System 20 MHz
70025	Japanese 8 MB Mono MHz
70026	Japanese 8 MB Color 16 MHz
70027	Japanese 8 MB Mono 20 MHz
70028	Japanese 8 MB Color 20 MHz

Table 7. Model numbers for packaged systems with monitor, keyboard, mouse, and peripherals: 179 MB disk and 150 MB tape in desktop housing.

A special configuration of an AViiON workstation can function as a server to up to five other AViiON workstations. Table 8 lists the model numbers for the **server configuration** of a 20 MHz workstation with 12 MB memory. This system includes a disk and 150 MB tape in peripherals housing. It does not include a monitor, keyboard, or mouse. Instead, a separate ANSI system console - DASHER D214 or newer - must be ordered.

Model	Description
70029	Server Config. - 12 MB, 179 MB
70030	Server Config. - 12 MB, 322 MB

NO MONITOR
KEYBOARD
OR MOUSE

Table 8. Model numbers for server configurations.

Model	Description
4540	Ethernet transceiver for connecting to standard Ethernet cable. Requires drop cable for connecting from the back of the system to the transceiver (Model 1329).
4540-A	Ethernet transceiver for connecting to Thin Ethernet cable. Requires drop cable for connecting from the back of the system to the transceiver (Model 1329).
4619	8-port Ethernet transceiver for connecting up to 8 Ethernet drop cables.
1326	5-foot Ethernet drop cable for connecting workstation to transceiver.

Table 9. Model numbers for transceivers and drop cables for Ethernet connection.

Options

Table 10 lists model numbers for options and table 11, for cables. Table 12 lists language suffices for keyboards.

<i>Model</i>	<i>Description</i>
7000	4 MB Add-on Memory Module
6486	20" Monochrome Monitor
6487	19" Color Monitor
6488	Keyboard
4512	Mouse
10565	Desktop Peripheral Housing*
6600	179 MB Disk in Housing*
6601	322 MB Disk in Housing*
6602	150 MB Tape in Housing*
6603	179 Disk/Tape in Housing*
6604	322 Disk/Tape in Housing*
6577-E	150 MB Tape - Add-on
6491-E	322 MB Disk - Add-on
4540	Ethernet Transceiver
4540-A	Thinnet Ethernet Transceiver
4619	Eight Port Ethernet Transceiver
1326	Ethernet Drop Cable - 5 meter

*Does not include cables. See table 11.

Table 10. Model numbers for options.

<i>Model</i>	<i>Description</i>
<i>CPU to Peripheral Housing</i>	
15324E005 - 5'	(005-33000)
15324E010 - 10'	(005-33001)
15324E015 - 15'	(005-33345)
<i>Peripheral Housing Daisy Chain Cable</i>	
15325E001 - 1.3'	(005-33003)
15325E005 - 5'	(005-33004)
15325E010 - 10'	(005-33005)

Table 11. Model numbers for cables.

<i>Suffix</i>	<i>Country</i>
-A	US
-B	UK
-C	French
-D	German
-E	Japanese AX-compatible* (available only on the Japanese models)
-G	Spanish
-I	Italian
-Y	Swiss
-Z	Swedish

*AX is the international standard for the Japanese language.

Table 12. Language suffices for keyboards.

Related Information

See table 13.

<i>Order No.</i>	<i>Title</i>
046-001013	DG/UX 4.10 MAPS/PLUS article, page 301-12.3
046-001191	AViiON Server Systems, page 202-13
046-001196	VME Communications Controllers, page 271-113
046-001139	Green Hills Compilers MAPS/PLUS article, page 320-77
046-000924	AViiON Mass Storage MAPS/PLUS article, page 239-29
046-000848-03	DG/UX TCP/IP MAPS/PLUS article, page 330-15
014-001800-00	Programming AViiON 300 Series System Board
014-001801-00	Setting Up and Starting AViiON 300 Series Station
014-001802-00	Using the AViiON System Control Monitor
014-001803-00	Maintaining AViiON 300 Series Stations
014-001722-00	Installing Your Half-Height Winchester Disk Drive
014-001808-00	MC88200 User's Manual, Cache Memory/Management Unit
014-001809-00	MC88100 User's Manual, Reduced Instruction Set Compare
014-001810-00	Installing and Maintaining Mass Storage Subsystems
012-003496-01	AViiON Workstations product brief

Table 13. Related publications.



AViiON 5200+/6200 Servers

Fact Sheet

This revision reflects added connectivity (AV5200+) and raised mass storage maximums (both systems).

AViiON 5200+ and AV6200 systems are Data General's answer for customers looking for UNIX based servers and multi-user applications. With its compact office packaging, the 5200+ system is ideally suited as a low cost entry system for environments with 30 or more users. The 6200 system provides flexible rackmount packaging for larger applications. These systems utilize Motorola's 88100 RISC microprocessors in single, dual, and quad configurations.

These systems are an outstanding investment for customers. Simple, quick upgrades are available that can increase system capacities within minutes for growing applications. Data General's symmetrical, multi-processing DG/UX operating system allows applications equal access to hardware resources. If customer applications need large disk and memory capacities, the resources are available in the AV 5200+ and AV 6200 systems.

- Industry-leading CMOS RISC technology
- Choice of Single, dual, or quad 25 MHz Motorola 88100 CPUs:
 - Field upgradeable from single to dual to quad
- Single- and double-precision IEEE hardware FPU
- Two Motorola 8820X memory management/cache chips per CPU
 - separate data and instruction ports (full Harvard architecture)
 - 4-way, set-associative caches
 - 88200 16 KB cache on single
 - 88204 64 KB cache with dual and quad
- Up to 832 MB of ECC memory
- 10-slot or 20-slot industry-standard VME bus for I/O:
 - Industry-standard Revision C.1
 - 25 MB/sec block transfers sustained
 - Full hardware cache coherency
 - 4 levels of bus arbitration
 - 7 levels of interrupt
- High-speed bus between CPU and memory:
 - VME/Motorola MBus superset bussed to 5 backplane slots
 - 4 byte/cycle peak transfer rate (100 MB/sec at 25 MHz)

- DG/UX operating system:
 - Symmetrical multiprocessing
 - Robust file system and medium-term scheduler
 - Complies with 88open, POSIX, SVID 2, and other standards
- Also available in AV 7000, AV 8000 packaged systems
- Machine-initiated service call (dual and quad CPU servers)

AViiON servers:	5200+	6200	6200-20
Packaging	Office	Rackmt.	Rackmt.
VME slots	10	10	20
Max. Memory	576 MB	832 MB	832 MB
Asynchronous connects (VDA/VDC) max.	1020	1275	1275
Asynchronous connects (VAC/16) max.	32	16	0
Ethernet LAN VTC max.**	2/4	2/6	8
Synch. boards/ports	4/16	6/24	12/48
Max. disk capacity:*			
Integral	4.2 GB	N/A	N/A
External	39.7 GB	60.0 GB	134.0 GB
Max. cartridge tapes (150 MB)	4	4	4
Max. reel-to-reel tapes	4	4	4
*Disk array maximums are lower			
**2 VLC max.			

Description

Overview

AViiON Servers can be configured to address a wide range of applications implemented in multi-user systems or network server models. AV 5200+, AV 6200 and 6200-20 Series systems generally support 30 to 400 asynchronous users in typical commercial applications. This is only an estimate, however; appropriate user counts will vary greatly by application.

As servers, these systems provide file and compute resources for AViiON workstations, X-windows terminals, and DASHER/386 systems distributed across a local area network. Configured for multi-user applications, they can connect up to 1020 (AV 5200+) or 1275 (AV 6200, 6200-20) asynchronous devices through VME distributed async host adapters and cluster controllers.

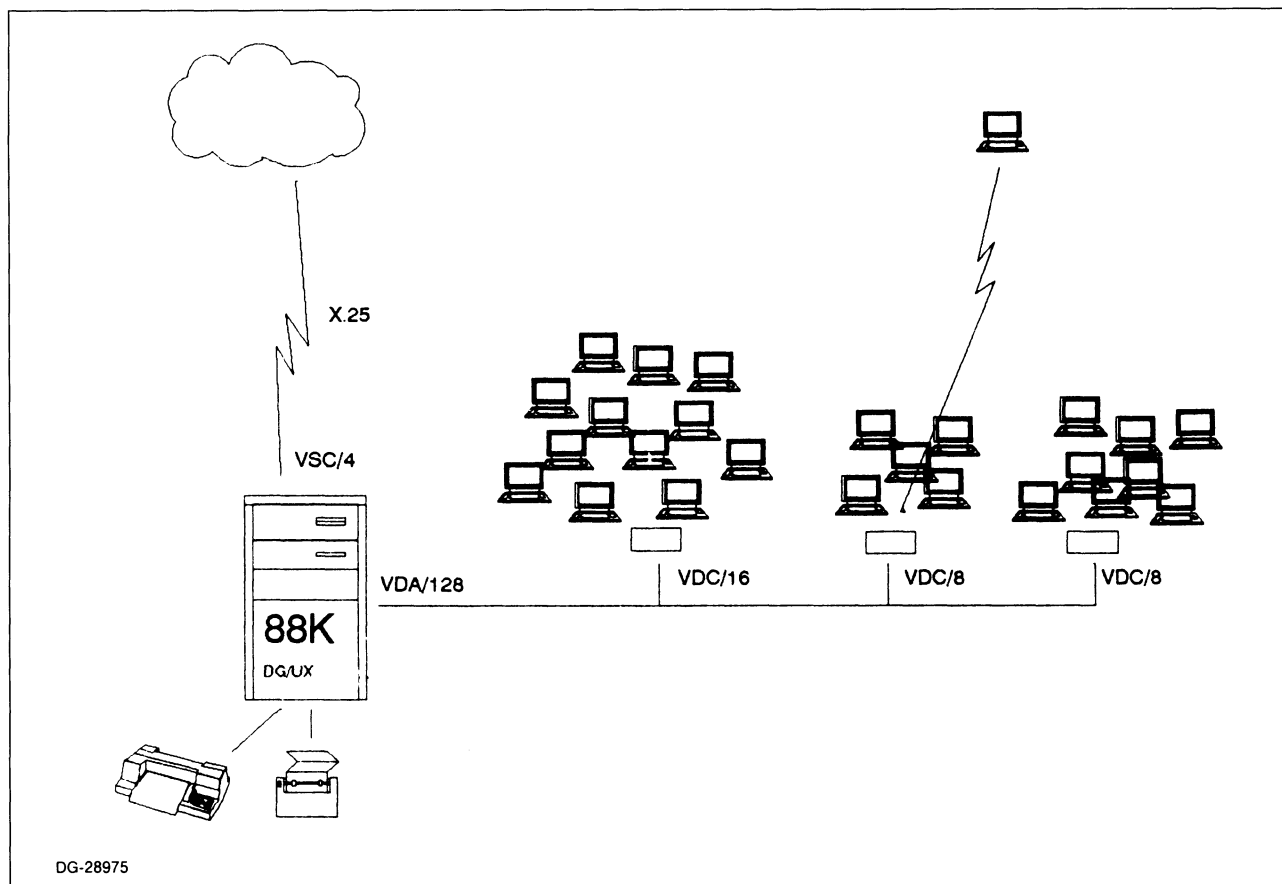


Figure 1. AViiON multi-user system configuration.

Industry-standard AViiON Server Systems offer customers superior price/performance in systems which are both configurable and balanced. Mass storage subsystems meet a range of user capacity and cost requirements, while providing high-performance I/O. The many configuration choices—single- or dual-processor, rackmount or office packaging—match the needs of many different customers.

AViiON system design is oriented towards performance; the Motorola 88000 chip set has a highly pipelined architecture, fast instruction execution, and integrated floating point. Equally important, the chip set architecture provides for multiprocessing (figure 3) so that customers can increase CPU performance with only a board swap.

The performance orientation of the AViiON systems carries through to the selection of peripherals and controller boards. For example, the mass storage controllers selected for the AV 5000 and AV 6000 Series are among the highest speed

available: they transfer data to the CPU and memory across an industry-standard 40 MB/sec VME bus.

CPU

The AViiON Server CPU is the Motorola 88100, Implemented with Motorola's HCMOS technology, the MC88100 incorporates 32-bit registers, data paths, and addresses. Because of the importance of maintaining a filled pipeline in RISC processors, the MC88100 incorporates *four independent execution units* (integer, floating point, data, and instruction) which operate independently and concurrently. Data memory accesses are performed by the data unit while instruction prefetches are handled by the instruction unit.

A *common register file* provides data sharing and synchronization control among the register units through register scoreboarding.

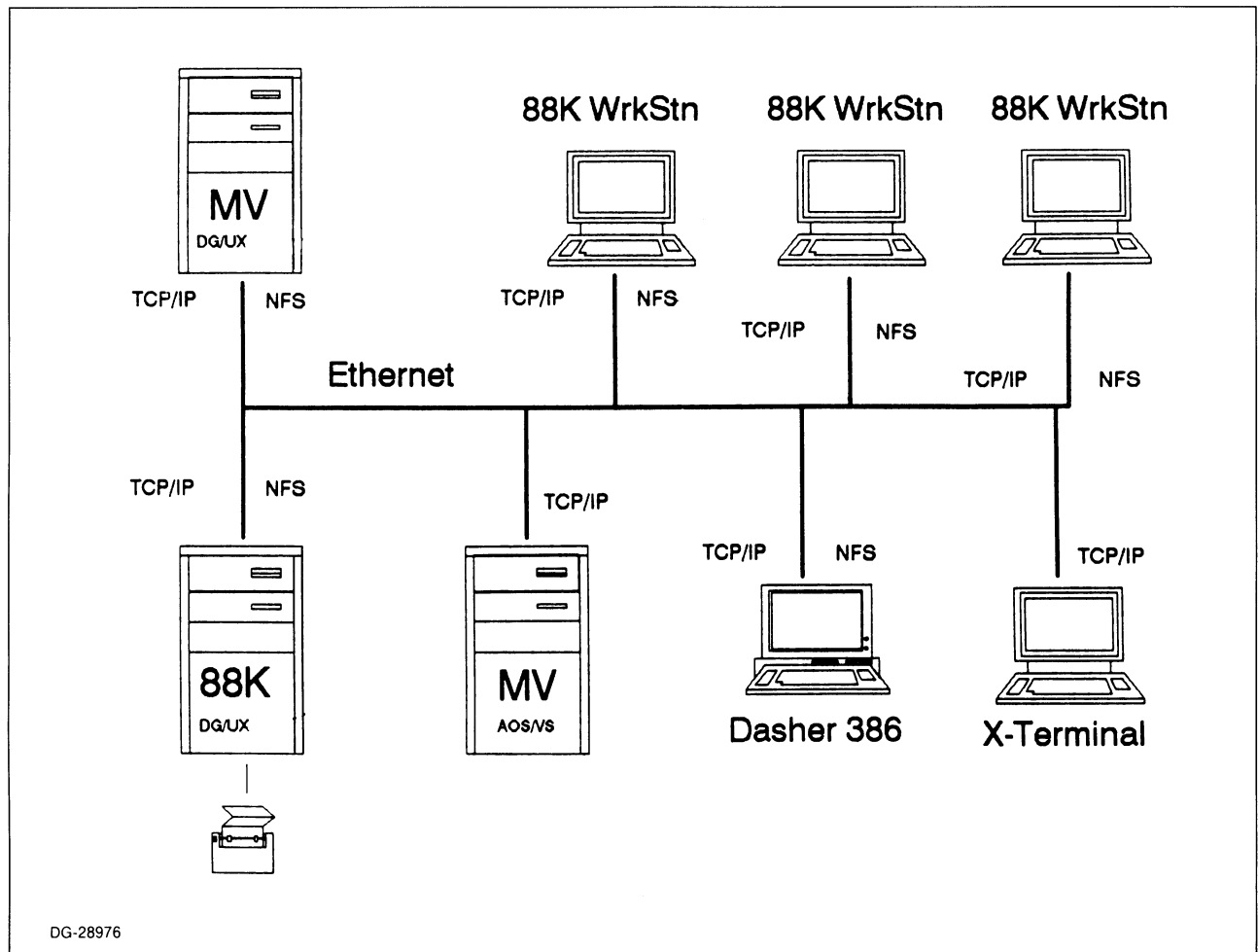


Figure 2. AViiON Network Server configuration.

IEEE P754 *floating point arithmetic* is fully supported by the processor's hardware which includes a 32-bit combinatorial multiplier. The FPU implements two pipelines: one for multiply instructions (6 stages) and one for all other floating point instructions (5 stages).

Parallel operations and pipelining are integral elements of the MC88100 design. The four execution units allow the MC88100 to perform up to five operations in parallel (figure 4):

- Access program memory
- Execute an arithmetic, logical, or bit-field instruction
- Access data memory
- Execute floating point or integer divide instructions
- Execute floating point or integer multiply instructions

In addition, the floating point, data, and instruction units themselves are pipelined and can complete an operation in every clock cycle:

- Up to five floating point add, subtract, compare, or convert instructions can execute simultaneously
- Up to six floating point or four integer multiply instructions execute simultaneously
- Up to three data memory accesses can be in progress simultaneously:
 - Two memory accesses on the external bus
 - One address calculation
- Up to two instruction fetches can be in progress simultaneously

The MC88100 instruction set contains 51 instructions. All integer arithmetic, logical, and bit field instructions, and certain flow control instructions can execute in a single cycle. Figure 5 is the MC88100 programming model: figure 6, the MC88100 instruction set.

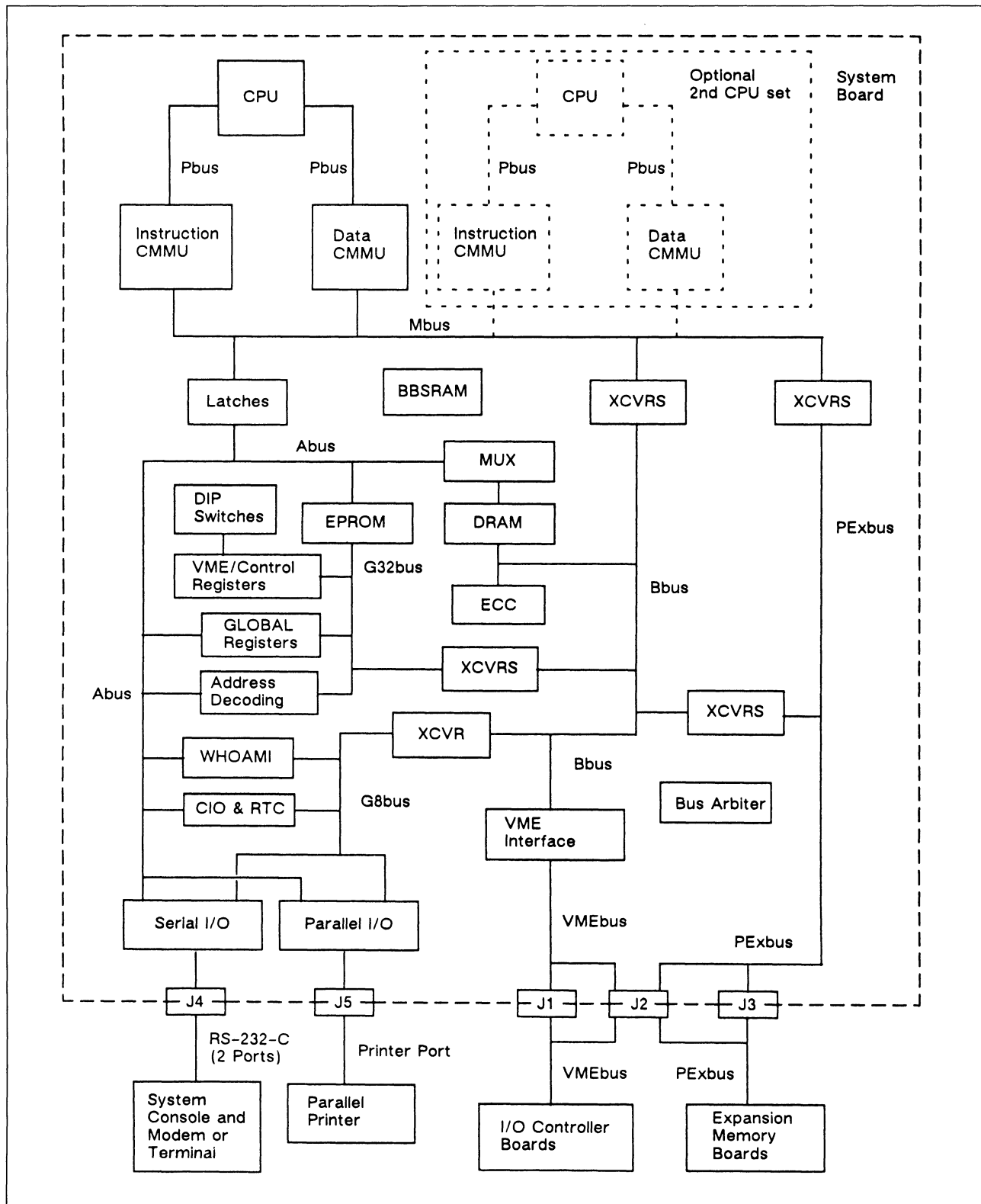


Figure 3. Single and dual system board architecture.

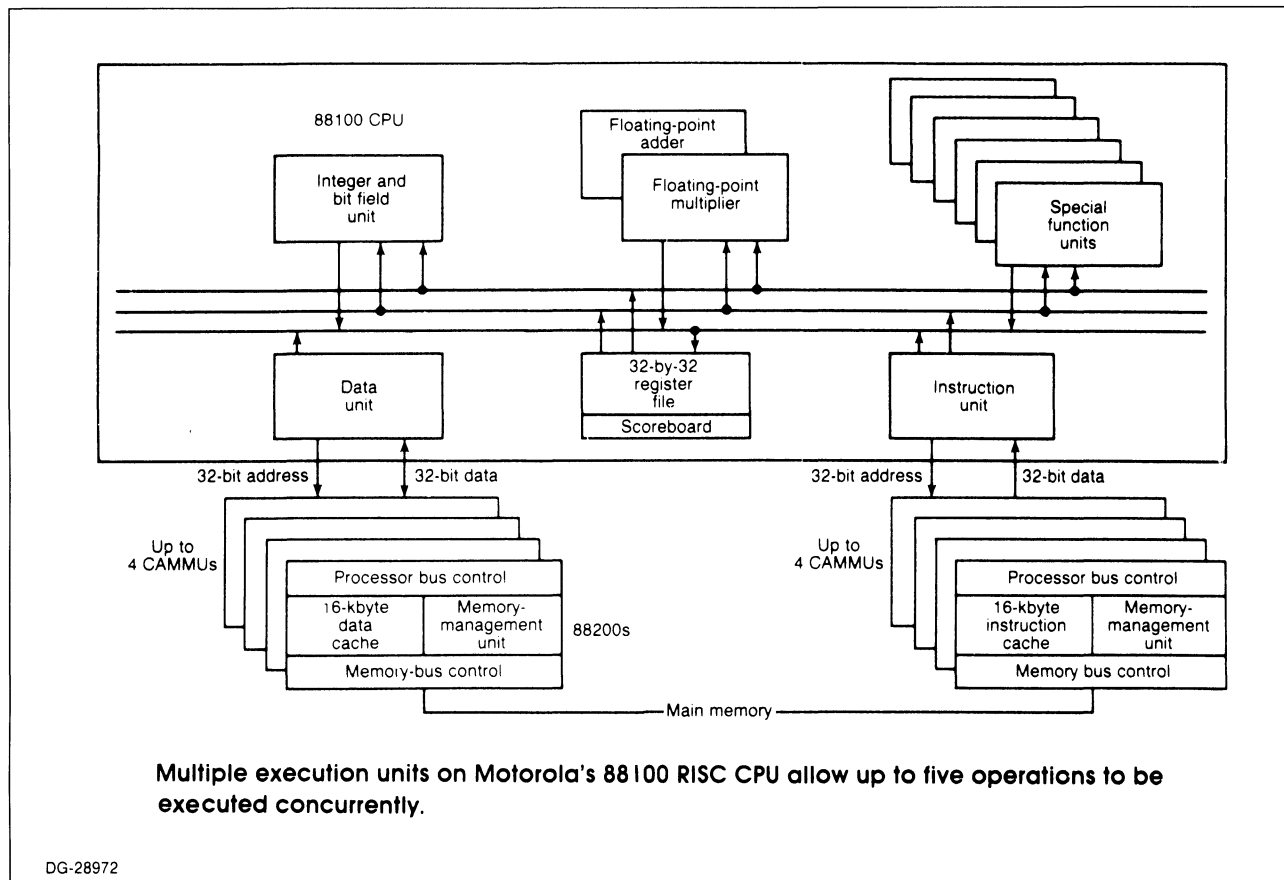


Figure 4. Concurrent execution of up to five operations.

The MC88100 uses a two-port, non-multiplexed memory access scheme (Harvard architecture). Transfers to and from the CMMU chips are performed through dedicated address and data paths; instruction fetches also take place over dedicated paths. These ports operate concurrently, eliminating bus contention between data accesses and instruction fetches.

Memory Management/Caching

The MC88200 (16 KB) and MC88204 (64 KB) CMMU are high-performance, HCMOS VLSI devices which provides zero-wait-state memory management and data caching. The MMU (memory management unit) supports a demand-paged, virtual memory environment with two logical address ranges (user/supervisor) of 4 GB each.

Translated addresses are provided by one of two ATCs (address translation caches), providing address translation in one clock cycle for most memory accesses. The PATC (page address translation cache) is a 56-entry, fully associative cache containing recently used translations for 4 KB memory pages and is maintained by MC88200 hardware. The BATC (block address translation cache) is a 10-entry

cache, loaded by software, containing translations for 512 KB memory blocks.

The CMMU data cache is a four-way, set-associative cache for instruction or data storage. The cache incorporates memory-update policies and cache coherency mechanisms that support multiprocessor applications. Each cache set employs an LRU (least recently used) replacement algorithm to allocate cache entries. The AViiON Server System maintains cache coherency through a copy-back mechanism.

Memory

The AViiON 5200+ and AV 6200 single processor system boards contain 16 MB of 100ns ECC memory. The ECC memory performs single-bit error correction and double-bit error detection. Dual processor boards are configured with 64 MB of memory utilizing 80ns 4Mbit DRAMS. The quad processor CPU board does not have any system memory as do the single and dual processor boards.

Up to 4 memory boards can be configured with the 5200+ and 6200 systems. These memory boards are available in 16MB, 32MB, 64MB, 128MB, and 192MB capacities (192MB available only on 6200 systems). 48MB boards are no longer available.

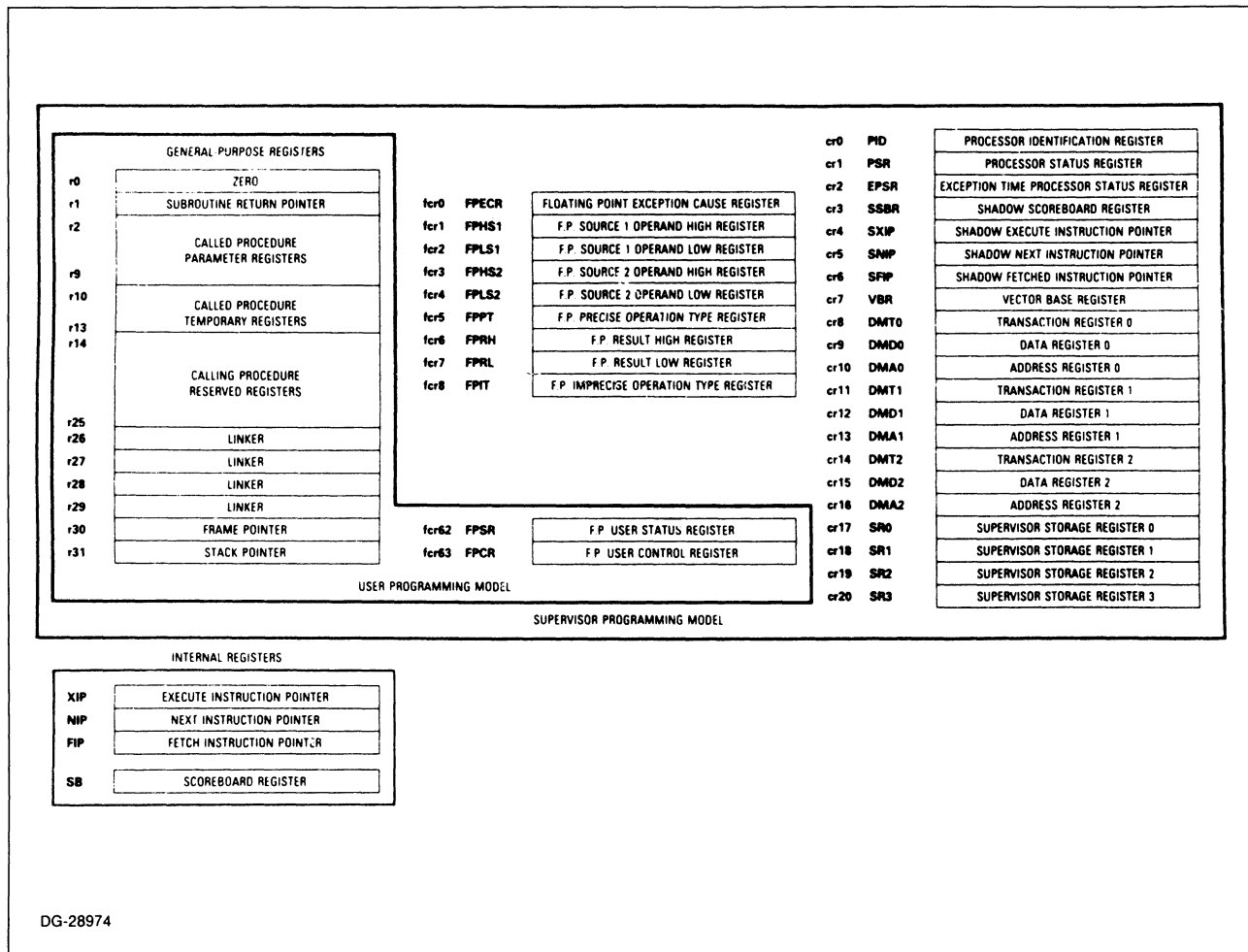


Figure 5. MC 88100 programming model.

Both the CPU board memory and the memory boards utilize ZIP packaging. The single CPU boards, the 16MB memory board, and the 32MB memory board utilize 1 Mbit DRAM's. The dual processor board, 64MB, 128MB, and 192MB memory boards use 4 Mbit chips. Memory is implemented in rows of 39 bits each with a 2:1 interleave factor.

CPU and memory boards are a 9U form factor and interface to the system's memory bus.

Bus Structure

Two busses provide paths for all communications between boards in the system.

The *VME bus* on AV 5200+, AV 6200 and 6200-20 Series systems is fully compliant electrically with Motorola's VME Bus Specification, Revision C.1. The VME bus is an industry-

standard 40 MB/sec bus which provides for data transfers between the system board and all controllers such as those for mass storage and communications. Data General's implementation of this bus incorporates high-performance features such as block transfers.

J1/J2 connectors are provided for all chassis slots to connect to standard P1/P2 connectors on Eurocard 6U form factor (233mm x 160mm) VME boards. For the 10-slot chassis, J3 connectors are provided for slots 1-6 and are reserved for the proprietary Pexbus. 9U form factor (400mm x 366mm) boards are also supported so long as they use VME standard signals on the J1/J2 connectors only. Since the slots themselves are all 9U form factor, an adapter is required to configure 6U boards. Such an adapter is included with all 6U form factor boards sold by Data General. Figure 7 displays 9U and 6U VME Eurocards.

Integer Arithmetic Instructions		Load/Store/Exchange Instructions	
Mnemonic	Description	Mnemonic	Description
add	Add	ld	Load Register from Memory
addu	Add Unsigned	lda	Load Address
cmp	Compare	ldcr	Load from Control Register
div	Divide	st	Store Register to Memory
divu	Divide Unsigned	stcr	Store to Control Register
mul	Multiply	xcr	Exchange Control Register
sub	Subtract	xmem	Exchange Register with Memory
subu	Subtract Unsigned		

Floating-Point Arithmetic Instructions		Flow-Control Instructions	
Mnemonic	Description	Mnemonic	Description
fadd	Floating-Point Add	bb0	Branch on Bit Clear
fcmp	Floating-Point Compare	bb1	Branch on Bit Set
fdiv	Floating-Point Divide	bcnd	Conditional Branch
fldcr	Load from Floating-Point Control Register	br	Unconditional Branch
flt	Convert Integer to Floating Point	bsr	Branch to Subroutine
fmul	Floating-Point Multiply	jmp	Unconditional Jump
fstcr	Store to Floating-Point Control Register	jsr	Jump to Subroutine
fsub	Floating-Point Subtract	rt	Return from Exception
fxcr	Exchange Floating-Point Control Register	tb0	Trap on Bit Clear
int	Round Floating-Point to Integer	tb1	Trap on Bit Set
nint	Round Floating-Point to Nearest Integer	tbnd	Trap on Bounds Check
trnc	Truncate Floating-Point to Integer	tcnd	Conditional Trap

Logical Instructions		Bit-Field Instructions	
Mnemonic	Description	Mnemonic	Description
and	AND	clr	Clear Bit Field
mask	Logical Mask Immediate	ext	Extract Signed Bit Field
or	OR	extu	Extract Unsigned Bit Field
xor	Exclusive OR	ff0	Find First Bit Clear
		ff1	Find First Bit Set
		mak	Make Bit Field
		rot	Rotate Register
		set	Set Bit Field

DG-28973

Figure 6. MC88100 instruction set.

Mechanically, in order for a 6U form factor board to mate with the DG 6U-9U adapter, it must operate without a front panel and that front panel must be user removable. This is the case with all the 6U VME boards sold by Data General and is the case with the large majority of third-party boards. It is a limitation of which the customer should be aware, however, should he intend to configure third-party VME bus products. More expensive third-party adapter products such as the Dawn Model #9U400/6U-1 (Dawn VME Products, 47073 Warm Springs Blvd., Fremont, CA 94539 (415/657-4444) do not have this limitation, but do violate the VME bus specification by extending by three inches the distance from a driver on the VME board to the backpanel. It should be noted that this mechanical discussion also applies to Sun Microsystems

VME-based systems and is, therefore, not unique to Data General.

The *Pexbus (buffered memory bus)* is also bussed to the backplane of slots 1 through 5 for communication between the system board and all system memory, on-board and expansion. *Pexbus utilizes not only J3/P3 but also user-defined pins on J2/P2. Therefore, third-party or custom boards using the user-defined pins on J2/P2 should be configured only in slots 7 and higher.* It is a superset of Motorola's Mbus used by the MC88200 cache chips to provide a high-speed data path to system memory. The Pexbus is not an industry standard and is used only by the system board and DGC expansion memory for the AV 5200+ and AV 6200 Series systems.

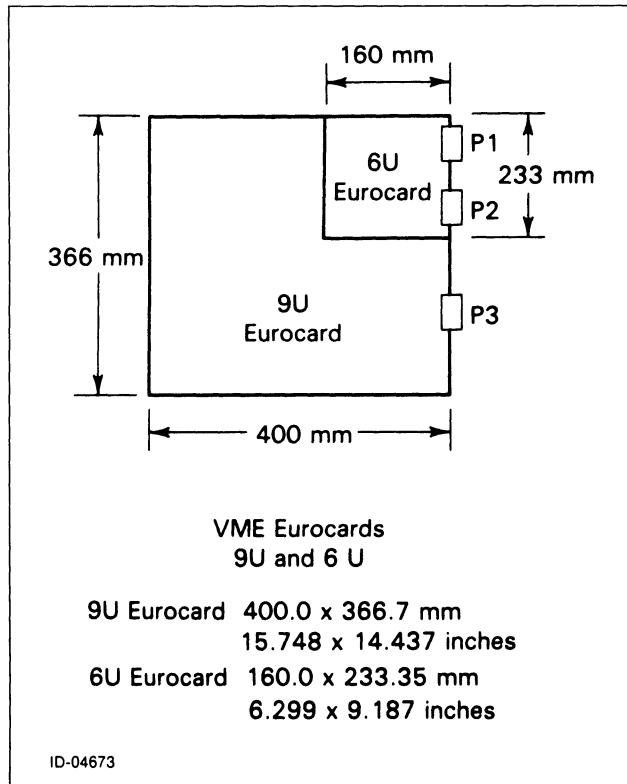


Figure 7. 9U and 6U VME Eurocards

DG/UX

DG/UX for RISC Systems is an advanced implementation of the UNIX Operating System based on USL's System V and the Berkeley Software Distribution (BSD) 4.3 operating systems, as well as the POSIX application interface standard. It also incorporates the 88open Binary Compatibility Standards and the X Windows standard among other industry, government, or de facto standards. DG/UX supports TCP/IP protocols for file transfer; remote disk access is provided by the Network File System (NFS).

DG/UX has many capabilities not generally available from other vendor: fully symmetric multiprocessing, an advanced file system with data security and recovery features, support for large file systems and files, a medium-term scheduler (for superior throughput and guaranteed forward response under heavy load), and enhanced error-reporting.

Packaging

Three packages are available: free-standing office (AV 5200+ Series), 10-slot rackmount (AV 6200 Series) and 20-slot rackmount (AV 6200-20 Series) (Figures 8, 9, 10).

The *office package* is an attractive 17.25" W x 24.75" H x 25.5" D caster-mounted, integrated system suitable for an office environment. In addition to the 10-slot card cage and a 750 watt power supply, the office system can incorporate up to three full-height 5.25" disks and up to three half-height 5.25" removable media devices such as the 525 MB QIC cartridge tape or 2 FH and 4 HH devices. Additional mass storage, such as a desktop reel-to-reel tapes, can be added externally.

The *10-slot rackmount chassis* incorporates the card cage with a 527 watt power supply in a NEMA-standard 14"-high chassis.

The *20-slot rackmount chassis* has a 1,080 W power supply in a Nema-standard, 28"-high chassis. It offers 15 VMEbus I/O-only slots for large AViiON system configurations. Four slots in the chassis can be used for memory expansion or for VMEbus I/O. All slots in the chassis have J1/J2/J3 connectors. The PEXbus runs through slots 1-5.

Communications

Asynchronous Communications

Three methods are provided to connect asynchronous devices to AV 5200+, AV 6200 and AV 6200-20 Systems. See the VME Communications Controllers MAPS article (page 271-113) for complete details.

For low-connect counts, up to 16 RS232 devices can be connected through the *VAC/16 (VME Asynchronous Controller/16)*. Each VAC/16 is a 6U form factor board. All sixteen lines are full duplex. The board has an aggregate maximum data rate of 16 x 19.2 KBPS full duplex. All 16 ports support modem connection.

A *TCP/IP Ethernet LAN based terminal server connection scheme* is available. Recommended configurability is for 30 active users on a single 25MHz 5200+/6200 and 60 active users on a dual processor 5220+/6220. Development work is planned to increase the number of active users that can connect to 5200+ and 6200 systems from Ethernet-based terminal servers. Terminal server connection is the strategic direction for connection of asynch users. AViiON systems in the future will have all users connected via LANs.

Also available is a *distributed asynchronous host adapter* solution. This host adapter allows the concentration of terminal hook-ups some distance from the rear bulkhead of the system via a single coax cable. This relieves cabling concentration problems at the rear of the bulkhead and also dramatically increases the number of connects per VME slot.

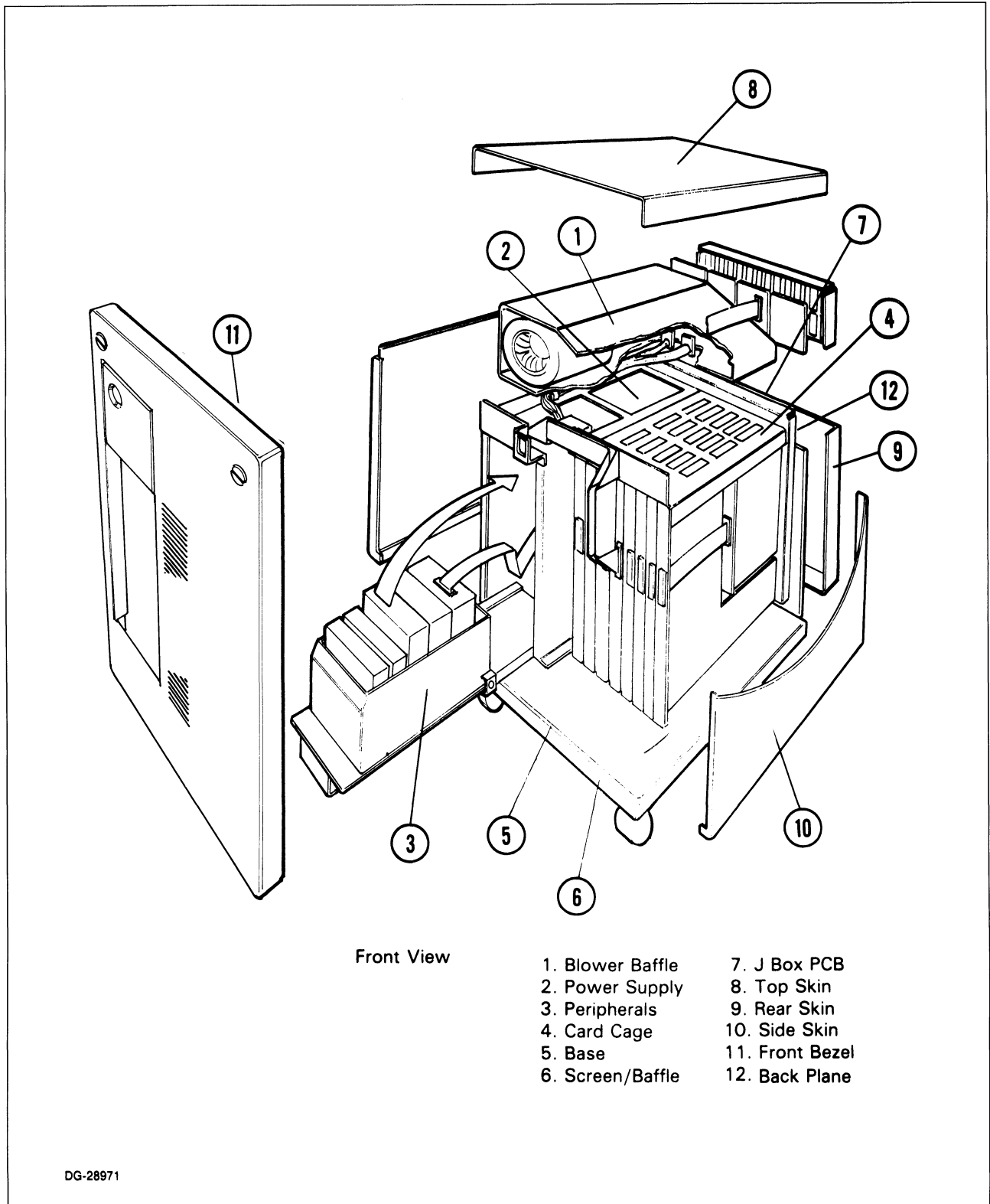


Figure 8. AV 5200+ office packaging.

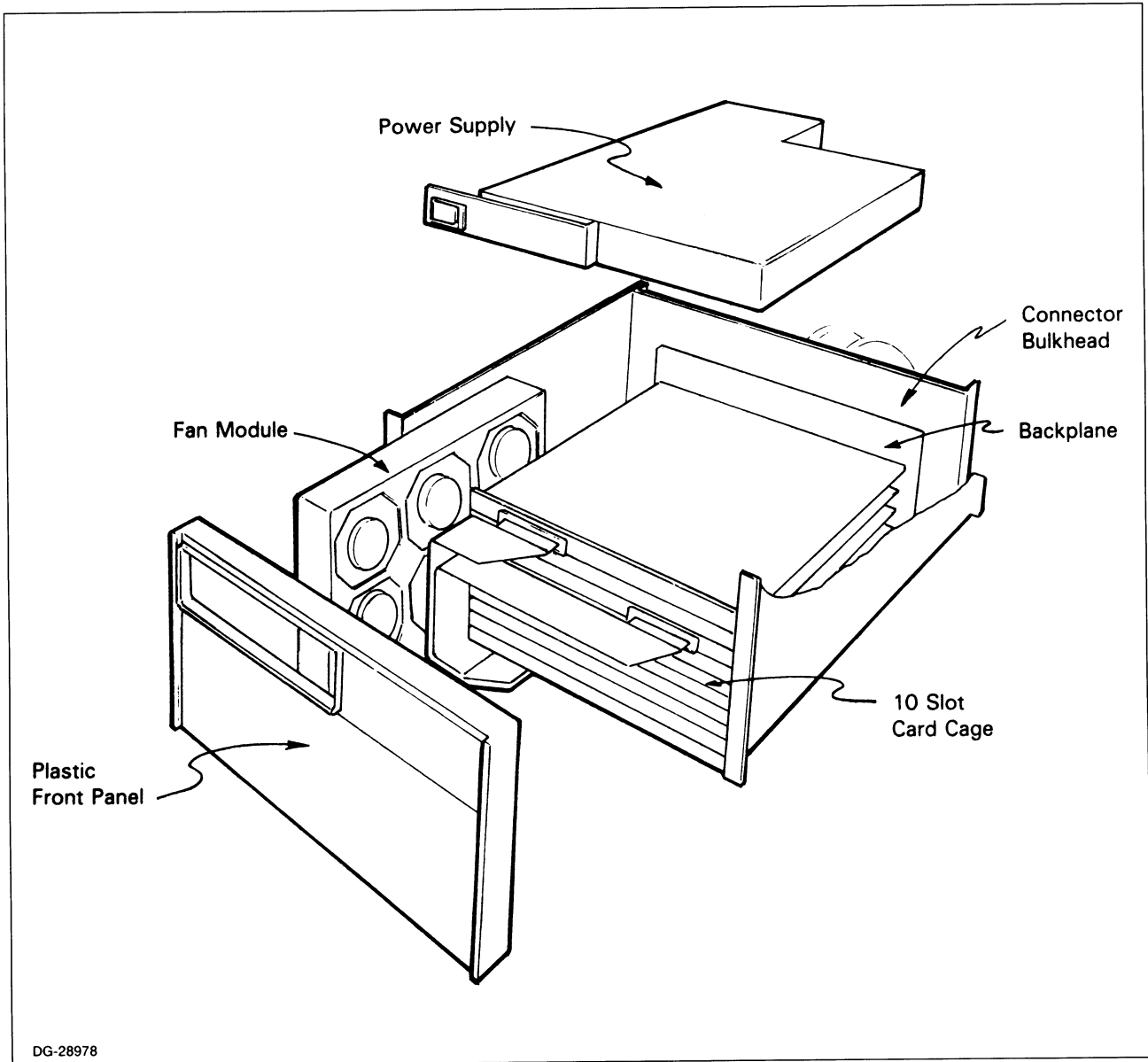


Figure 9. AV 6200 10-slot rackmount packaging.

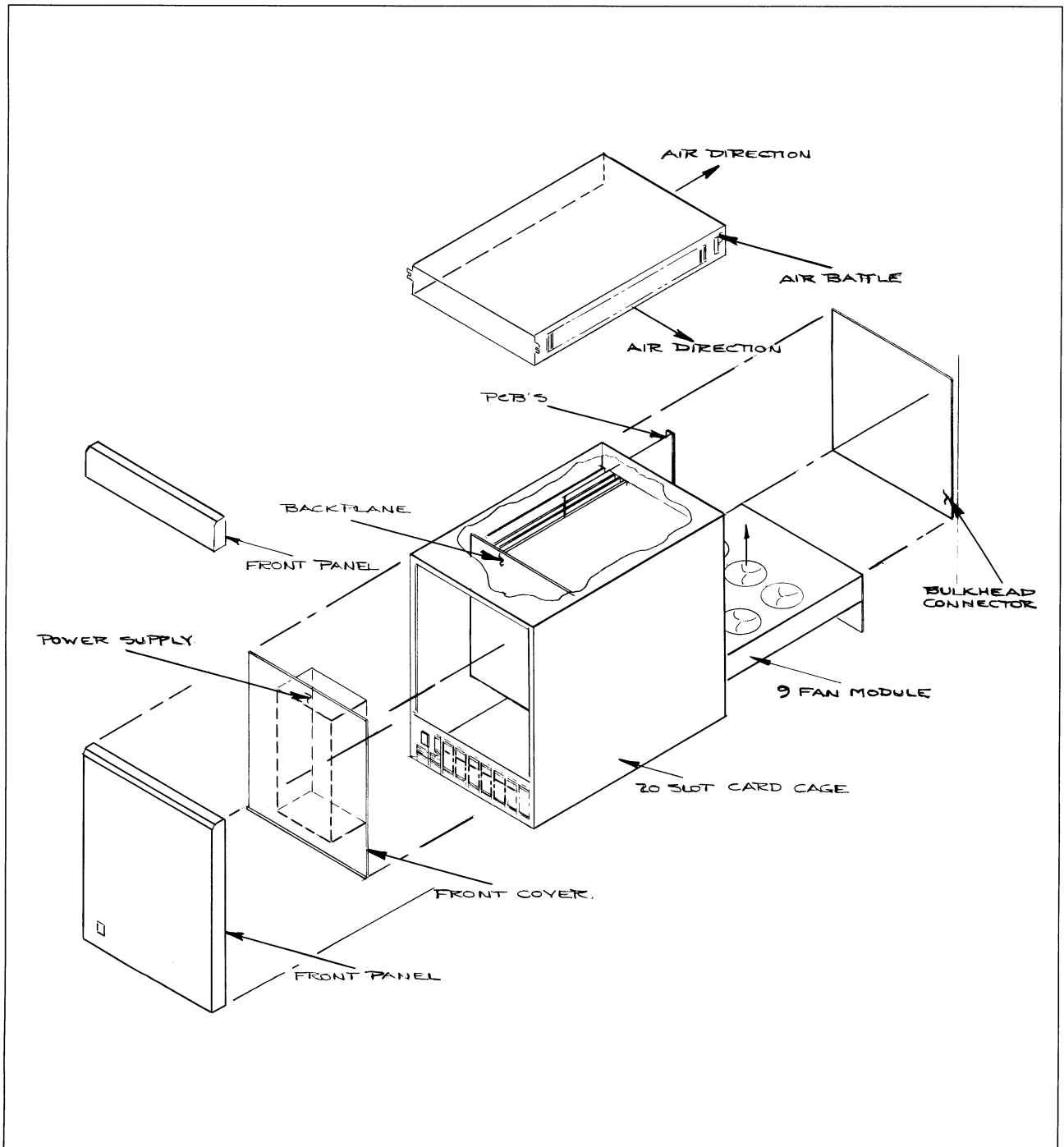


Figure 10. AV 6200-20 20-slot rack-mount packaging.

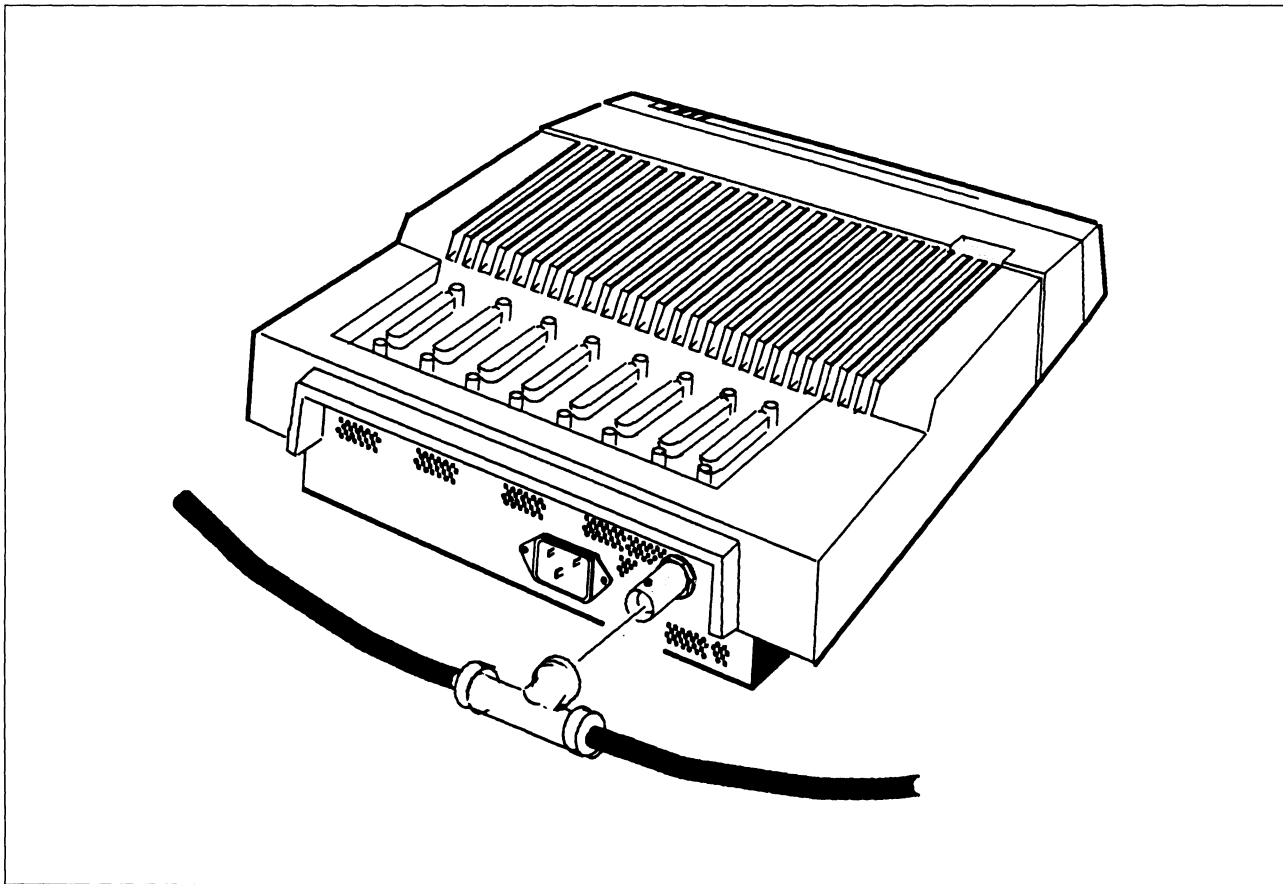


Figure 11. VME distributed cluster controller (VDC). T-connector shipped with VDC. Cables are Model 15338Exxx cluster extension cables.

The *VDA/255 (VME Distributed Async)* is the 6U form factor board which plugs into a VME slot in the AViiON Server System and connected to the *VDC (VME Distributed Cluster)* boxes through an RG62 coax cable. Up to 255 lines per VDA/255 may be connected through distributed clusters. For typical commercial applications, however, the active users per VDA/255 should be limited to approximately 128 for performance reasons.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines) (figure 10). All cluster controllers support the following RS232C signals: CTS, DCD, DSR, DTR, RTS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

Synchronous Communications

Synchronous communications for the AV 5200+, AV 6200, and AV 6200-20 Systems are handled by the *VSC/4 (VME Bus Synchronous Controller)*. This 6 U form factor controller offers four multi-protocol serial communications channels (RS232C/RS422) with full duplex DMA operation using two Zilog 8530 SCC chips. The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. Two independent sync protocols can be handled simultaneously by this board. Aggregate throughput is 1.6 Mbit/sec.

LAN Communications

Ethernet LAN communications are provided by the *VLC (VME Bus Ethernet LAN Controller)*. This board implements IEEE 802.3 Ethernet on a 6U VME board with an intelligent Ethernet controller chip (7990 LANCE) and a 256 KB dual-ported data buffer, providing high-speed, 32-bit bus slave data access. The controller chip communicates with the on-board memory for all command and data transactions. The data packet is placed or retrieved from the buffer on the VME bus from main memory via a software process which handles cache coherency.

Data General's *TermServer product family* provides asynchronous terminal connectivity over ETHERNET® /802.3 networks to AViiON systems with LAN interfaces. TermServers use Telnet/TCP/IP for terminal sessions.

The *VME Terminal Controller (VTC)* attaches the AViiON system to an IEEE 802.3 LAN and offloads TCP/IP Telnet terminal traffic from the CPU. The VTC is primarily for use with TermServer. However, other LAN-attached desktop devices, workstations, and PCs, for example, may be routed through the VTC. Like other VME devices, the VTC is initialized from DG/UX. Therefore, it does not require special boot software or TermManager initialization. For further information; please see MAPS/PLUS 279-65 and 279-66.1.

Mass Storage

For a detailed review of the mass storage controllers, disks, and tapes used on the AViiON 5200+ and 6200 subsystems, see references in Related Information. Below is a brief summary of the VMEbus mass storage controllers.

VME Controller Boards

VME SCSI Controller Board (Office and Rackmount): This 6U form-factor controller board controls up to 7 devices on an asynchronous SCSI bus with a 2MB/sec asynchronous transfer rate, synchronous 5MB/sec. The board is designed around an Intel 80186 processor and an NCR 53C94 SCSI chip. This board is an OEM'd version of the Ciprico Rimfire 3560. One of these boards is included in all AV 5200+ and 6200 package configurations to support the 525 MB cartridge tape. This controller replaces the Rimfire 3500, which was used on the 5200+ /6200 systems up to July 1991.

Hardware Support Services

Field Support Services

Data General Field Engineering supports the AViiON systems with state-of-the-art service technology. Several types of service programs offer a full array of options designed to

satisfy users' uptime requirements. A feature of the 5225+, 6225, 5240+, and 6240 servers is a machine initiated trouble call to country support centers, implemented through field engineering.

On-Call Service with a 4 hour response goal, lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include:

- Multi-Year Plus offers discounts up to 10% and price protection in return for signing a 3, 4 or 5 year agreement.
- Extended Coverage offers coverage up to 7 days a week, 24 hours a day.
- Enhanced Response offers 2-hour on-site response for those installation sites within 50 miles of a Data General Service Center.
- Basic Response offers a relaxed on-site response, generally within 24 hours.
- Multi-Device Deferred offers standard discounts up to 40% to customers who have a large number of PC's, workstations, terminals and desktop printers and can wait until a specified number are down before placing a service call.

Additionally, this service offers pre-payment discounts up to 25% for non-cancellable pre-payment terms and up to 10% for cancellable pre-payment terms. The pre-payment discounts start for terms as short as 6 months.

A 7-day, 24-hour on-line remote diagnostic service, PCB Resume, used in conjunction with remote diagnostics, lets the field engineer or remote staff access valuable information on the performance history, specs, revision level, and compatibility of the board in questions. The result is fast, accurate diagnosis and an increase in system uptime.

Unified System Support: AViiON customers with On-Call or Multiyear service receive not only hardware maintenance, but also the following software services:

Telephone and remote support system software, including DG/UX, DTK, NFS, TCP/IP, X Windows, Motif, Looking Glass, and Gnu C.

Right-to-Copy (RTC) purchased updates and revisions of any software licensed to run on the customer's AViiON for which Data General offers RTC. Note that the actual updates and revisions must be purchased separately.

Additional information on service is available from a Data General salesperson or by calling the Data General Field Engineering Telemarketing Group at 1-800-325-3065, (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Users may take advantage of a warranty conversion option by signing up for a Multiyear Plus or On-Call Agreement. With an agreement, warranty service is automatically upgraded to contract service. This warranty covers all base-system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server specific, shared AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Configurations/Ordering

Color

The AViiON systems use a Gray (G prefix) color scheme.

CPU and Memory Guidelines

The processors are on a single 9U system board. With the single processor, 16 MB of memory is included on the system board. Dual processor 5225 + /6225 have 64MB on the CPU board. The quad processor has no system memory on the board. Only one processor board may reside in the system. Customers may have their systems upgraded on-site through a simple board swap. See the upgrade section for details.

Additional memory can be configured in slots 2-5. Memory boards are available in 16MB, 32MB, 64MB, 128MB, and 192MB. The 192MB memory board is available only on the 6200 systems. Any combination of these may be installed in the systems. See Table 1 for the memory model numbers.

With the DG/UX operating system, a minimum of 16MB is required for the single and dual processors. The quad processor requires a minimum of 32MB of memory.

Memory board upgrades are available from CPD. A memory board upgrade is the swap of memory boards—for example, a 16MB for a larger size memory. These would be used if your customer is increasing system memory and is limited by the four memory slots. To limit the cases where upgrades are required, always order the largest memory board that meets your customers requirements to preserve memory slots for future expansion.

<i>Model Number</i>	<i>Description</i>
7001	16MB Memory Board
7002	32MB Memory Board
7015	64MB Memory Board
7016	128MB Memory Board
7017	192MB Memory Board

Table 1. AViiON 5200+ and 6200 Memory Boards.

Slot Assignments

The system board must reside in slot 1. Expansion memory must reside in slots 2 through 5. VME boards can be configured in slots 2 through 10. Third-party or custom VME boards which utilize the user-defined pins on J2/P2 may be configured in slots 7 through 10 only. Table 2 displays slot assignments for the 10 slot chassis.

<i>Slot No.</i>	<i>Slot Assignment</i>
1	System board
2	Expansion Memory or I/O
3	Expansion Memory or I/O
4	Expansion Memory or I/O
5	Expansion Memory or I/O
6	I/O
7	I/O
8	I/O
9	I/O
10	I/O

Table 2. AV 5200+, AV 6200 slot assignments, (10-slot chassis).

6200-20 systems have a 20 slot VMEbus chassis for large configurations. There have been two generations of AViiON 20 slot chassis. Special Systems first shipped a 20 slot product in Spring 1990. In March 1991, a revised version of the Special Systems product was qualified for shipment as a standard product. This product also significantly expanded configurability of mass storage, Ethernet LAN's, and synchronous communication.

To meet the increased configuration maxima, certain configuration restrictions apply. These are:

9U VME boards can only be configured in slots 1-10. Standard products in the 9U form factor are the CPU board, memory boards, and the disk array IOP.

Slots 11-20 can only take 6U form factor boards. To increase the room for internal cables, a different adapter board is used in these slots that recesses the front of the boards several inches from the 9U form factor. The 20 slot chassis ships with all 20 slots configured with a board or the applicable board adapter to ensure the integrity of the cooling subsystem. VME boards added to the system following shipment do not require the adapter boards.

Power

The integrated office package includes a 750-watt power supply and the 10-slot rackmount package includes a 527-watt power supply. The 20-slot includes a 1,080 W power supply. If only Data General controller boards and peripherals are configured with these systems, no configuration restrictions are imposed by available power.

Below are the amperes required for each of the boards and mass storage devices that draw current from the 5200+ and 6200 series power supplies.

	<i>Current Requirements for AViiON Boards and Disks</i>		
	<i>Amperes Required</i>		
	+5V dc	+12V dc	-12V dc
Single CPU/16MB	23	—	.01
Dual CPU/16MB	24	—	.01
Dual CPU/64MB	2.48	—	.01
Quad CPU	20.7	—	.01
16MB expansion memory	8.2	—	—
32MB expansion memory	8.6	—	—
48 MB expansion memory	9.0	—	—
64 MB expansion memory	9.0	—	—
128 MB expansion memory	9.2	—	—
192 MB expansion memory	9.5	—	—
SCSI Controller	4	—	—
Disk Array IOP	20.0	—	—
ESDI Controller	5	—	.5
SMD Controller	5	—	.586
VDA/128	3	—	.17
VSC/4	3	.07	.07
VAC/16	3	.25	.25
VLC	2.5	.45	—
VTC	2	—	—
150MB QIC tape	.66	1.5	—
525MB QIC tape	.81	1.8	—
332MB SCSI drive	1.1	2.5	—
662MB SCSI drive	.7	2.0	—
1GB SCSI drive	2.0	4.0	—
1.4 GB SCSI drive	1.1	4.5	—
590 MB R/W optical	2.0	1.0	—
CD Rom	2.1	—	—

The 5200+ Series power supply provides 750 watts of power for the office package configuration. In Japan, output of the power supply must be limited to 670 watts because of the AC input line cord maximum rating. The maximum DC amperes output for the 5200+ series power supply is listed below.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	105	525
+ 12 dc	17	204
- 12 dc	4	48
Total		777 watts

The limiting factor is the 750 watts maximum output. Therefore, power draw cannot go to the maximum of each of the dc outputs listed above. The total wattage cannot exceed 750 watts.

In Japan, NDG has recommended that the following guidelines be used for configuring 5200+ Series systems to the 670 watt maximum.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	88	440
+ 12 dc	15	180
- 12 dc	4	48
Total		668 watts

The NDG guidelines for each of the dc outputs can be exceeded up to the maximum output of the power supply as long as total watts does not exceed 670. For example, in Japan a total of 95A + 5, 12A + 12, and 4A - 12 could be configured for a total of 667 watts.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	95	475
+ 12 dc	12	144
- 12 dc	4	48
Total		667 watts

The 6200 series power supply is rated at 527 watts with the following maximum dc outputs. Please note that the DC ratings below are valid for shipments of 10-slot chassis beginning on April 13, 1990. A change to the power supply was made at that time to accommodate maximum configurations of SMD disks. If you have a customer with a rackmount chassis that shipped prior to 4-13-90, this power supply must be upgraded when the third SMD controller is added to the system. Revision 5 or higher (part # 005-34493) is required when adding the third SMD controller. All other configurations using Revision 4 and earlier power supplies operate reliably.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	92	460
+ 12 dc	2.3	28
- 12 dc	3.2	38
Total		527 watts

The 6200-20 Series power supply is rated at 1,080 Watts with the following maximum dc output.

	<i>20-Slot</i>	
	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	180	900
+ 12 dc	15	180
- 12 dc	10	120

Ordering 5200+ Systems

Entry 5200+ systems include the caster mounted desk side package with the processor board, a SCSI controller (single ended bus), a QIC cartridge tape (load device), and at least one SCSI disk. The models and their contents are identified in Table 3.

<i>Model #</i>	<i>Processor</i>	<i>Memory</i>	<i>Disk</i>	<i>Tape</i>
G70443-M	5200+	16MB	2 CSS2/DC w/1GB each	525MB
G70444	5225+	64MB	662	525MB
G70445	5225+	64MB	1GB	525MB
G70446	5225+	64MB	1.4GB	525MB
G70447	5225+	64MB	5GB (CSS2DC) array	525MB
G70449	5240+	64MB	1GB	525MB
G70450	5240+	64MB	1.4GB	525MB
G70451	5240+	128MB	1GB	525MB
G70452	5240+	128MB	1.4GB	525MB

Table 3. 5200 System Models.

AV 5225+, 6226

Note that the AV 5225+ and 6225 servers require, and are therefore shipped with, DG/UX revision 5.4 or later. Customers with earlier revs of DG/UX who wish to upgrade their hardware to 5225+ or 6225 will require a corresponding uprev of their operating system.

<i>Model No.</i>	<i>Description</i>	<i>CPU</i>
G70082	AV6200 10-slot rackmount chassis, 16MB memory	single
G70363	AV6225 10-slot rackmount chassis, 64MB memory	dual
G70190	AV6200 20-slot rackmount chassis, 16MB memory	single
G70365	AV6225 20-slot rackmount chassis, 64MB memory	dual
G70296	AV6240 10-slot rackmount chassis, 64MB memory	quad
G70297	AV6240 10-slot rackmount chassis, 128MB memory	quad
G70298	AV6240 10-slot rackmount chassis, 192MB memory	quad
G70396	AV6240 20-slot rackmount chassis, 64MB memory	quad
G70397	AV6240 20-slot rackmount chassis, 128MB memory	quad
G70398	AV6240 20-slot rackmount chassis, 192MB memory	quad

Table 4. AV6200 Series (Rackmount) Base Systems.

<i>Model</i>	<i>Slots</i>	<i>VMEbus Board</i>			<i>CSS2 Chassis</i>			<i>CSS2 Chassis</i>		<i>CSS2 Chassis</i>	<i>Cabinets</i>
		<i>CPU</i>	<i>LAN</i>	<i>SCSI</i>	<i>525QIC</i>	<i>2GB TP</i>	<i>1GB</i>	<i>662MB</i>	<i>1GB</i>	<i>1GB</i>	
G70383-MB	10	6200	1	3	1	1			1	1	G11212
G70383-MC	10	6200	1	3	1	1			1	1	G11222
G70384-B	10	6225	1	1	1		2				G11212
G70384-C	10	6225	1	1	1		2				G11222
G70385-B	20	6225	1	1	1		2				G11212
G70385-C	20	6225	1	1	1		2				G11222

11000 Series cabinets are either power suffix -G7 or -F7, G11212 is 59" cabinet, G11222 is 63" cabinet.
Model G70263 uses differential SCSI subsystem with 2nd CSS2 chassis, 70300-M uses differential SCSI in 2nd and 3rd CSS2 chassis.
All required device cabling is included.

Table 5. AV6200 System Packages.

Ordering 6200 Systems

Rackmount systems are available in 10 slot and 20 slot chassis. The 10 slot chassis is suitable for small configurations. Where growth is anticipated order the 20 slot chassis to ensure that your customer has adequate room to expand their configurations. Customers purchasing dual and quad processor configurations should order the 20 slot chassis to meet configuration requirements.

Systems are available in base packaging (CPU chassis, CPU board, and memory) and packaged with disk, tape, and cabinets (single and dual processors only). Base packages are listed in Table 4. Packaged systems are listed in Table 5.

5200+ SCSI Mass Storage

5200+ systems use SCSI peripherals to provide mass storage resources. One to five separate channels are available in the system to connect SCSI devices. Pertinent information on SCSI Bus length configuration rules is included in a following section. Ensure this is understood prior to configuring mass storage for the 5200+.

An internal single-ended SCSI channel is connected to six storage bays in the 5200+ chassis (see figure 12). The first bay (media bay 0 in figure 12) is for disk only. This bay is located behind the front panel of the 5200+. Either disk devices or removable media devices can be configured in media bay 1,

which is a full height bay. Media bays 2 and 3 can accommodate either a full-height device (fixed media or removable media) or two half-height devices. Only half-height devices can be configured in bays 4 and 5. Installation of SCSI devices in these internal media bays must follow the rules listed in figure 12. Use this information to configure your customer's systems.

The internal SCSI cable included with the base system package runs to each of the six storage cavities and then to the bulkhead where it is terminated.

External reel-to-reel tapes can be configured on the internal SCSI channel. See figure 12 for model numbers.

Four more SCSI channels can be configured with the 5200+ to connect to external SCSI devices. This channel can be either a single-ended channel (VMEbus controller Model 7421) or a differential channel (VMEbus controller Model 7422). There are specific models for single-ended and differential products. They cannot be mixed. Subsystems are either all single-ended components or all differential components. The differential controller should always be used if customers require large disk configurations. Cable length limitations on the single ended SCSI do not allow two CSS2/DC chassis to be daisy chained together. With a differential SCSI subsystem, two CSS2/DC chassis can be daisy chained together.

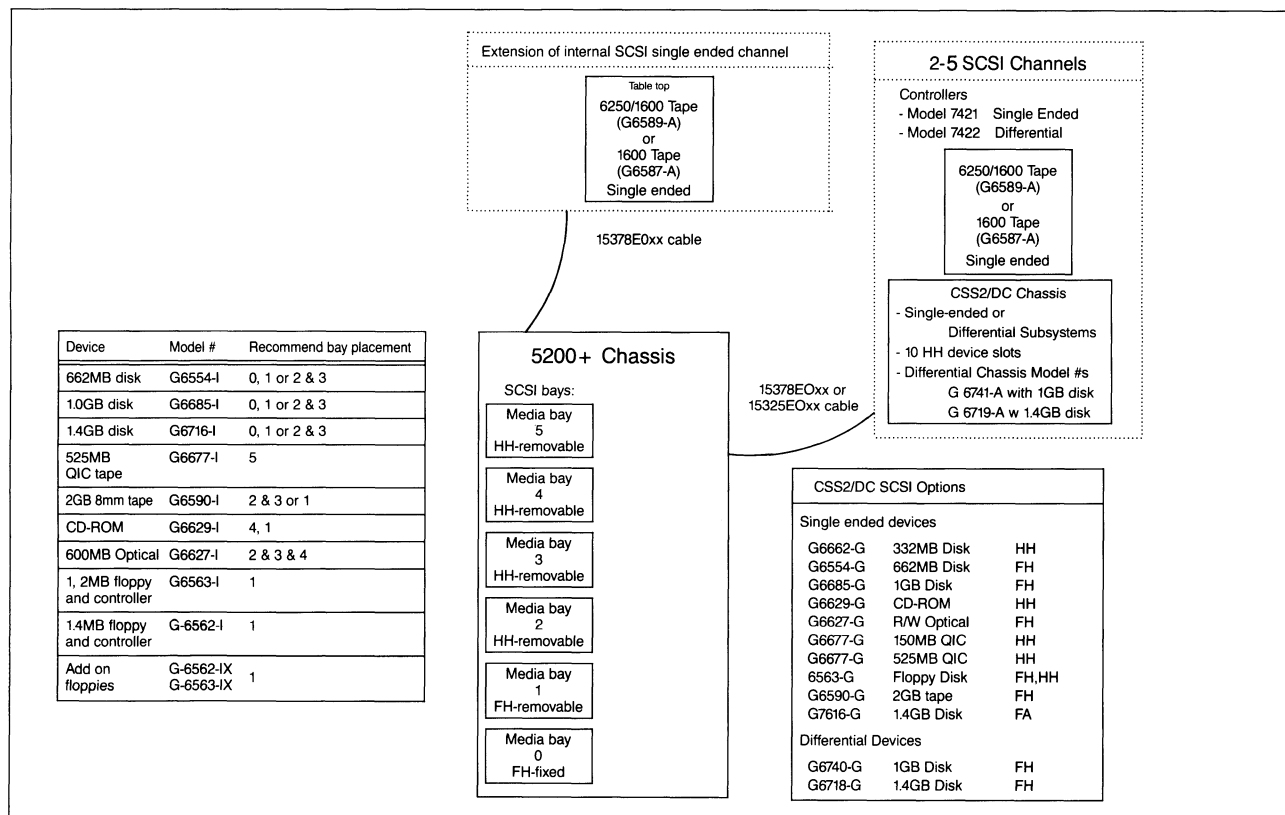


Figure 12. 5200+ Mass Storage Options.

External chassis that can be connected to the 5200+ systems are the CSS2/DC chassis, a table top 6250 bpi R-R tape, and a table top 1600 bpi R-R tape (see table 6 for model numbers). The CSS2/DC is an office package that can configure 10 HH 5.25" SCSI devices. These 10 HH slots can be configured as a mixture of FH or HH devices. See Figure 12 for the details on 5200+ mass storage options.

Maximum disk storage on a 5200+ is 43.4GB. Figure 13 details how to configure maximum storage on a 5200+ system.

Cables for connection of the 5200+, CSS2/DC, and the R-R tapes MUST be ordered separately. See Figure 15 for a listing of required SCSI cables.

CSS2/DC array subsystems can be configured on 5200+ servers. A single IOP can be cabled to as many as 5 separate CSS2/DC chassis. When an IOP is installed in a 5200+ chassis, all 5 external SCSI bulkhead openings on the back of the chassis are utilized. Therefore, no other external SCSI channels can be configured in a 5200+ system when a disk array IOP is installed.

6200 SCSI Mass Storage

All of 6200 mass storage is SCSI based. The CSS2 is an 8.75" high rackmount storage chassis that has space for 10 HH 5.25" devices or an equivalent combination of HH and FH. Both disks and tapes are supported in the CSS2 chassis.

CSS2 subsystems are available in single-ended and differential interfaces. This requires a matching of controller, cable, CSS2 chassis, and 5.25" devices. There are specific models for single-ended and differential products. They cannot be mixed. Subsystems are either all single-ended components or all

differential components. The functional difference between the two bus interface type is bus length. Configuration detail is included in the next section.

Each system will require at least one single-ended CSS2 subsystem that includes the QIC tape load device. All 5.25" SCSI devices are available on single-ended subsystems.

Whenever disk only CSS2 subsystems are ordered, it is recommended that you order differential subsystems. This will eliminate configuration restrictions that are imposed by the single-ended SCSI bus. The only 5.25" differential device available as of September 1991 is the 1GB and the 1.4GB drives. These disks have the best performance and price per MB of SCSI disks available on the 6200. It is the right choice for 6200 systems.

See Figure 14 for 6200 disk subsystem models.

Model Number	Description
6713-A	CSS2/DC with 332MB disk drive
6723-A	CSS2/DC with 662MB disk drive
G6721-A	CSS2/DC with 1GB disk drive—Single ended
G6741-A	CSS2/DC with 1GB disk drive—Differential
G6717-A	CSS2/DC with a 1.4GB disk drive—Single
G6759-A	CSS2/DC with 2GB cartridge tape
G6587-A	1600bpi reel-to-reel tape (table top chassis)
G6589-A	6250bpi reel-to-reel tape (table top chassis)
G6719-A	CSS2/DC with 1.4GB—Differential

Table 6. External SCSI chassis for 5200+ systems.

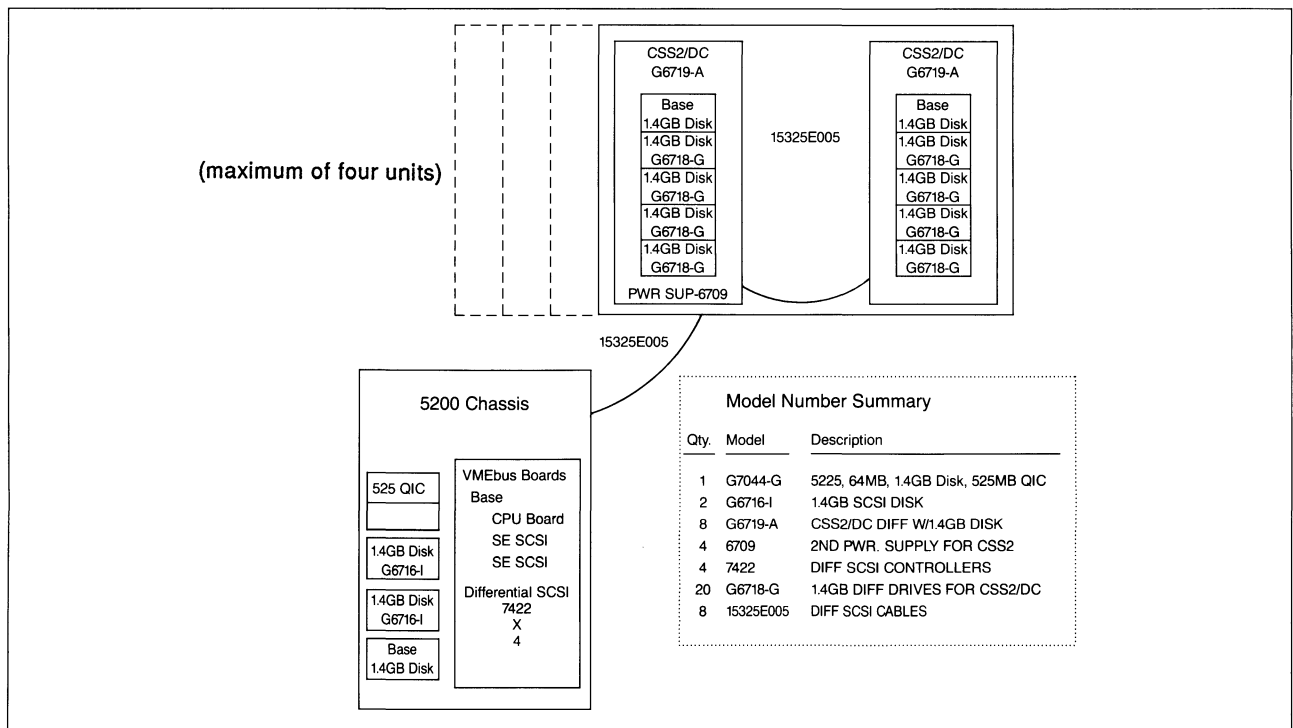


Figure 13. 5200+ maximum storage configuration.

SCSI Bus Configuration Rules

SCSI is a daisy chained bus with specific bus length limits for the two interface types available. The single ended interface has a bus length limit of 19.6 ft. (6 meters). The differential interface has 81.2 ft. (25 meters) bus length. When calculating the SCSI bus length, all internal device cabling as well as external cabling must be added to determine total length. Figure 15 lists the internal cable length as well as the applicable external cables available for AViiON 5200+ and 6200 systems. Examples on bus length calculations are also shown in figure 15.

All SCSI external cables must be ordered separately except in the packaged AV6200 models, where cables connecting the CPU and CSS2 chassis are included.

Disk Arrays for 6200 Systems

AViiON 6200 systems connect to either the standalone High Availability Disk Array cabinet or the rackmount Disk Array chassis. Two disk array IOP's can be configured in a 6200 or 6200-20 CPU chassis. These must be mounted in slots 6 and 10 of the 20 slot chassis. There are no slot specific requirements for the 10 slot rackmount chassis.

A single IOP connects to a single disk array cabinet. Because of the disk array bus length maximum, the disk array cabinet must be located directly adjacent to the CPU cabinet. The cables connecting the CPU and the disk array cabinet are included in the base disk array subsystem. See Figure 16 for disk array cabinet model numbers and examples on ordering subsystems.

Disk array cabinets can be dual ported from two separate 6200 chassis mounted in a single cabinet. The SCSI bus is routed from one processor to the next and continues to the disk array cabinet. Termination of the SCSI bus occurs on the first CPU chassis bulkhead.

A maximum configuration would consist of two IOP's cabled to two disk array cabinets positioned to the left and right of the CPU cabinet. Any other peripherals must be configured in the CPU cabinet or in a peripheral cabinet attached to the disk array cabinet. When two HADA disk arrays are configured in a system, any rack mounted single ended SCSI devices must be mounted in the cabinet with the CPU. SCSI bus length limits require this. If a dual ported configuration with two 6220-20 systems were configured, the mounting space required by these two CPU chassis (56") would leave no room in a 71" cabinet (63" mounting space) for additional peripherals.

With the rackmount disk array chassis, a single IOP can connect to three chassis. Two IOP's are configurable.

For detailed information regarding disk array capabilities and technologies, see MAPS/PLUS articles beginning on page 230-41 and 239-53.

Asynchronous Connections

Two asynchronous RS232 connections are on the system board. These were designed to be used for the system console terminal and a remote terminal for service support. A cable for the system console is included with every system model.

The VAC/16 provides connections for 32 or less asynchronous devices on the 5200+ and 6200 systems (note that the 10 slot rackmount chassis only has connections for a single VAC/16). 20 slot rackmount chassis do not support VAC/16's. Cabling for the VAC/16 RS232 ports is done directly from the system's bulkhead. Cables must be ordered separately.

Large numbers of asynchronous devices can be connected to the AV/5200+ and AV/6200 systems with the VDA/255.

Table 7 lists the model numbers for asynch connect products.

Synchronous Connections

The VSC/4 provides connections for synchronous devices. Model 7404 for the 5200+ systems, Model 7404-V for the 10 slot rackmount, and 7404-W for the 20 slot rackmount are the 6U VMEbus boards with four ports each.

On the 5200 systems, up to four Model 7404's can be configured in the system. Bulkhead connections used are the four DB25 connectors marked 'OPTION' and up to twenty of the thirty two DB25 slots at the top of the bulkhead that alternately are used for the VAC/16 connections.

<i>Model</i>	<i>Description</i>
7400	VAC/16 for AV5000
7406	VAC/16 for AV6200 10 slot system
7418	VDA/255 for 5200/6200
7418-W	VDA for 6200-20
7402	VDC/8P for VDA/128
7403	VDC/16 for VDA/128
7419	VDC/16 for VDA/255
7420	VDC/8P for VDA/255
7405	VLC for 5200 and 10 slot 6200
7405-W	VLC for 20 slot 6200-20
7404	VSC/4 for 5200 systems
7404-V	VSC/4 for 6200 10 slot systems
7404-W	VSC/4 for 6200 20 slot systems
7409	6U to 9U VME adaptor board
7425	VTC for 5200+ and 10 slot 6200
7425-W	VTC for 20 slot 6200-20

Table 7. VMEbus communications controller.

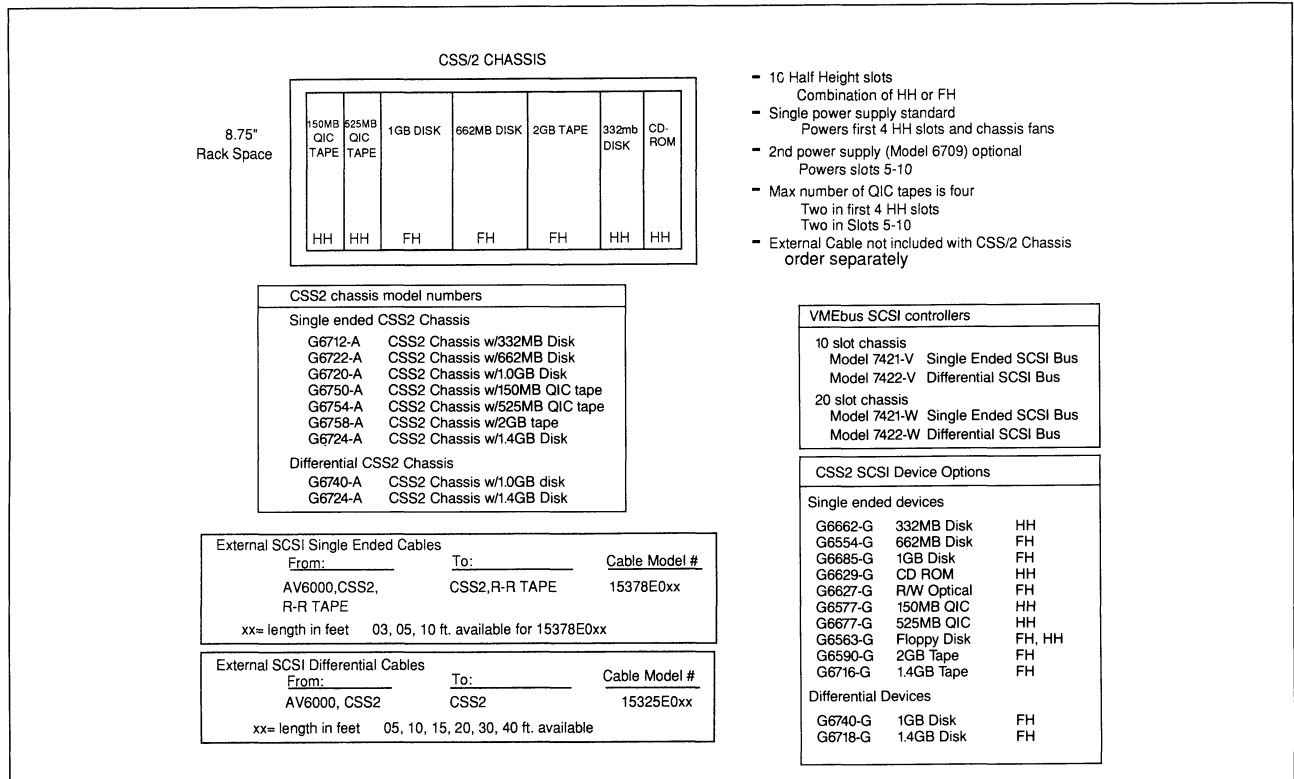


Figure 14. 6200 SCSI Options.

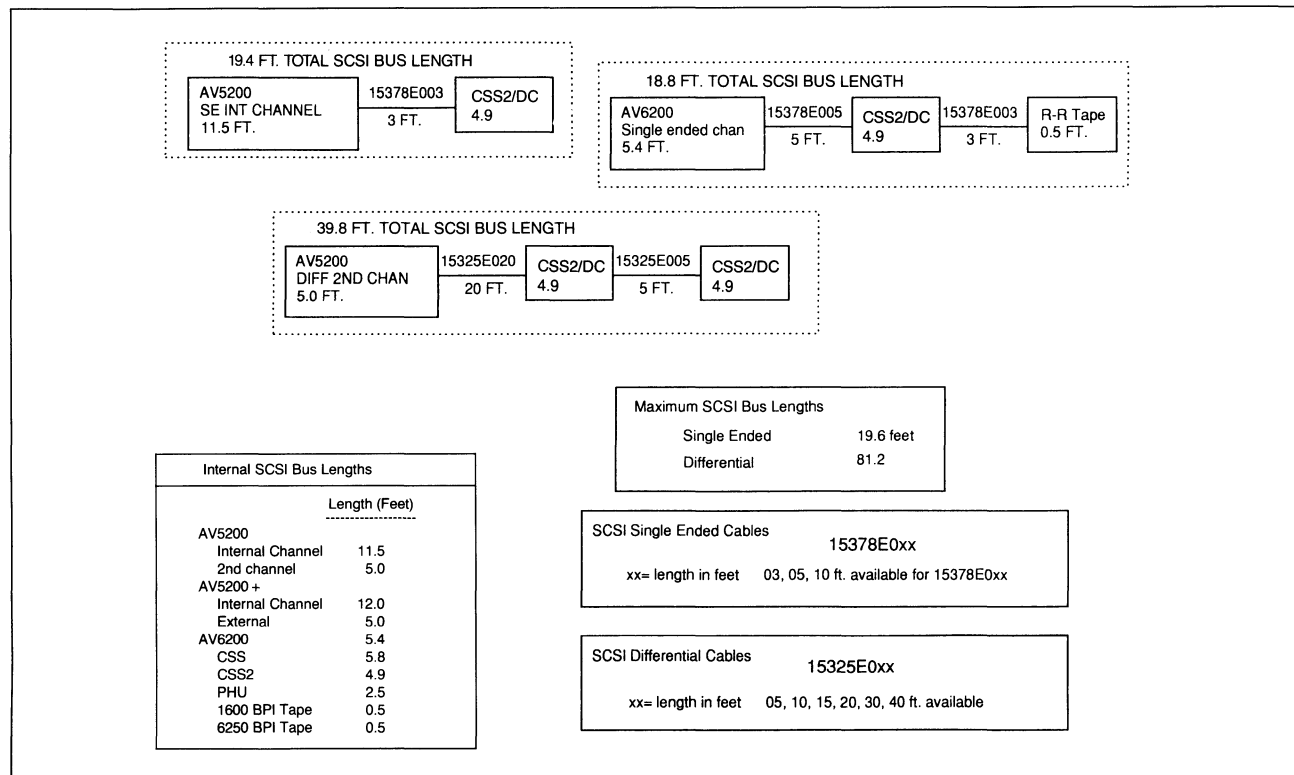


Figure 15. SCSI Configuration Rules.

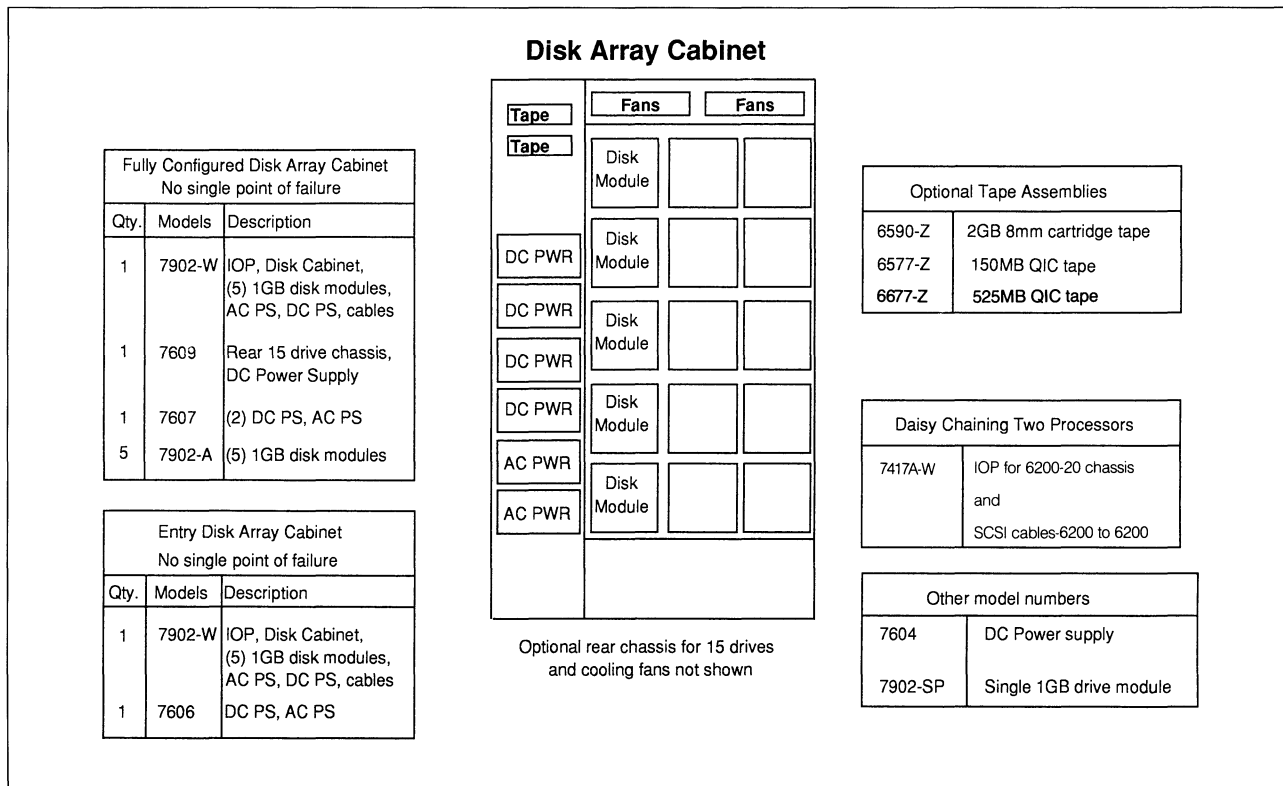


Figure 16. Disk array cabinet for 6220-20.

Model No.	Description
15338E025	25' cluster extension cable—VDA
15338E050	50' cluster extension cable—VDA
15338E100	100' cluster extension cable—VDA
15339E010	10' async system console cable
15339E015	15' async system console cable
15339E025	25' async system console cable
15340E010	10' async terminal cable for VDC, VAC
15340E015	15' async terminal cable for VDC, VAC
1540E025	25' async terminal cable for VDC, VAC
15369E010	modem cable, async
15369E015	modem cable, async
15369E025	modem cable, async
15290E006	synch device cable
15290E015	synch device cable
15290E025	synch device cable
15345E015	15' Centronics printer cable
15345E025	25' Centronics printer cable

Table 8. Async, synch, and printer cables.

Ethernet LAN Guidelines

The Ethernet controller board for VME bus-based AViiON Server Systems (VLC) has a standard DB-15 connector and uses the same drop cables and transceivers as do MV/Family systems (figure 12). Table 9 lists model numbers.

Model No.	Description
4540	N tap for Thick Ethernet
4540-A	BNC tap for Thin Ethernet
4540-B	Vampire tap for Thick Ethernet
4619	8-port transceiver (8PT-E)
1326	5-meter drop cable (for plenums)
1326-A	20-meter drop cable (for plenums)
15274E005	5-meter drop cable (PVC)
15274E020	20-meter drop cable (PVC)

Table 9. Transceivers and drop cables for Ethernet LANs.

Printers

RS232 interface printers are supported on the second RS232 port on the system board, the VAC/16, or the ports on VDC cluster controllers. In addition, the system board has a parallel port selectable for printers with Centronics interfaces. The VDC/8P cluster controllers each incorporate one Centronics interface along with their 8 RS232 ports. All Data General printers which meet these interface requirements are supported.

Printers using the Data Products interface that Data General uses on the MV systems DO NOT WORK reliably on AViiON systems. Initial product information on printer support indicated that the Data Product interface was supported from the parallel interface on the CPU board. This information was incorrect. Only the Centronics interface is supported from the parallel port on the 5200+ /6200 CPU board.

If your customer has a Data Products printer and wants to install this printer on an AViiON system, options are available to provide a Centronics port on recent generations of Data Products printers. These options are available with the band printers now sold by Data General. Below are the current DG printer models and the DG option model numbers that provide a Centronics and serial port.

<i>Printer Model</i>	<i>Option Model</i>
4595,6,7	4601
4598C-X	4603C-X
4599C-X	4604C-X

If your customer has previous generation Data Products printers purchased from Data General, options may be available for these with the Centronics interface.

To run a 1200LPM printer on an asynchronous port requires a 19.2k bps line. The printer line must have the highest priority on the VDA/255 to ensure that it operates at full speed.

Terminals

All asynchronous connections supported by Data General communications products on AViiON Server Systems comply with the RS232 specification. AViiON Server Systems support RS232 terminals with support for ANSI control codes.

Data General D211/410/460- and D215/411/461-generation terminals should use DG ANSI mode to operate on AViiON systems with DG/UX. DG ANSI mode works adequately with DG/UX, but some anomalies exist that may cause customer dissatisfaction. With the terminals now sold by

Data General, customers should use the VT100/220 mode when connected to AViiON systems for complete compatibility and trouble-free terminal operation with DG/UX.

If a hardcopy terminal is used as the system console, it should have one of the following two features to properly display powerup error messages: not respond to backspace codes or process a line only after receiving an End-of-Line. DASHER D57x hardcopy terminals meet these requirements. TPI terminals do not.

All RS232 ports on AViiON Server Systems are female DB-25 (connected to by male DB-25 cables) as is the standard on VME bus-based systems. This is the opposite of the convention used on MV/Family systems, most personal computers, and the AVX 300 AViiON Workstation. The proper cable for user terminals will be automatically structured with terminals ordered with an AViiON Server System model designator. Model numbers for cables ordered by themselves are shown in the Cables section.

The cable for the system console is different from that used for user terminals. The system console terminal should be ordered with a -X suffix (to indicate no cable). A 25' console cable is included with all AV 5200+ and AV 6200/6200-20 Series systems. The model numbers for additional console cables are given in the Cables section.

Cabinets for 6200 Systems

6200 systems use the Model 11000 Series cabinets. These cabinets provide the flexibility required to build large AViiON systems. See the '11000 Series Cabinets' MAPS/PLUS article beginning on page 289-45 for details on configuring these cabinets. Below are the mounting space requirements for the AV6200 systems.

<i>Chassis</i>	<i>Mounting space required</i>
6200 20 slot	28"
6200 10 slot	14"
CSS2	8.75"
6250 bpi tape	8.75"
16000 bpi	8.75"
Disk array-CSS2	8.75"

System Capacities

VMEbus boards capacities for the 5200+ and 6200 systems are listed below. Not all of the configuration maxima identified below can be concurrently achieved. Configuration maxima will be determined by the number of I/O slots available (impacted by the number of expansion memory boards configured) and your customers choice of VMEbus boards.

VMEbus Board/ports	6200 10-slot			6200-20 20-slot
	5200+	with VAC/16	Standard	
Disk Array IOP	1	0	2	2
SCSI Controller	5	4	6	8
*LAN Controllers	4	6	2	8
VDA/255	4	1	5	5
VAC/16	2	1	0	0
VSC/4 boards	4	4	6	12
ports	16	6	24	48

6200 and 6200-20 I/O maxima available for immediate shipment are listed below. Configuration of VME bus controllers greater than this limit and up to the maximums listed above require a 90 day ARO:

Disk Array	2
SCSI	5
LAN	4
VDA/255	3
VAC/16	1
VSC/4	4
VTC	5

There are two separate bulkheads shipped with the 6200 10 slot chassis. The standard bulkhead offers the following for connections from VMEbus boards to external devices:

- 3 CPU board connectors—two asynch connectors—two asynch connectors, one parallel printer connection.
- 2 Ethernet LAN connectors
- 5 VDA connectors
- 31 Connectors for SCSI (one connector per board) or synch (4 connectors per board)

Note that this standard bulkhead began shipping in October 1990. Prior to this, bulkhead design did not have the mix and match scheme employed with the 31 connectors identified above that can connect either SCSI or Synch connections. Standard bulkheads shipped prior to this date had a fixed connection scheme similar to the AV5200+ 's bulkhead. With the standard bulkhead shipped prior to October 1990, customers cannot expand to the I/O maxima cited above on the 6200 10 slot chassis for SCSI or Synch. Connection to the HADA disk array requires the standard bulkhead that began shipping on 10/90.

When a VAC/16 (Model 7406-V) is ordered with a 10 slot 6200 chassis, the correct bulkhead is automatically configured with the system. If a VAC/16 is ordered as an upgrade to an installed system, the bulkhead that accommodates the VAC/16 is shipped with the VMEbus board.

The bulkhead for the 6200-20 chassis is displayed in Figure 18. Optional I/O bulkhead subpanels let the chassis reach full configurability on I/O maxima. The configurability of the bulkhead is explained in Figure 18.

Microcode

Because AViiON systems are based on a RISC processor, they do not use microcode.

System Software

AViiON Server System model numbers do not include a bundled RTU for the operating systems.

A wide variety of DG/UX system software packages are available for both server and multi-user AViiON Server System configurations. Multi-user DG/UX licenses are classed by user count categories. For ordering information on system software packages, please refer to the MAPS/PLUS articles on AViiON Unix software.

Upgrades

System board upgrades are offered through the Upgrades Marketing Group of the Continuing Products Division. These upgrades require only a simple board swap and include Field Engineering installation and deinstallation. If you have any questions regarding upgrades or would like to upgrade a system or component not listed here, please call a CPD Marketing Specialist at 508-870-1400.

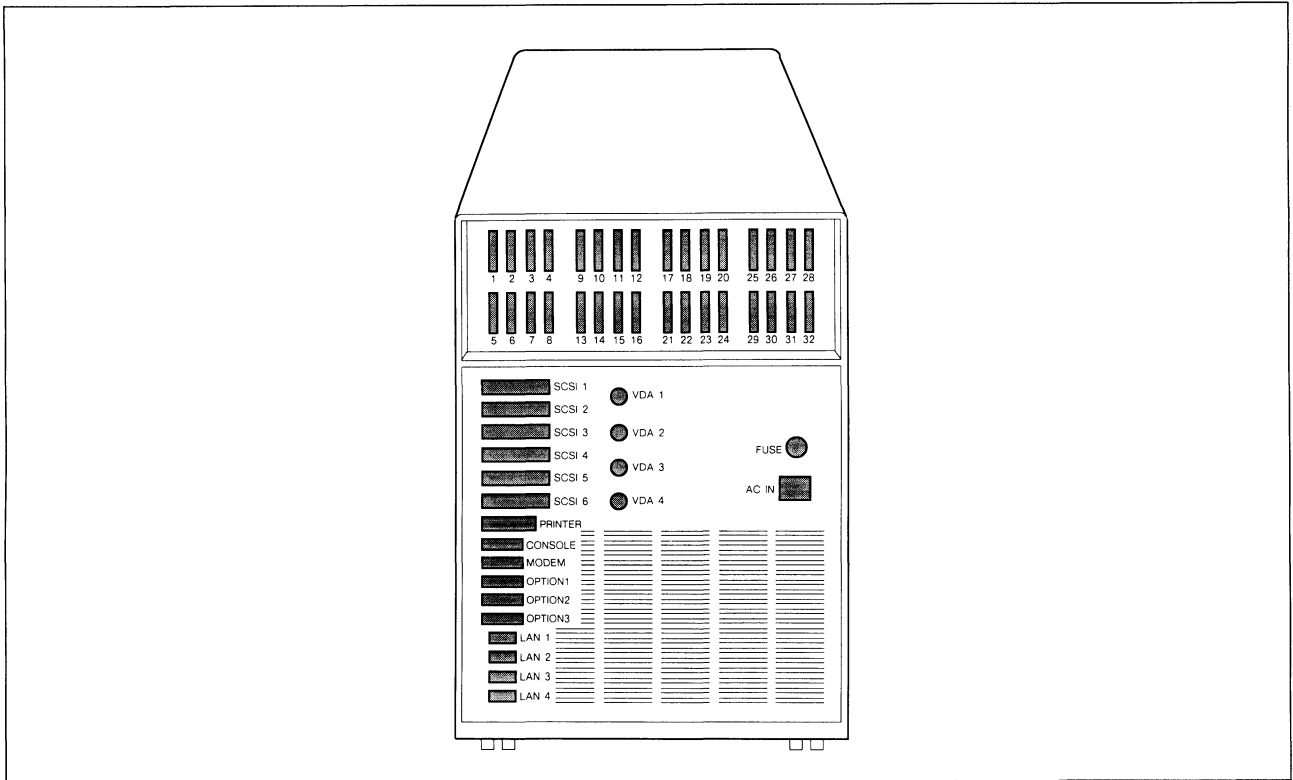


Figure 17. 5200+ Bulkhead Configuration.

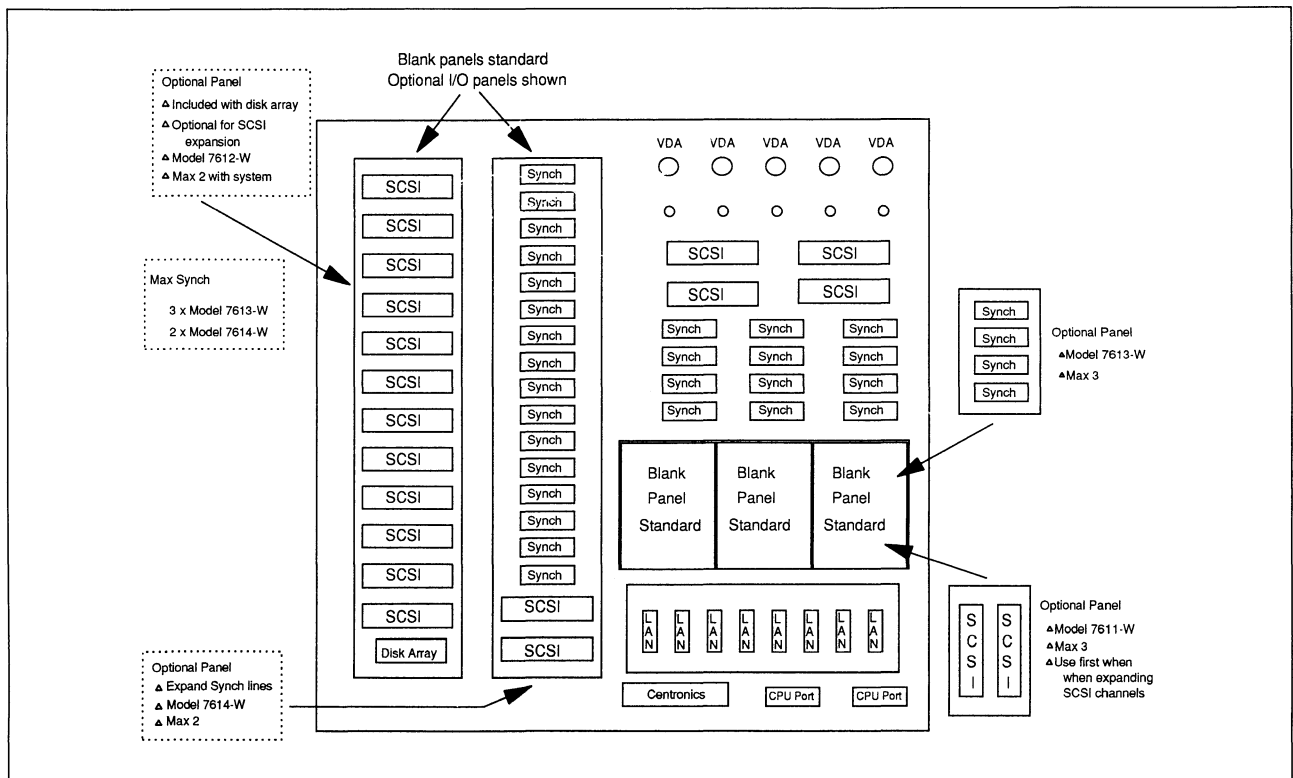


Figure 18. 6200-20 Bulkhead Configuration.

Related Information

Table 10 lists customer manuals for FCS; table 14, MAPS/PLUS articles.

<i>Part No.</i>	<i>Title</i>
<i>AViiON 5000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001806	Setting Up and Starting AViiON 5000 Series Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 5000 VAR/OEM DOC. PACKAGE</i>	
014-1850	Expanding AViiON 5000 Series Systems
<i>AViiON 6000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001807	Starting and Testing AViiON 6000 Series Systems
014-509389-00	Installing and Starting AViiON 6200-20 Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 6000 VAR/OEM DOC. PACKAGE</i>	
015-000345	Expanding AViiON 6000 Series Systems
<i>AViiON 5000 AND 6000 SERIES SYSTEMS PROGRAMMER'S DOC. PACKAGE</i>	
014-001805	AViiON 5000 and 6000 Series Systems: Programming System Control and I/O Registers
014-001808	MC88200 User's Manual, Cache Memory/Management Unit (CMMU)
014-001809	MC88100 User's Manual, Reduced Instruction Set Computer (RISC)
<i>MODEL 10565 MASS-STORAGE SUBSYSTEM OWNER'S PACKAGE</i>	
014-001810	Installing and Operating the Model 10565 Mass-Storage Subsystem
<i>MASS STORAGE DRIVE MANUALS</i>	
014-001699	Model 6536 Tape Drive Operations and Maintenance (-00 vendor manual on the shelf; -01 manual on the shelf 6/24-150 MB Cartridge Tape)
014-001692	6586/6587 Magnetic Tape Drive Installation Guide
014-001460	Disk Drive Model 6491 Series General Specifications (-01 now on the shelf; rackmount drive, not office systems)-322MB Winchester Disk Drive
<i>MASS STORAGE OEM/VAR MANUALS</i>	
014-001756	Rimfire 3500 VMEbus SCSI Host Adapter with Floppy Port Product Specification
014-001757	Rimfire 3400 VMEbus ESDI Driver Controller Product Specification
014-001758	Rimfire 3200 VMEbus SMD-E Disk Controller Product Specification
<i>COMMUNICATIONS OEM/VAR MANUALS</i>	
014-001813	HPS Cluster Controller Technical Manual (VDC/8P, VDC/16)
014-001814	HPS Cluster Controller Installation Guide (VDC/8P, VDC/16)
014-001815	HPS VMEbus Host Adapters Technical Manual (VDA/128)
014-001816	DCP 8820 Technical Manual (VSC/4)
014-001817	Model 6236 Technical Manual (VAC/16)
014-001818	High-Performance VMEbus Ethernet Communications Controller User's Guide (VLC)
069-000347	HPS Terminal Control Software User Manual
069-000348	HPS Application Installation Manual
069-000349	HPS Diagnostic Application User Manual
069-000361	HPS Cluster Controller Download Package User Manual

Table 10. List of customer manuals for FCS of AViiON Systems Servers.

<i>Part No.</i>	<i>Description</i>
046-001287	Disk Array (AViiON), page 230-41
046-001288-02	High Availability Disk Array, page 239-53
046-001196	VME Communications Controllers, page 271-113, 271-121.5
046-001292-02	AV 7000, 8000 Packages, page 202-40.1
046-001291	AViiON Async. Connectivity, page 271-121.1
046-000924-02	AViiON Mass Storage, page 239-29
046-001013-02	DG/UX 4.30, page 301-12.3
046-000982-02	AViiON 4000 Servers, page 202-59
045-001313	AV 4600, 4620 Servers, page 202-70.3
046-000959-01	AViiON 400 Workstations
046-001230-02	1100 Series Cabinets MAPS/PLUS article, page 289-45

Table 11. MAPS/PLUS articles.

Specifications

Processor

25 MHz Motorola 88100 32-bit RISC processor:	HCMOS technology IEEE P754 floating point support on-chip Separate data and instruction memory ports Hardware register scoreboard
Motorola 88200/88204 CMMU:	HCMOS technology 16 or 64 KB, 4-way set-associative physical cache MMU with user/supervisor logical address space of 4 GB each

Memory

Minimum 16 MB to maximum 832 MB
ERCC with single-bit correction and double-bit detection
100ns 1 MBit and 4 MBit DRAMs in ZIP packaging

VME Bus

Slots:

10 9U slots: 6 slots also
support the memory bus:

Electrically compliant with
Motorola VME specification.
Revision C.1

Performance:

Sustained block mode VME bus
transfer rate: 25 MByte/sec

Lines:

Data transfer master:
—D32, D16, D08[EO]
—A32, A24, A16
—ADO (Address Only Cycles)
—RMW (Read Modify Write)

Data transfer slave:
—D32, D16, D09[EO]
—UAT (Unaligned Address
Transfer)
—A32, A24, A16
—ADO
—RMW
—BLT (Block Transfer)
—Location monitor A16

Requestor:

—Any one of BR (0-3)
—Any one of ROR, RWD, RONR

Interrupter:

—Any one of I(1-7)
—D08(O)
—ROAK (Release on
Acknowledge)

Interrupt handler:

—IH(1-7), D08(O)

Slots 1 functions (selectable):

—SYSCLK driver
—Power Monitor (power supply)
—IACK daisy chain driver
—Bus timer (BTO(32, 64, 128))
—Arbiter (PRI, RRS, SGL)

AC Power

Office package:	120V: 12 amps, single-phase 220V: 10 amps, single-phase 100V: 12 amps, single-phase
10 Slot Rackmount:	120V: 10 amps, single-phase 220V: 5.5 amps, single-phase 100V: 12 amps, single-phase 240V: 5 amps, single-phase
20 Slot Rackmount:	120V: 15 amps, single-phase 220V: 7.5 amps, single-phase 240V: 8.2 amps, single-phase

Environmental

Temperature:	
Office package:	Operating: 50° to 100°F; 10° to 38°C
Rackmount Packages:	Operating: 50° to 100°F; 10° to 38°C
Rackmount Dual and Quad CPU chassis:	Operating 32° to 100°F; 0° to 38°C
Rackmount and office package:	Storage -40° to +149°F; -40° to 65°C
Humidity:	Operating: 20% to 80% noncondensing Storage: 10% to 90%, noncondensing
Altitude:	2,438 meters (8,000') maximum

BTU/Hour (Worst Case)

Office package:	2650
Rackmount 10-slot CPU chassis	1775
Rackmount 20-slot CPU chassis	5460

KVA Rating

Office package	1.5 KVA
Rackmount 10-slot chassis	1.2 KVA
Rackmount 20-slot chassis	2.0 KVA

Physical

Dimensions:

Office package:	17.25" wide x 24.75" high x 25.5" deep
Rackmount 10-slot:	17.52" wide x 13.84" high x 24.203" deep
Rackmount 20-slot:	18.75" wide x 28.0" high x 26.25" deep (for systems mounted in cabinet positions other than topmost an additional 3.5" of vertical rack space is required)

Weight:

Office package:	Approx. 160 lbs (fully configured with mass storage)
Rackmount 10-slot chassis:	Approx. 135 lbs. (fully configured)
Rackmount 20-slot chassis:	Approx. 150 lbs. (fully configured)



AViiON 5200/6200 Servers

Fact Sheet

This revision includes the addition of quad-CPU 5240 and 6240 systems, higher system memory capacities, 1GB SCSI disks, disk array subsystems, and I/O maxima increases.

AViiON 5200 and AV6200 systems are Data General's answer for customers looking for UNIX based servers and multi-user applications. With its compact office packaging, the 5200 system is ideally suited as a low cost entry system for environments with 30 or more users. The 6200 system provides flexible rackmount packaging for larger applications. These systems utilize Motorola's 88100 RISC microprocessors in single, dual, and quad configurations.

These systems are an outstanding investment for customers. Simple, quick upgrades are available that can increase system capacities within minutes for growing applications. Data General's symmetrical, multi-processing DG/UX operating system allows applications equal access to hardware resources. If customer applications need large disk and memory capacities, the resources are available in the AV 5200 and AV 6200 systems.

- Industry-leading CMOS RISC technology
- Choice of Single, dual, or quad 25 MHz Motorola 88100 CPUs:
 - Field upgradeable from single to dual to quad
- Single- and double-precision IEEE hardware FPU
- Two Motorola 8820X memory management/cache chips per CPU
 - separate data and instruction ports (full Harvard architecture)
 - 4-way, set-associative caches
 - 88200 16 KB cache on single/dual processor
 - 88204 64 KB cache with quad
- Up to 784 MB of ECC memory
- 10-slot or 20-slot industry-standard VME bus for I/O:
 - Industry-standard Revision C.1
 - 25 MB/sec block transfers sustained
 - Full hardware cache coherency
 - 4 levels of bus arbitration
 - 7 levels of interrupt
- High-speed bus between CPU and memory:
 - VME/Motorola MBus superset bussed to 5 backplane slots
 - 4 byte/cycle peak transfer rate (100 MB/sec at 25 MHz)

- DG/UX operating system:
 - Symmetrical multiprocessing
 - Robust file system and medium-term scheduler
 - Complies with 88open, POSIX, SVID 2, and other standards
- Also available in AV 7000, AV 8000 packaged systems
- Machine-initiated service call (quad CPU servers)

AViiON servers:	5200	6200	6200-20
Packaging	Office	Rackmt.	Rackmt.
VME slots	10	10	20
Max. Memory	528 MB	784 MB	784 MB
Asynchronous connects (VDA/VDC) max.	1020	1275	1275
Asynchronous connects (VAC/16) max.	32	16	0
Ethernet LAN max.	2	2	8
Synch. boards/ports	6/24	6/24	12/48
Max. disk capacity:*			
Integral	3.3 GB	N/A	N/A
External	12 GB	60.0 GB	113.0 GB
Max. cartridge tapes (150 MB)	4	4	4
Max. reel-to-reel tapes	4	4	4
*Disk array maximums are lower			

Description

Overview

AViiON Servers can be configured to address a wide range of applications implemented in multi-user systems or network server models. AV 5200, AV 6200 and 6200-20 Series systems generally support 30 to 400 asynchronous users in typical commercial applications. This is only an estimate, however; appropriate user counts will vary greatly by application.

As servers, these systems provide file and compute resources for AViiON workstations, X-windows terminals, and DASHER/386 systems distributed across a local area network. Configured for multi-user applications, they can connect up to 1020 (AV 5200) or 1275 (AV 6200, 6200-20) asynchronous devices through VME distributed async host adapters and cluster controllers.

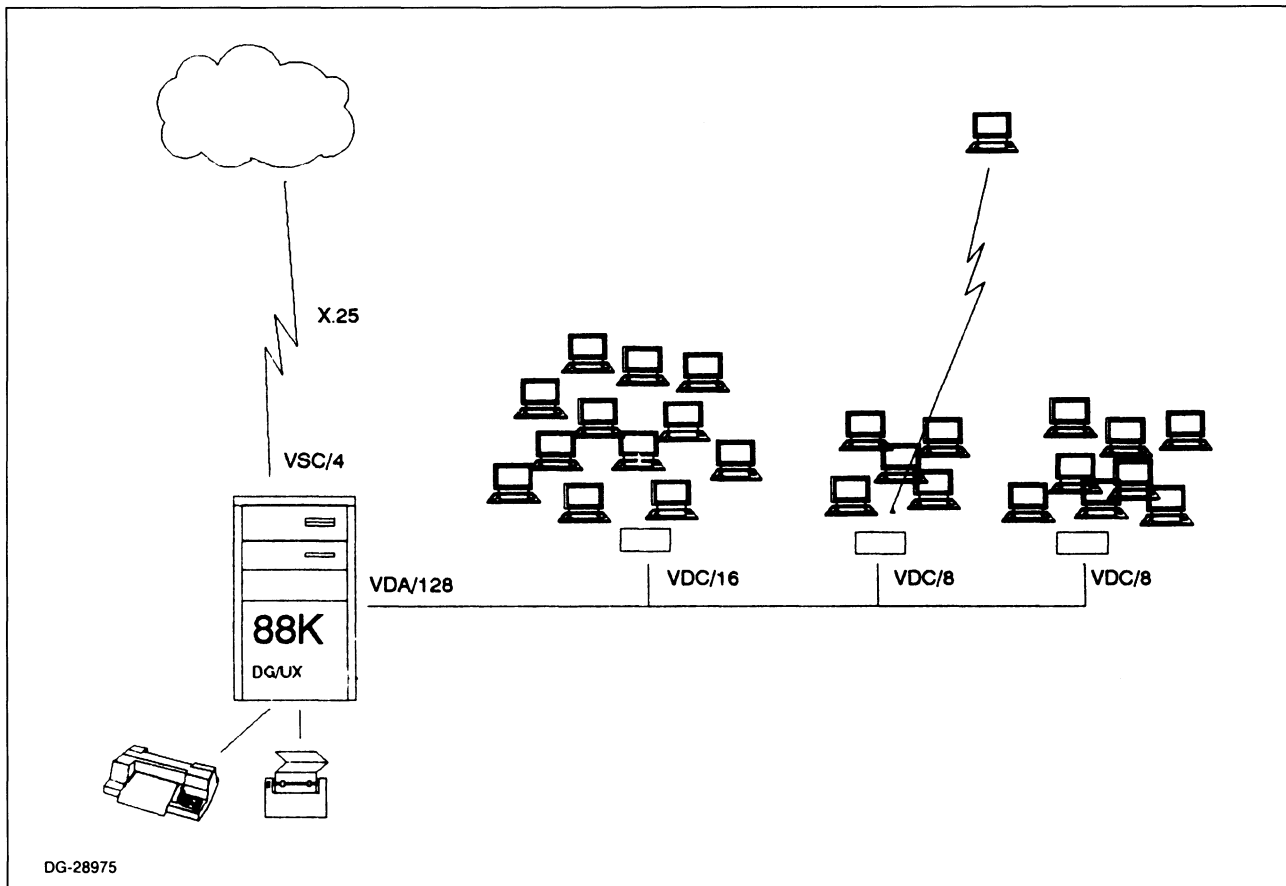


Figure 1. AViiON multi-user system configuration.

Industry-standard AViiON Server Systems offer customers superior price/performance in systems which are both configurable and balanced. Mass storage subsystems meet a range of user capacity and cost requirements, while providing high-performance I/O. The many configuration choices—single- or dual-processor, rackmount or office packaging—match the needs of many different customers.

AViiON system design is oriented towards performance; the Motorola 88000 chip set has a highly pipelined architecture, fast instruction execution, and integrated floating point. Equally important, the chip set architecture provides for multiprocessing (figure 3) so that customers can increase CPU performance with only a board swap.

The performance orientation of the AViiON systems carries through to the selection of peripherals and controller boards. For example, the mass storage controllers selected for the AV 5000 and AV 6000 Series are among the highest speed

available: they transfer data to the CPU and memory across an industry-standard 40 MB/sec VME bus.

CPU

The AViiON Server CPU is the Motorola 88100, Implemented with Motorola's HCMOS technology, the MC88100 incorporates 32-bit registers, data paths, and addresses. Because of the importance of maintaining a filled pipeline in RISC processors, the MC88100 incorporates *four independent execution units* (integer, floating point, data, and instruction) which operate independently and concurrently. Data memory accesses are performed by the data unit while instruction prefetches are handled by the instruction unit.

A *common register file* provides data sharing and synchronization control among the register units through register scoreboarding.

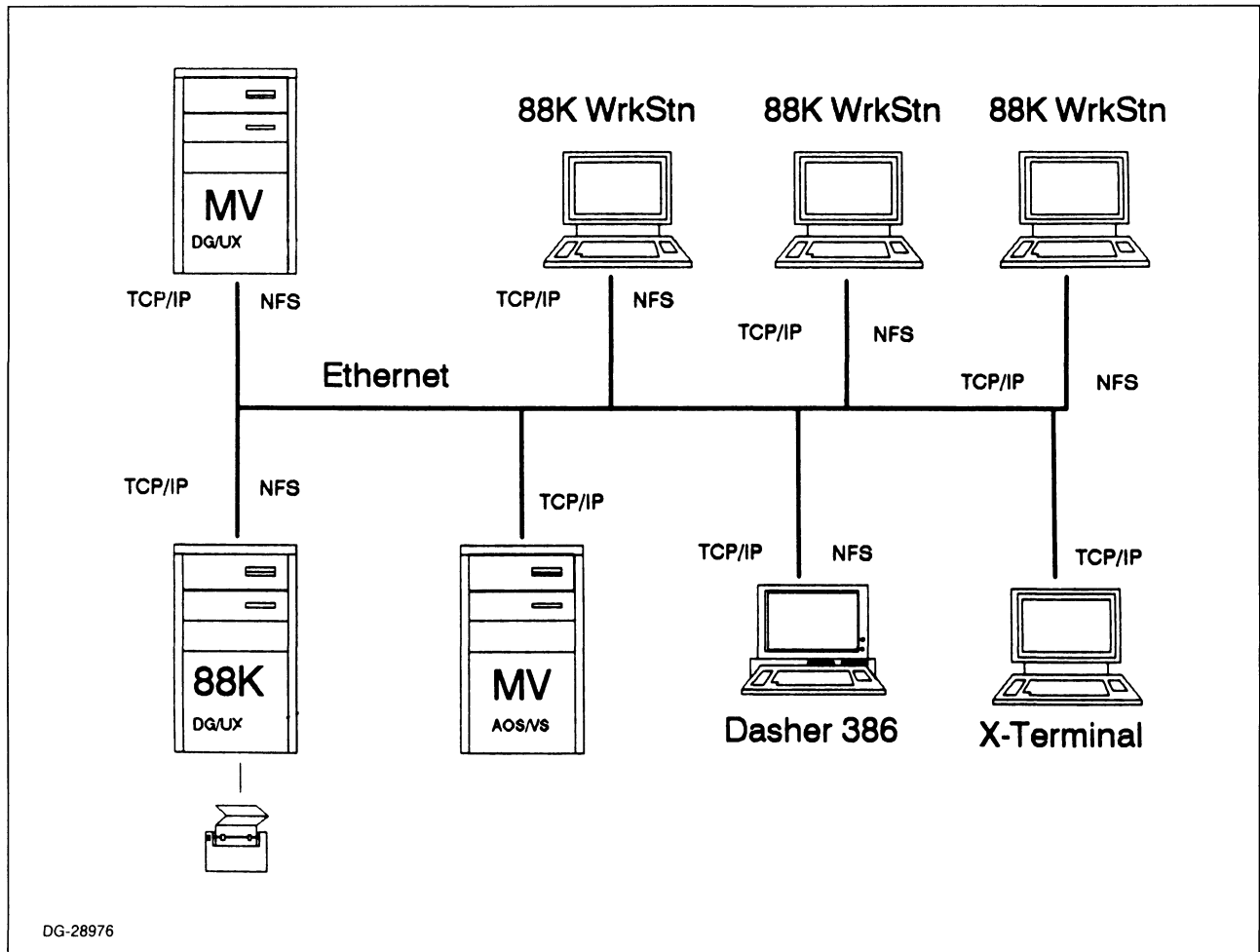


Figure 2. AViiON Network Server configuration.

IEEE P754 *floating point arithmetic* is fully supported by the processor's hardware which includes a 32-bit combinatorial multiplier. The FPU implements two pipelines: one for multiply instructions (6 stages) and one for all other floating point instructions (5 stages).

Parallel operations and pipelining are integral elements of the MC88100 design. The four execution units allow the MC88100 to perform up to five operations in parallel (figure 4):

- Access program memory
- Execute an arithmetic, logical, or bit-field instruction
- Access data memory
- Execute floating point or integer divide instructions
- Execute floating point or integer multiply instructions

In addition, the floating point, data, and instruction units themselves are pipelined and can complete an operation in every clock cycle:

- Up to five floating point add, subtract, compare, or convert instructions can execute simultaneously
- Up to six floating point or four integer multiply instructions execute simultaneously
- Up to three data memory accesses can be in progress simultaneously:
 - Two memory accesses on the external bus
 - One address calculation
- Up to two instruction fetches can be in progress simultaneously

The MC88100 instruction set contains 51 instructions. All integer arithmetic, logical, and bit field instructions, and certain flow control instructions can execute in a single cycle. Figure 5 is the MC88100 programming model: figure 6, the MC88100 instruction set.

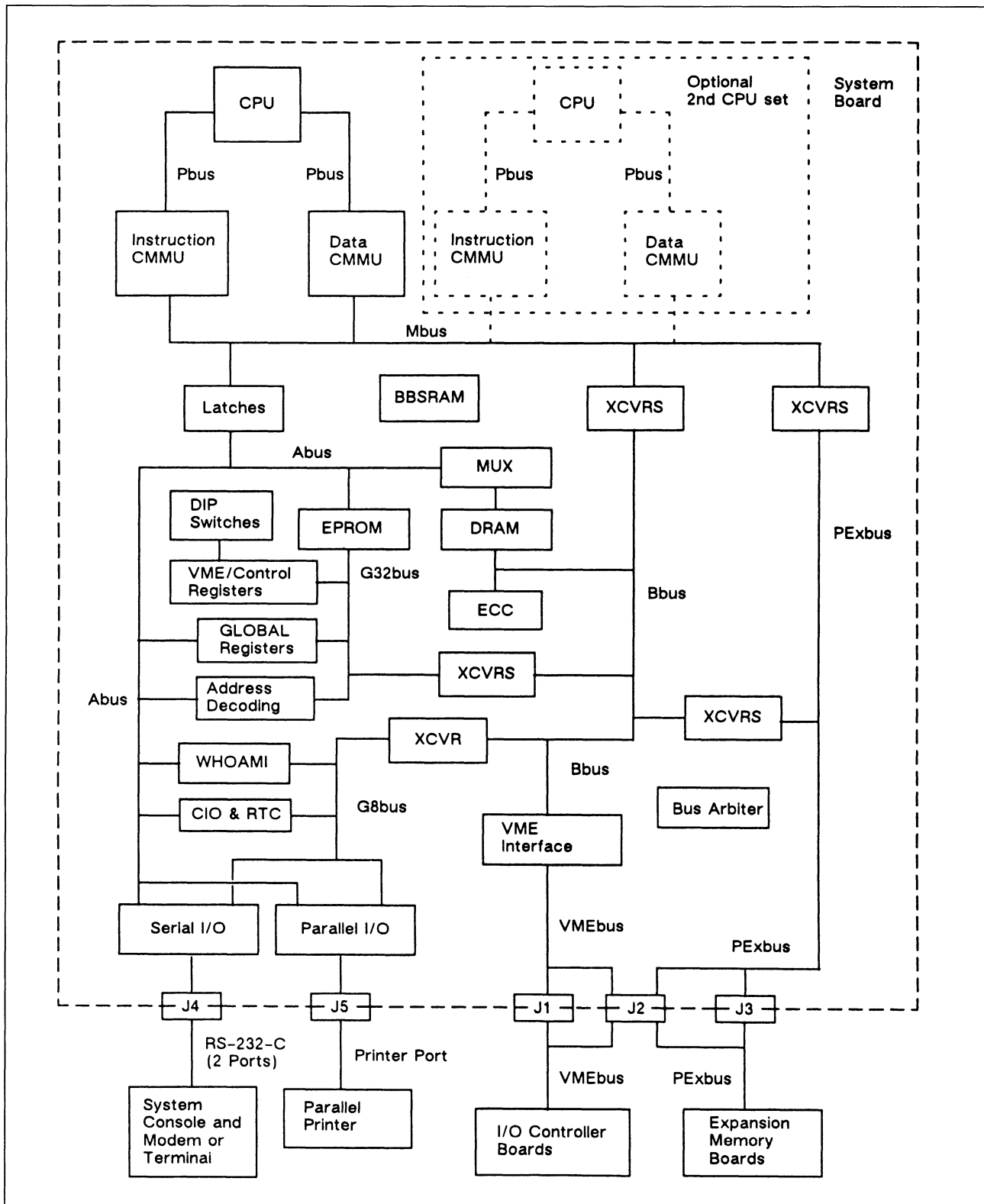


Figure 3. Single and dual system board architecture.

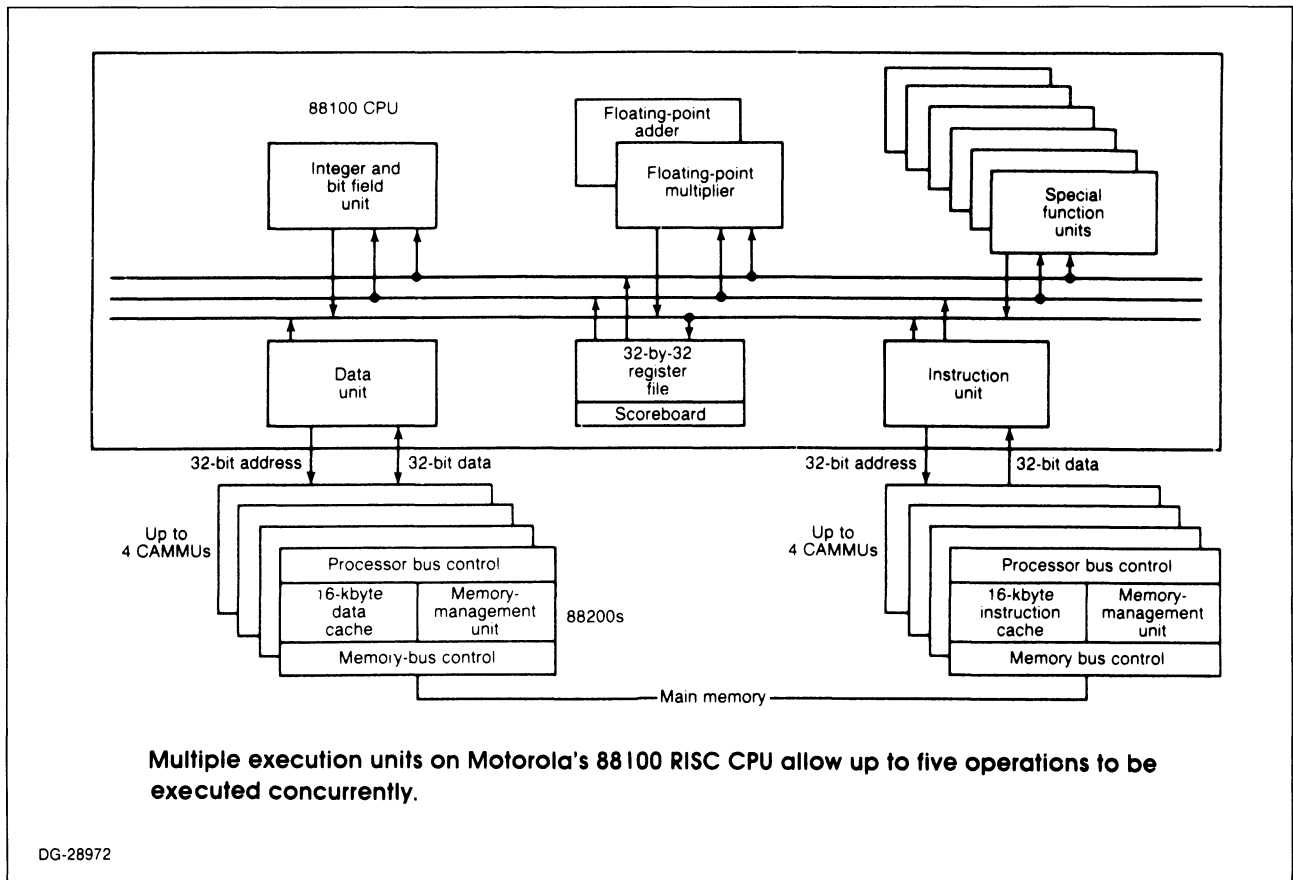


Figure 4. Concurrent execution of up to five operations.

The MC88100 uses a two-port, non-multiplexed memory access scheme (Harvard architecture). Transfers to and from the CMMU chips are performed through dedicated address and data paths; instruction fetches also take place over dedicated paths. These ports operate concurrently, eliminating bus contention between data accesses and instruction fetches.

Memory Management/Caching

The MC88200 (16 KB) and MC88204 (64 KB) CMMU are high-performance, HCMOS VLSI devices which provides zero-wait-state memory management and data caching. The MMU (memory management unit) supports a demand-paged, virtual memory environment with two logical address ranges (user/supervisor) of 4 GB each.

Translated addresses are provided by one of two ATCs (address translation caches), providing address translation in one clock cycle for most memory accesses. The PATC (page address translation cache) is a 56-entry, fully associative cache containing recently used translations for 4 KB memory pages and is maintained by MC88200 hardware. The BATC (block address translation cache) is a 10-entry

cache, loaded by software, containing translations for 512 KB memory blocks.

The CMMU data cache is a four-way, set-associative cache for instruction or data storage. The cache incorporates memory-update policies and cache coherency mechanisms that support multiprocessor applications. Each cache set employs an LRU (least recently used) replacement algorithm to allocate cache entries. The AViiON Server System maintains cache coherency through a copy-back mechanism.

Memory

The AViiON 5200, AV 6200 single and dual processor system boards contain 16 MB of 100ns ECC memory. The ECC memory performs single-bit error correction and double-bit error detection. The quad processor CPU board does not have any system memory as do the single and dual processor boards.

Up to 4 memory boards can be configured with the 5200 and 6200 systems. These memory boards are available in 16MB 32MB, 64MB, 128MB, and 192MB capacities. 48MB boards are no longer available.

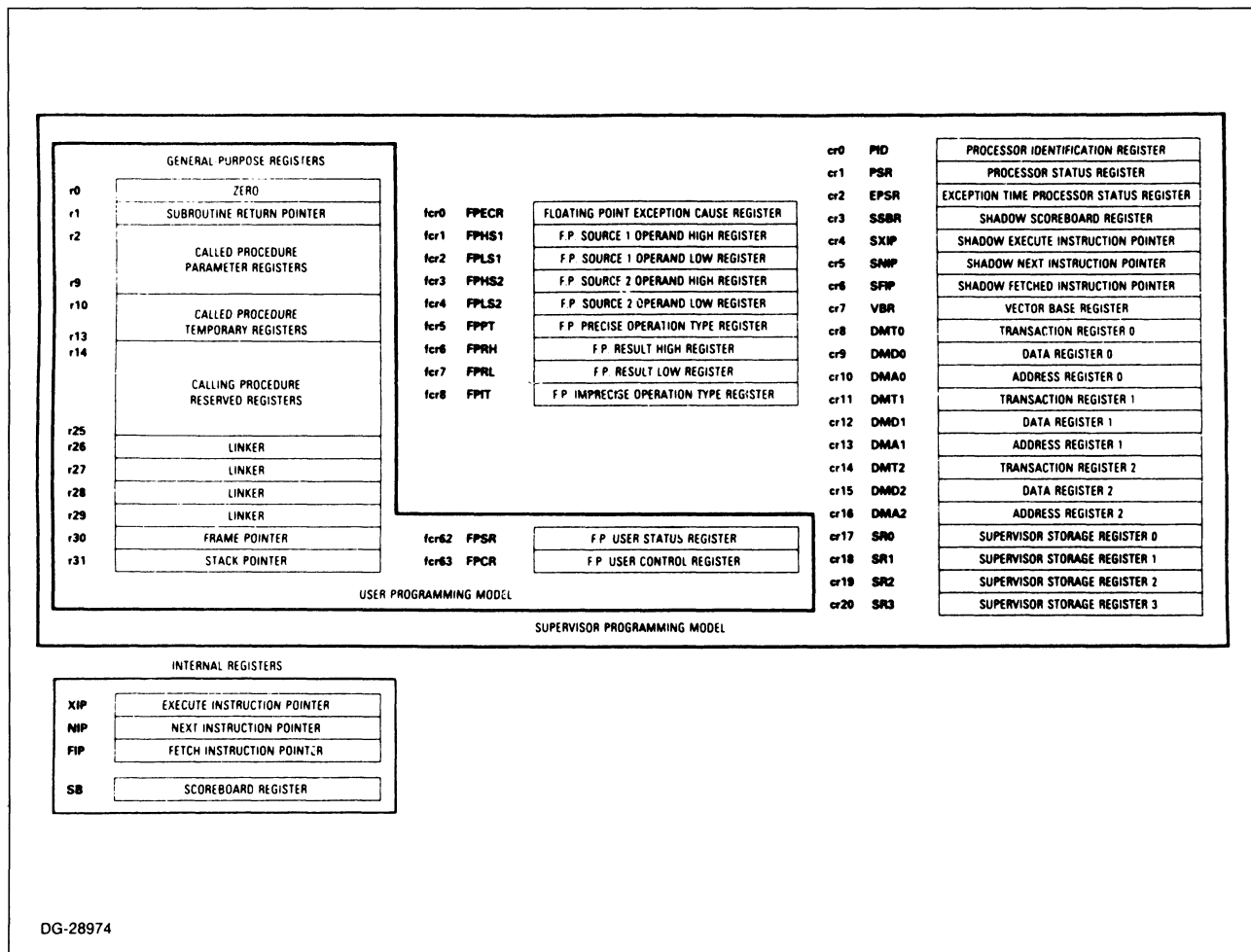


Figure 5. MC 88100 programming model.

Both the CPU board memory and the memory boards utilize ZIP packaging. The single and dual CPU boards, the 16MB memory board, and the 32MB memory board utilize 1 Mbit DRAM's. The 64MB, 128MB, and 192MB memory boards use 4 Mbit chips. Memory is implemented in rows of 39 bits each with a 2:1 interleave factor.

CPU and memory boards are a 9U form factor and interface to the system's memory bus.

Bus Structure

Two busses provide paths for all communications between boards in the system.

The *VME bus* on AV 5200, AV 6200 and 6200-20 Series systems is fully compliant electrically with Motorola's VME Bus Specification, Revision C.1. The VME bus is an industry-

standard 40 MB/sec bus which provides for data transfers between the system board and all controllers such as those for mass storage and communications. Data General's implementation of this bus incorporates high-performance features such as block transfers.

J1/J2 connectors are provided for all chassis slots to connect to standard P1/P2 connectors on Eurocard 6U form factor (233mm x 160mm) VME boards. For the 10-slot chassis, J3 connectors are provided for slots 1-6 and are reserved for the proprietary Pexbus. 9U form factor (400mm x 366mm) boards are also supported so long as they use VME standard signals on the J1/J2 connectors only. Since the slots themselves are all 9U form factor, an adapter is required to configure 6U boards. Such an adapter is included with all 6U form factor boards sold by Data General. Figure 7 displays 9U and 6U VME Eurocards.

Integer Arithmetic Instructions		Load/Store/Exchange Instructions	
Mnemonic	Description	Mnemonic	Description
add	Add	ld	Load Register from Memory
addu	Add Unsigned	lda	Load Address
cmp	Compare	ldcr	Load from Control Register
div	Divide	st	Store Register to Memory
divu	Divide Unsigned	stcr	Store to Control Register
mul	Multiply	xcr	Exchange Control Register
sub	Subtract	xmem	Exchange Register with Memory
subu	Subtract Unsigned		

Floating-Point Arithmetic Instructions		Flow-Control Instructions	
Mnemonic	Description	Mnemonic	Description
fadd	Floating-Point Add	bb0	Branch on Bit Clear
fcmp	Floating-Point Compare	bb1	Branch on Bit Set
fdiv	Floating-Point Divide	bcnd	Conditional Branch
fldcr	Load from Floating-Point Control Register	br	Unconditional Branch
flt	Convert Integer to Floating Point	bsr	Branch to Subroutine
fmul	Floating-Point Multiply	jmp	Unconditional Jump
fstcr	Store to Floating-Point Control Register	jsr	Jump to Subroutine
fsub	Floating-Point Subtract	rte	Return from Exception
fxcr	Exchange Floating-Point Control Register	tb0	Trap on Bit Clear
int	Round Floating-Point to Integer	tb1	Trap on Bit Set
nint	Round Floating-Point to Nearest Integer	tbnd	Trap on Bounds Check
trnc	Truncate Floating-Point to Integer	tcnd	Conditional Trap

Logical Instructions		Bit-Field Instructions	
Mnemonic	Description	Mnemonic	Description
and	AND	clr	Clear Bit Field
mask	Logical Mask Immediate	ext	Extract Signed Bit Field
or	OR	extu	Extract Unsigned Bit Field
xor	Exclusive OR	ff0	Find First Bit Clear
		ff1	Find First Bit Set
		mak	Make Bit Field
		rot	Rotate Register
		set	Set Bit Field

DG-28973

Figure 6. MC88100 instruction set.

Mechanically, in order for a 6U form factor board to mate with the DG 6U-9U adapter, it must operate without a front panel and that front panel must be user removeable. This is the case with all the 6U VME boards sold by Data General and is the case with the large majority of third-party boards. It is a limitation of which the customer should be aware, however, should he intend to configure third-party VME bus products. More expensive third-party adapter products such as the Dawn Model #9U400/6U-1 (Dawn VME Products, 47073 Warm Springs Blvd., Fremont, CA 94539 (415/657-4444) do not have this limitation, but do violate the VME bus specification by extending by three inches the distance from a driver on the VME board to the backpanel. It should be noted that this mechanical discussion also applies to Sun Microsystems

VME-based systems and is, therefore, not unique to Data General.

The *Pexbus (buffered memory bus)* is also bussed to the backplane of slots 1 through 5 for communication between the system board and all system memory, on-board and expansion. *Pexbus utilizes not only J3/P3 but also user-defined pins on J2/P2. Therefore, third-party or custom boards using the user-defined pins on J2/P2 should be configured only in slots 7-10.* It is a superset of Motorola's Mbus used by the MC88200 cache chips to provide a high-speed data path to system memory. The Pexbus is not an industry standard and is used only by the system board and DGC expansion memory for the AV 5200 and AV 6200 Series systems.

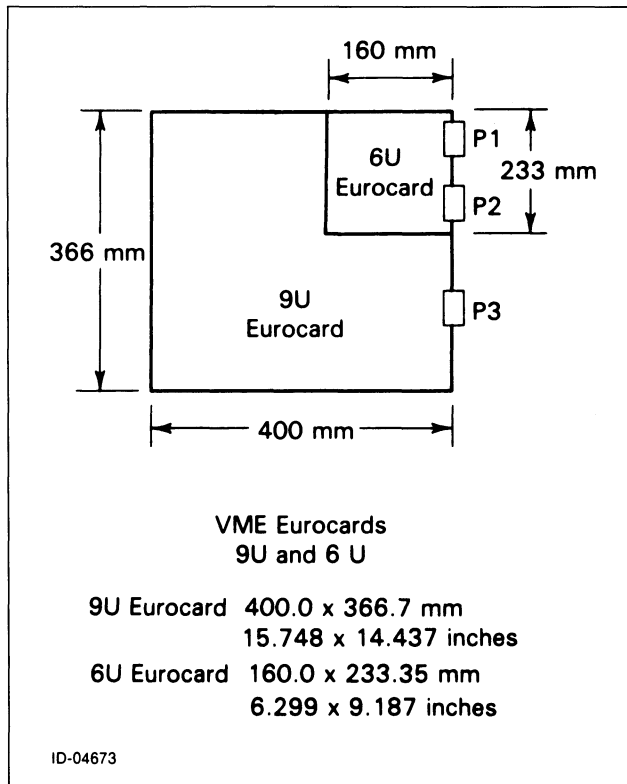


Figure 7. 9U and 6U VME Eurocards

DG/UX

DG/UX for RISC Systems is an advanced implementation of the UNIX Operating System based on AT&T's System V and the Berkeley Software Distribution (BSD) 4.3 operating systems, as well as the POSIX application interface standard. It also incorporates the 88open Binary Compatibility Standards and the X Windows standard among other industry, government, or de facto standards. DG/UX supports TCP/IP protocols for file transfer; remote disk access is provided by the Network File System (NFS).

DG/UX has many capabilities not generally available from other vendor: fully symmetric multiprocessing, an advanced file system with data security and recovery features, support for large file systems and files, a medium-term scheduler (for superior throughput and guaranteed forward response under heavy load), and enhanced error-reporting.

Packaging

Three packages are available: free-standing office (AV 5200 Series), 10-slot rackmount (AV 6200 Series) and 20-slot rackmount (AV 6200-20 Series) (Figures 8, 9, 10).

The *office package* is an attractive 17.25" W x 24.75" H x 25.5" D caster-mounted, integrated system suitable for an office environment. In addition to the 10-slot card cage and a 750 watt power supply, the office system can incorporate up to three full-height 5.25" disks and up to two half-height 5.25" removeable media devices such as the 150 MB QIC cartridge tape. Additional mass storage, such as a desktop reel-to-reel tapes, can be added externally.

The *10-slot rackmount chassis* incorporates the card cage with a 527 watt power supply in a NEMA-standard 14"-high chassis.

The *20-slot rackmount chassis* has a 1,080 W power supply in a Nema-standard, 28"-high chassis. It offers 15 VMEbus I/O-only slots for large AViiON system configurations. Four slots in the chassis can be used for memory expansion or for VMEbus I/O. All slots in the chassis have J1/J2/J3 connectors. The PEXbus runs through slots 1-5.

Communications

Asynchronous Communications

Three methods are provided to connect asynchronous devices to AV 5200, AV 6200 and AV 6200-20 Systems. See the VME Communications Controllers MAPS article (page 271-113) for complete details.

For low-connect counts, up to 16 RS232 devices can be connected through the *VAC/16 (VME Asynchronous Controller/16)*. Each VAC/16 is a 6U form factor board. All sixteen lines are full duplex. The board has an aggregate maximum data rate of 16 x 19.2 KBPS full duplex. All 16 ports support modem connection.

A *TCP/IP Ethernet LAN based terminal server connection scheme* is available. Recommended configurability is for 30 active users on a single 25MHz 5200/6200 and 60 active users on a dual processor 5220/6220. Development work is planned to increase the number of active users that can connect to 5200 and 6200 systems from Ethernet-based terminal servers. Terminal server connection is the strategic direction for connection of async users. AViiON systems in the future will have all users connected via LANs.

Also available is a *distributed asynchronous host adapter* solution. This host adapter allows the concentration of terminal hook-ups some distance from the rear bulkhead of the system via a single coax cable. This relieves cabling concentration problems at the rear of the bulkhead and also dramatically increases the number of connects per VME slot.

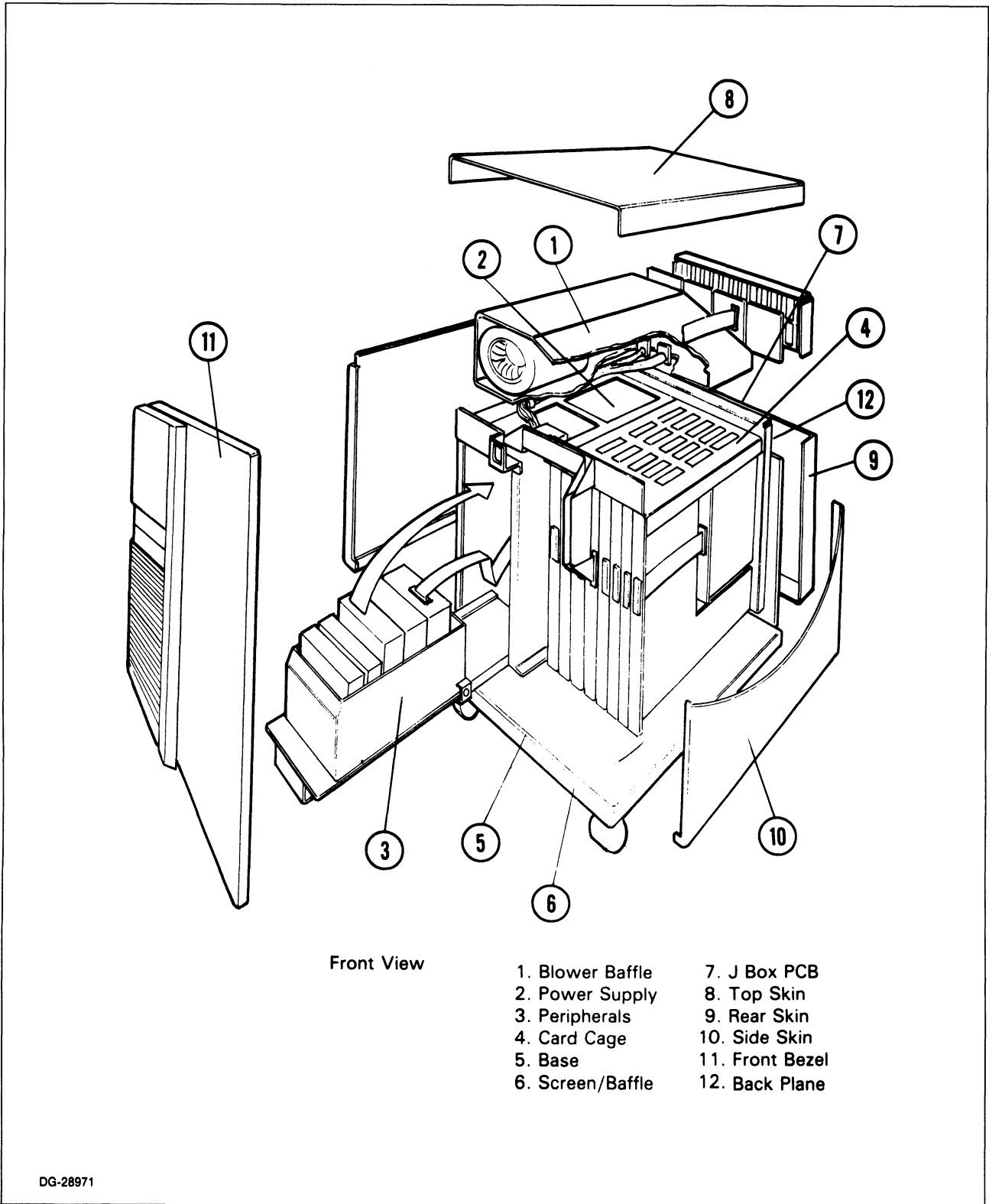


Figure 8. AV 5200 office packaging.

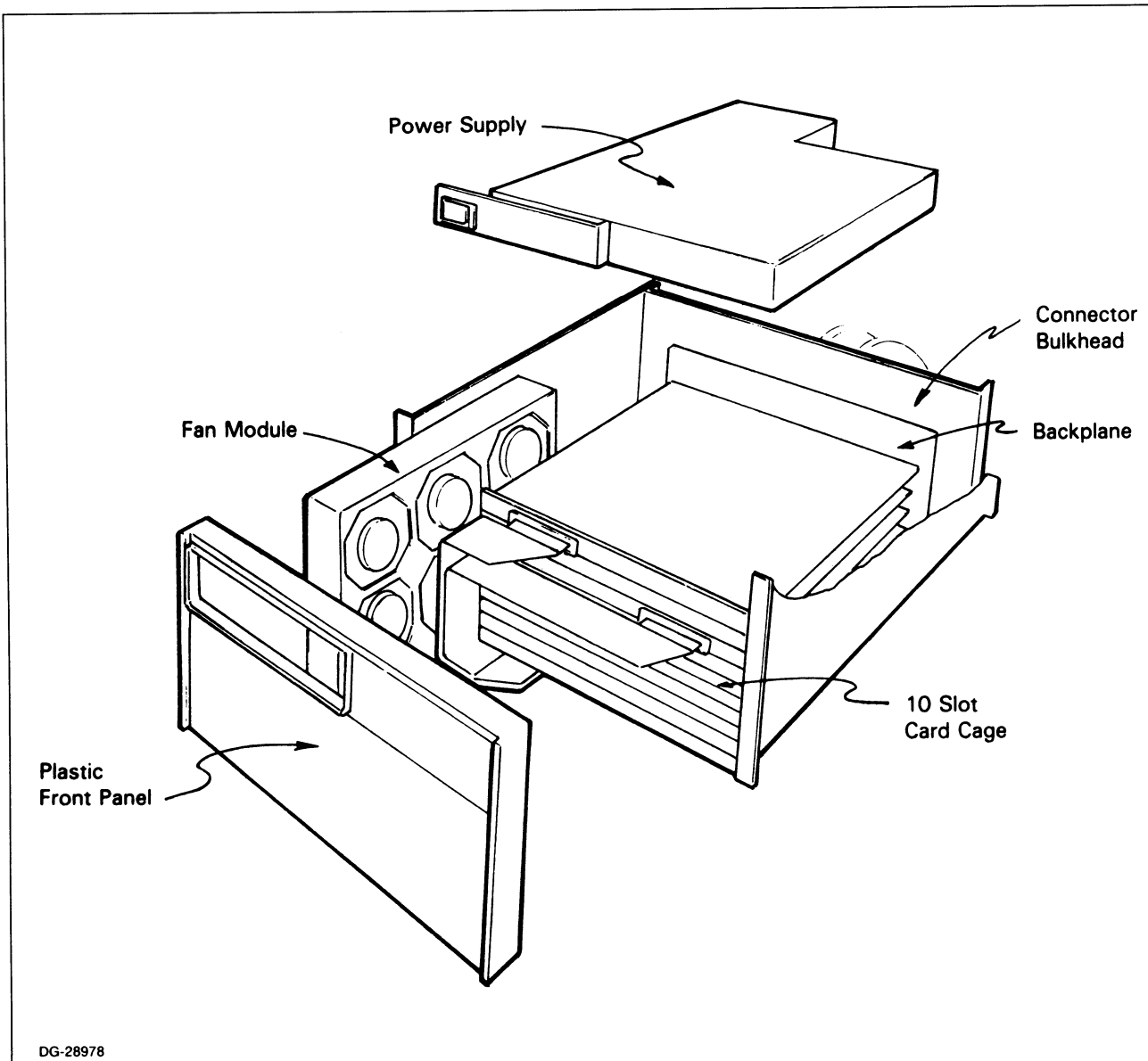


Figure 9. AV 6200 10-slot rackmount packaging.

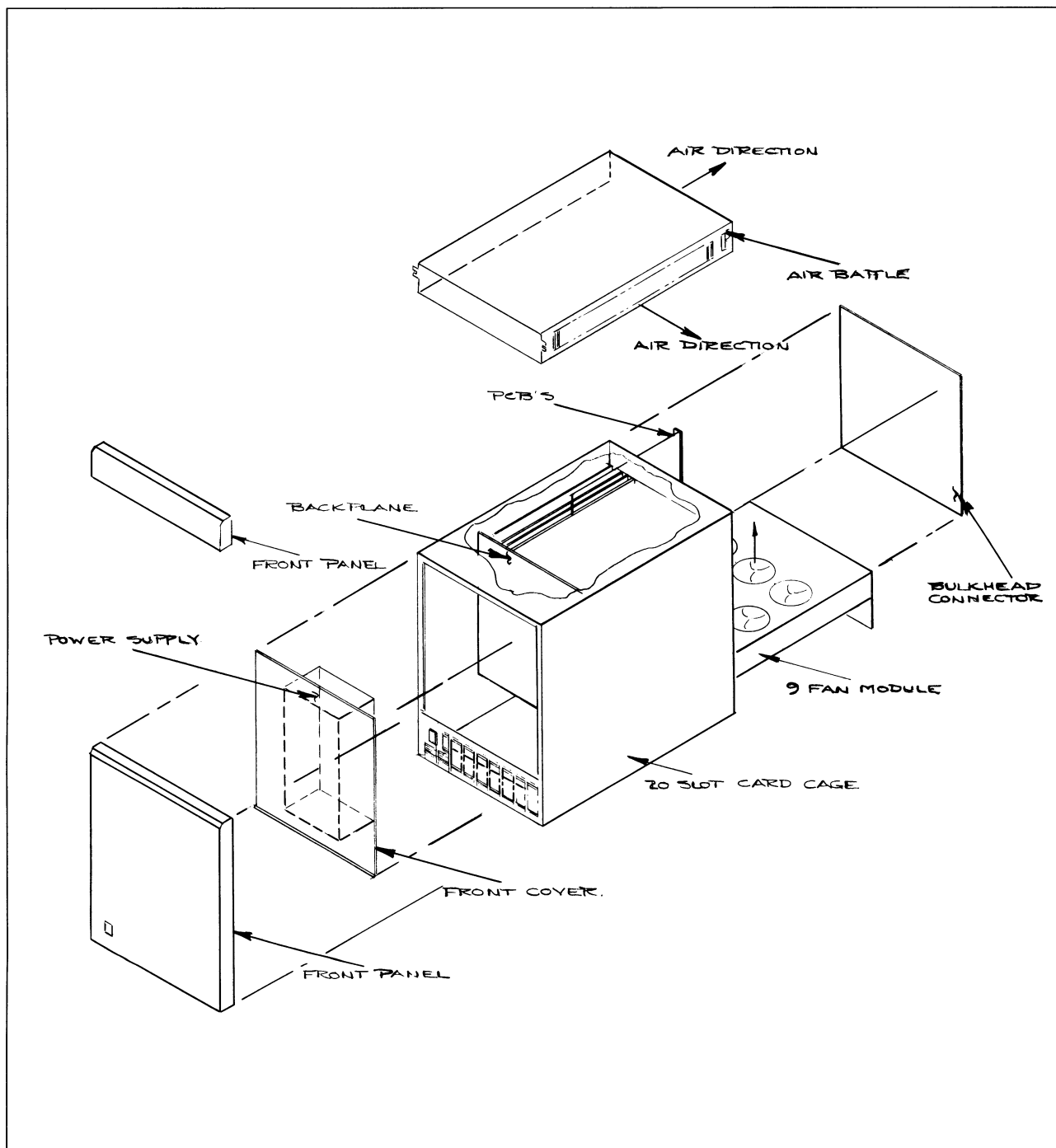


Figure 10. AV 6200-20/6220-20 20-slot rack-mount packaging.

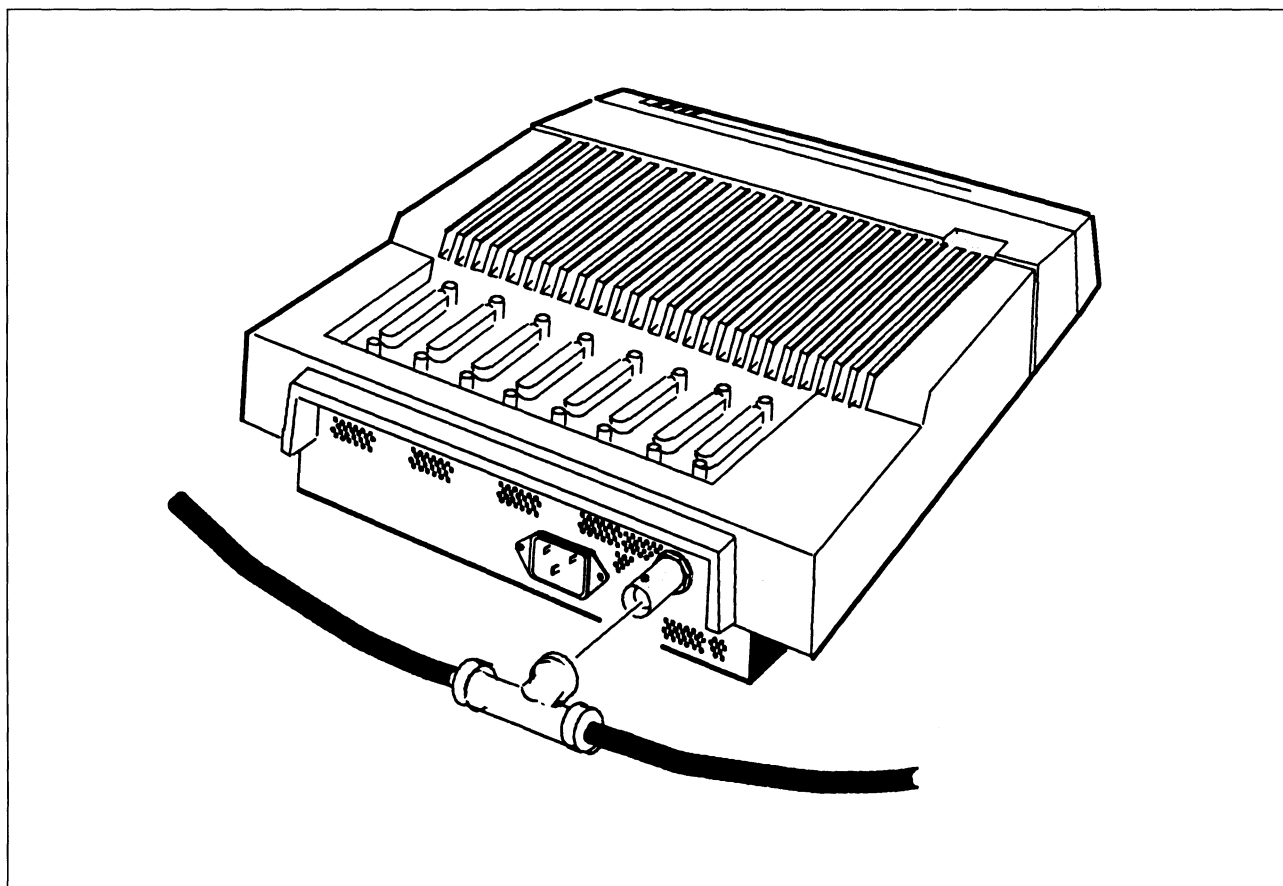


Figure 11. VME distributed cluster controller (VDC). T-connector shipped with VDC. Cables are Model 15338Exxx cluster extension cables.

The *VDA/255 (VME Distributed Async)* is the 6U form factor board which plugs into a VME slot in the AViiON Server System and connected to the *VDC (VME Distributed Cluster)* boxes through an RG62 coax cable. Up to 255 lines per VDA/255 may be connected through distributed clusters. For typical commercial applications, however, the active users per VDA/255 should be limited to approximately 128 for performance reasons.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines) (figure 10). All cluster controllers support the following RS232C signals: CTS, DCD, DSR, DTR, RTS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

Synchronous Communications

Synchronous communications for the AV 5200, AV 6200, and AV 6200-20 Systems are handled by the *VSC/4 (VME Bus Synchronous Controller)*. This 6U form factor controller offers four multi-protocol serial communications channels (RS232C/RS422) with full duplex DMA operation using two Zilog 8530 SCC chips. The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. Two independent sync protocols can be handled simultaneously by this board. Aggregate throughput is 1.6 Mbit/sec.

LAN Communications

Ethernet LAN communications are provided by the *VLC (VME Bus Ethernet LAN Controller)*. This board implements IEEE 802.3 Ethernet on a 6U VME board with an intelligent Ethernet controller chip (7990 LANCE) and a 256 KB dual-ported data buffer, providing high-speed, 32-bit bus slave data access. The controller chip communicates with the on-board memory for all command and data transactions. The data packet is placed or retrieved from the buffer on the VME bus from main memory via a software process which handles cache coherency.

Mass Storage

For a detailed review of the mass storage controllers, disks, and tapes used on the AViiON 5200 and 6200 subsystems, see references in Related Information. Below is a brief summary of the VMEbus mass storage controllers.

VME Controller Boards

VME SCSI Controller Board (Office and Rackmount): This 6U form-factor controller board controls up to 7 devices on an asynchronous SCSI bus with a 2 MB/sec asynchronous transfer rate, synchronous 4MB/sec. The board is designed around an 8 MHZ Intel 80186 processor and a Western Digital 33C96 SCSI chip. This board is an OEM'd version of the Ciprico Rimfire 3500. One of these boards is included in all AV 5200 and 6200 package configurations to support the 150 MB cartridge tape.

VME SMD Controller Board (Rackmount): THIS BOARD IS NO LONGER ACTIVELY SOLD. This 9U formfactor controller board controls from 1 to 4 SMD drives for AV 6200/6200-20 Series systems with a 3.0MB/sec data transfer rate. It is based on an Intel 80186 processor and uses a 8466 National disk controller, 512 KB of on-board cache RAM, separate processor and system data buses, and a proprietary VME FIFO gate array. This controller achieves its high reliability and performance through a variety of special functional features including: bad sector remapping, scatter/gather DMA operations, overlapped seeks, command queuing, command optimization, and command coalescing (block address optimization) with a segmented read-ahead cache. This board is an OEM'd version of the Ciprico Rimfire 3221.

Hardware Support Services

Field Support Services

Data General Field Engineering supports the AViiON systems with state-of-the-art service technology. Several types of service programs offer a full array of options designed to satisfy users' uptime requirements. A new feature of the quad CPU (5240, 6240) servers is a machine initiated trouble call to country support centers, implemented through field engineering.

On-Call Service: An on-site service with flexibility of selecting coverage periods and varied options to meet specific application needs. Contracted on-site repair includes unlimited parts, labor and travel for a budgeted monthly fee. Customers may purchase additional options such as Extended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The Multiyear Plus: Offers all the benefits of an On-Call Agreement and more. Significant discounts and price increase protection are offered for customers signing a 3 to 5 year agreement. Customers receive discounts of up to 10% over the life of the agreement and all the benefits of On-Call service.

Both agreements include 7-day, 24-hour on-line remote diagnostic service. PCB Resume, a tool used in conjunction with remote diagnostics, lets the field engineer or remote staff access valuable information on the performance history, specs, revision level, and compatibility of the board in questions. The result is fast, accurate diagnosis and an increase in system uptime.

Unified System Support: AViiON customers with On-Call or Multiyear service receive not only hardware maintenance, but also the following software services:

Telephone and remote support system software, including DG/UX, DTK, NFS, TCP/IP, X Windows, Motif, Looking Glass, and Gnu C.

Right-to-Copy (RTC) purchased updates and revisions of any software licensed to run on the customer's AViiON for which Data General offers RTC. Note that the actual updates and revisions must be purchased separately.

Additional information on service is available from a Data General salesperson or by calling the Data General Field Engineering Telemarketing Group at 1-800-325-3065, (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Users may take advantage of a warranty conversion option by signing up for a Multiyear Plus or On-Call Agreement. With an agreement, warranty service is automatically upgraded to contract service. This warranty covers all base-system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server specific, shared AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Configurations/Ordering

Color

The AViiON systems use a Gray (G prefix) color scheme.

CPU and Memory Guidelines

The processors are on a single 9U system board. With the single and dual processors, 16 MB of memory is included on the system board. The quad processor has no system memory on the board. Only one processor board may reside in the system. Customers may have their systems upgraded on-site through a simple board swap. See the upgrade section for details.

Additional memory can be configured in slots 2-5. Memory boards are available in 16MB, 32MB, 64MB, 128MB, and 192MB. The 192MB memory board is available only on the 6200 systems. Any combination of these may be installed in the systems. See Table 1 for the memory model numbers.

With the DG/UX operating system, a minimum of 16MB is required for the single and dual processors. The quad processor requires a minimum of 32MB of memory.

Memory board upgrades are available from CPD. A memory board upgrade is the swap of memory boards—for example, a 16MB for a larger size memory. These would be used if your customer is increasing system memory and is limited by the four memory slots. To limit the cases where upgrades are required, always order the largest memory board that meets your customers requirements to preserve memory slots for future expansion.

<i>Model Number</i>	<i>Description</i>
7001	16MB Memory Board
7002	32MB Memory Board
7015	64MB Memory Board
7016	128MB Memory Board
7017	192MB Memory Board

Table 1. AViiON 5200 and 6200 Memory Boards.

Slot Assignments

The system board must reside in slot 1. Expansion memory must reside in slots 2 through 5. VME boards can be configured in slots 2 through 10. Third-party or custom VME boards which utilize the user-defined pins on J2/P2 may be configured in slots 7 through 10 only. Table 2 displays slot assignments for the 10 slot chassis.

<i>Slot No.</i>	<i>Slot Assignment</i>
1	System board
2	Expansion Memory or I/O
3	Expansion Memory or I/O
4	Expansion Memory or I/O
5	Expansion Memory or I/O
6	I/O
7	I/O
8	I/O
9	I/O
10	I/O

Table 2. AV 5200, AV 6200 slot assignments, (10-slot chassis).

6200-20 systems have a 20 slot VMEbus chassis for large configurations. There have been two generations of AViiON 20 slot chassis. Special Systems first shipped a 20 slot product in Spring 1990. In March 1991, a revised version of the Special Systems product was qualified for shipment as a standard product. This product also significantly expanded configurability of mass storage, Ethernet LAN's, and synchronous communication.

To meet the increased configuration maxima, certain configuration restrictions apply. These are:

9U VME boards can only be configured in slots 1-10. Standard products in the 9U form factor are the CPU board, memory boards, and the disk array IOP.

Slots 11-20 can only take 6U form factor boards. To increase the room for internal cables, a different adapter board is used in these slots that recesses the front of the boards several inches from the 9U form factor. The 20 slot chassis ships with all 20 slots configured with a board or the applicable board adapter to ensure the integrity of the cooling subsystem. VME boards added to the system following shipment do not require the adapter boards.

Power

The integrated office package includes a 750-watt power supply and the 10-slot rackmount package includes a 527-watt power supply. The 20-slot includes a 1,080 W power supply. If only Data General controller boards and peripherals are configured with these systems, no configuration restrictions are imposed by available power.

Below are the amperes required for each of the boards and mass storage devices that draw current from the 5200 and 6200 series power supplies.

<i>Current Requirements for AViiON Boards and Disks</i>			
	<i>Amperes Required</i>		
	<i>+5V dc</i>	<i>+12V dc</i>	<i>-12V dc</i>
Single CPU/16MB	23	—	.01
Dual CPU/16MB	24	—	.01
Quad CPU	20.7	—	.01
16MB expansion memory	8.2	—	—
32MB expansion memory	8.6	—	—
48 MB expansion memory	9.0	—	—
64 MB expansion memory	9.0	—	—
128 MB expansion memory	9.2	—	—
192 MB expansion memory	9.5	—	—
SCSI Controller	4	—	—
Disk Array IOP	20.0	—	—
ESDI Controller	5	—	.5
SMD Controller	5	—	.586
VDA/128	3	—	.17
VSC/4	3	.07	.07
VAC/16	3	.25	.25
VLC	2.5	.45	—
150MB QIC tape	.66	1.5	—
332MB SCSI drive	1.1	2.5	—
662MB SCSI drive	.7	2.0	—
1GB SCSI drive	2.0	4.0	—
General Purpose I/O	8	—	—
IEEE-488	2	—	—
DR11-W	4	—	—
Vector Processor	5	—	—

The 5200 Series power supply provides 750 watts of power for the office package configuration. In Japan, output of the power supply must be limited to 670 watts because of the AC input line cord maximum rating. The maximum DC amperes output for the 5200 series power supply is listed below.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	105	525
+ 12 dc	17	204
- 12 dc	4	48
Total		777 watts

The limiting factor is the 750 watts maximum output. Therefore, power draw cannot go to the maximum of each of the dc outputs listed above. The total wattage cannot exceed 750 watts.

In Japan, NDG has recommended that the following guidelines be used for configuring 5200 Series systems to the 670 watt maximum.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	88	440
+ 12 dc	15	180
- 12 dc	4	48
Total		668 watts

The NDG guidelines for each of the dc outputs can be exceeded up to the maximum output of the power supply as long as total watts does not exceed 670. For example, in Japan a total of 95A +5, 12A +12, and 4A -12 could be configured for a total of 667 watts.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	95	475
+ 12 dc	12	144
- 12 dc	4	48
Total		667 watts

The 6200 series power supply is rated at 527 watts with the following maximum dc outputs. Please note that the DC ratings below are valid for shipments of 10-slot chassis beginning on April 13, 1990. A change to the power supply was made at that time to accommodate maximum configurations of SMD disks. If you have a customer with a rackmount chassis that shipped prior to 4-13-90, this power supply must be upgraded when the third SMD controller is added to the system. Revision 5 or higher (part # 005-34493) is required when adding the third SMD controller. All other configurations using Revision 4 and earlier power supplies operate reliably.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	92	460
+ 12 dc	2.3	28
- 12 dc	3.2	38
Total		527 watts

The 6200-20 Series power supply is rated at 1,080 Watts with the following maximum dc output.

	<i>20-Slot</i>	
	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	180	900
+ 12 dc	15	180
- 12 dc	10	120

Ordering 5200 Systems

Entry 5200 systems include the caster mounted desktop package with the processor board, a SCSI controller (single ended bus), a QIC cartridge tape (load device), and at least one SCSI disk. The models and their contents are identified in Table 3.

<i>Model #</i>	<i>Processor</i>	<i>Memory</i>	<i>QIC Tape</i>		<i>Internal Disk</i>		
			<i>150MB</i>	<i>520MB</i>	<i>332MB</i>	<i>662MB</i>	<i>1GB</i>
G70184	5200	16MB	1		1		
G70185	5200	16MB	1			1	
G70186	5200	16MB	1			3	
G70268	5200	16MB		1	1		
G70269	5200	16MB		1		1	
G70272	5200	16MB		1		3	
G70270	5200	16MB	1				1
G70271	5200	16MB		1			1
G70331*	5200	16MB		1	1		
G70332*	5200	16MB		1			1
G70187	5220	16MB	1			1	
G70188	5220	16MB	1			3	
G70273	5220	16MB		1		1	
G70276	5220	16MB		1		3	
G70274	5220	16MB	1				1
G70275	5220	16MB		1			1
G70333*	5220	16MB		1			1
G70291	5240	32MB		1		1	
G70292	5240	32MB		1			1
G70293	5240	64MB		1			1
G70294	5240	128MB		1			1

*G70331, G70332, G70333 have two internal SCSI channels. First channel connected to three FH disk slots and is terminated internally. Second channel connects to two removeable HH slots and terminates on the bulkhead.

Table 3. 5200 System Models.

<i>Model No.</i>	<i>Description</i>	<i>CPU</i>
G70082	AV6200 10-slot rackmount chassis, 16MB memory	single
G70083	AV6220 10-slot rackmount chassis, 16MB memory	dual
G70190	AV6200 20-slot rackmount chassis, 16MB memory	single
G70191	AV6220 20-slot rackmount chassis, 16MB memory	dual
G70295	AV6240 10-slot rackmount chassis, 32MB memory	quad
G70296	AV6240 10-slot rackmount chassis, 64MB memory	quad
G70297	AV6240 10-slot rackmount chassis, 128MB memory	quad
G70298	AV6240 10-slot rackmount chassis, 192MB memory	quad
G70395	AV6240 20-slot rackmount chassis, 32MB memory	quad
G70396	AV6240 20-slot rackmount chassis, 64MB memory	quad
G70397	AV6240 20-slot rackmount chassis, 128MB memory	quad
G70398	AV6240 20-slot rackmount chassis, 192MB memory	quad

Table 4. AV6200 Series (Rackmount) Base Systems.

<i>Model</i>	<i>VMEbus Board</i>			<i>CSS2 Chassis</i>			<i>CSS2 Chassis</i>		<i>CSS2 Chassis</i>		<i>Cabinets</i>
	<i>CPU</i>	<i>LAN</i>	<i>SCSI</i>	<i>525QIC</i>	<i>2GB TP</i>	<i>1GB</i>	<i>662MB</i>	<i>1GB</i>	<i>1GB</i>		
G70262-B	6200	1	1	1		2					G11212
G70262-C	6200	1	1	1		2					G11222
G70263-B	6200	1	2	1	1			2			G11212
G70263-C	6200	1	2	1	1			2			G11222
G70264-B	6200	1	2	1	1		2				G11212
G70264-C	6200	1	2	1	1		2				G11222
G70300-MB	6200	1	3	1	1			1		1	G11212
G70300-MC	6200	1	3	1	1			1		1	G11222
G70265-B	6220	1	1	1		2					G11212
G70265-C	6220	1	1	1		2					G11222

10 slot rackmount chassis only
 11000 Series cabinets are either power suffix -G7 or -F7, G11212 is 59" cabinet, G11222 is 63" cabinet.
 Model G70263 uses differential SCSI subsystem with 2nd CSS2 chassis, 70300-M uses differential SCSI in 2nd and 3rd CSS2 chassis.
 All required device cabling is included.

Table 5. AV6200 System Packages.

Ordering 6200 Systems

Rackmount systems are available in 10 slot and 20 slot chassis. The 10 slot chassis is suitable for small configurations. Where growth is anticipated order the 20 slot chassis to ensure that your customer has adequate room to expand their configurations. Customers purchasing dual and quad processor configurations should order the 20 slot chassis to meet configuration requirements.

Systems are available in base packaging (CPU chassis, CPU board, and memory) and packaged with disk, tape, and cabinets (10 slot chassis, single and dual processors only). Base packages are listed in Table 4. Packaged systems are listed in Table 5.

5200 SCSI Mass Storage

5200 systems use SCSI peripherals to provide mass storage resources. Two separate channels are available in the system to connect SCSI devices. Pertinent information on SCSI Bus length configuration rules is included in a following section. Ensure this is understood prior to configuring mass storage for the 5200.

An internal single-ended SCSI channel is connected to five storage cavities in the 5200 chassis. Three of these cavities are disk only cavities capable of mounting either full height or half

height 5.25" devices. These three cavities are mounted behind the front dress panel and are not accessible in ordinary use. Two half height slots are available for removable media devices or disk. The internal SCSI cable included with the base system package runs to each of the five storage cavities and then to the bulkhead where it is terminated. External SCSI devices can be connected to the internal channel within the single ended SCSI bus length limitations and the limit of eight devices on any single SCSI bus. One device address slot is taken by the SCSI controller, which leaves seven addresses for disk and tape.

A second SCSI channel can be configured with the 5200 to connect to external SCSI devices. This channel can be either a single-ended channel (VMEbus controller Model 7407) or a differential channel (VMEbus controller Model 7415). There are specific models for single-ended and differential products. They cannot be mixed. Subsystems are either all single-ended components or all differential components. The differential controller should always be used if customers require large disk configurations. Cable length limitations on the single ended SCSI do not allow two CSS2/DC chassis to be daisy chained together. With a differential SCSI subsystem, two CSS2/DC chassis can be daisy chained together.

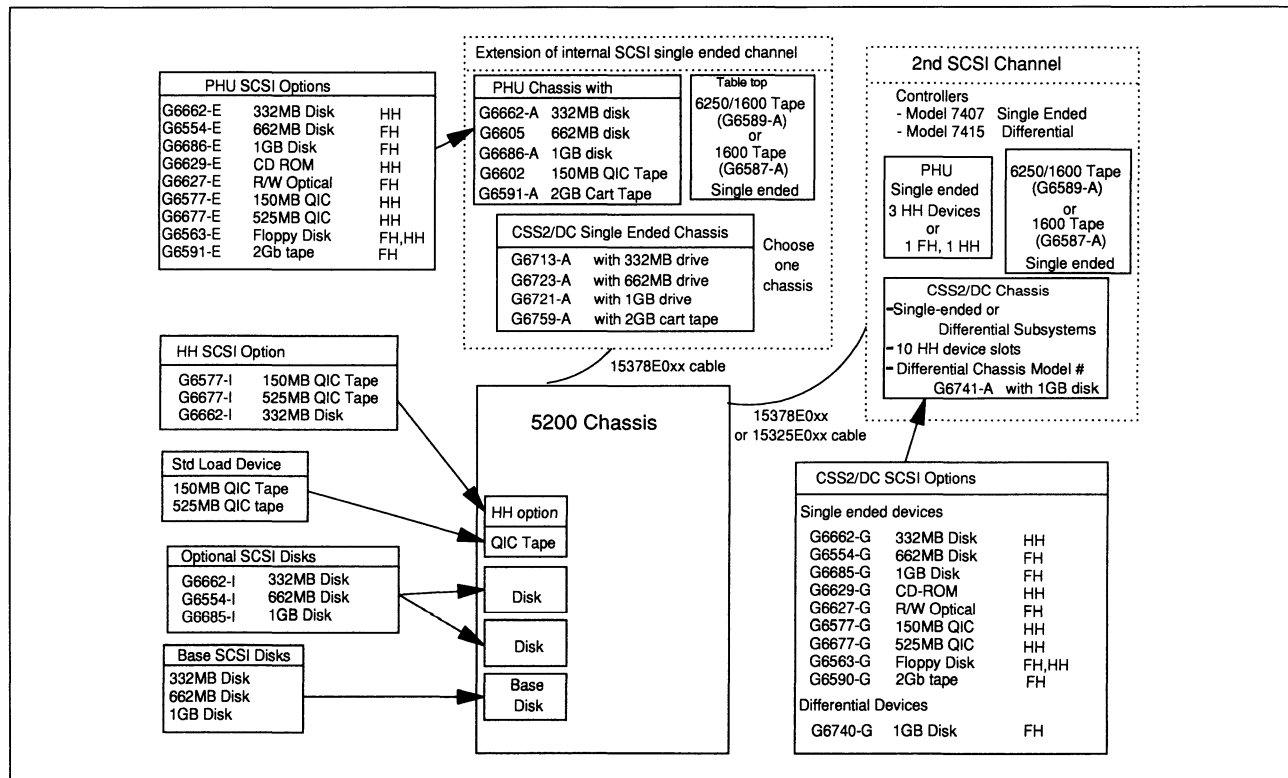


Figure 12. 5200 Mass Storage Options.

External chassis that can be connected to the 5200 systems are the CSS2/DC chassis, the peripheral housing unit (PHU), a table top 6250 bpi R-R tape, and a table top 1600 bpi R-R tape (see table 6 for model numbers). The CSS2/DC is an office package that can configure 10 HH 5.25" SCSI devices. These 10 HH slots can be configured as a mixture of FH or HH devices. The PHU is for smaller configurations and holds three HH devices or one FH and one HH. See Figure 12 for the details on 5200 mass storage options.

Maximum disk storage on a 5200 is 15GB. Figure 13 details how to configure maximum storage on a 5200 system.

Cables for connection of the 5200, CSS2/DC, PHU, and the R-R tapes MUST be ordered separately. See Figure 15 for a listing of required SCSI cables.

Disk arrays for 5200 servers are available in CSS2 chassis. See reference in Related Information for details.

6200 SCSI Mass Storage

All of 6200 mass storage is SCSI based. The CSS2 is an 8.75" high rackmount storage chassis that has space for 10 HH 5.25" devices or an equivalent combination of HH and FH. Both disks and tapes are supported in the CSS2 chassis.

CSS2 subsystems are available in single-ended and differential interfaces. This requires a matching of controller, cable, CSS2 chassis, and 5.25" devices. There are specific models for single-ended and differential products. They cannot be mixed. Subsystems are either all single-ended components or all differential components. The functional difference between the two bus interface type is bus length. Configuration detail is included in the next section.

Each system will require at least one single-ended CSS2 subsystem that includes the QIC tape load device. All 5.25" SCSI devices are available on single-ended subsystems.

Whenever disk only CSS2 subsystems are ordered, it is recommended that you order differential subsystems. This will eliminate configuration restrictions that are imposed by the single-ended SCSI bus. The only 5.25" differential device available as of October 1990 is the 1GB drive. This disk has the best performance and price per MB of SCSI disks available on the 6200. It is the right choice for 6200 systems.

See Figure 14 for 6200 disk subsystem models.

Model Number	Description
G6662-A	PHU with 332MB disk drive
G6605	PHU with 662MB disk drive
G6686-A	PHU with 1GB disk drive
G6602	PHU with 150MB QIC tape
G6591-A	PHU with 2GB 8mm cartridge tape
6713-A	CSS2/DC with 332MB disk drive
6723-A	CSS2/DC with 662MB disk drive
G6721-A	CSS2/DC with 1GB disk drive—Single ended
G6741-A	CSS2/DC with 1GB disk drive—Differential
G6759-A	CSS2/DC with 2GB cartridge tape
G6587-A	1600bpi reel-to-reel tape (table top chassis)
G6589-A	6250bpi reel-to-reel tape (table top chassis)

Table 6. External SCSI chassis for 5200 systems.

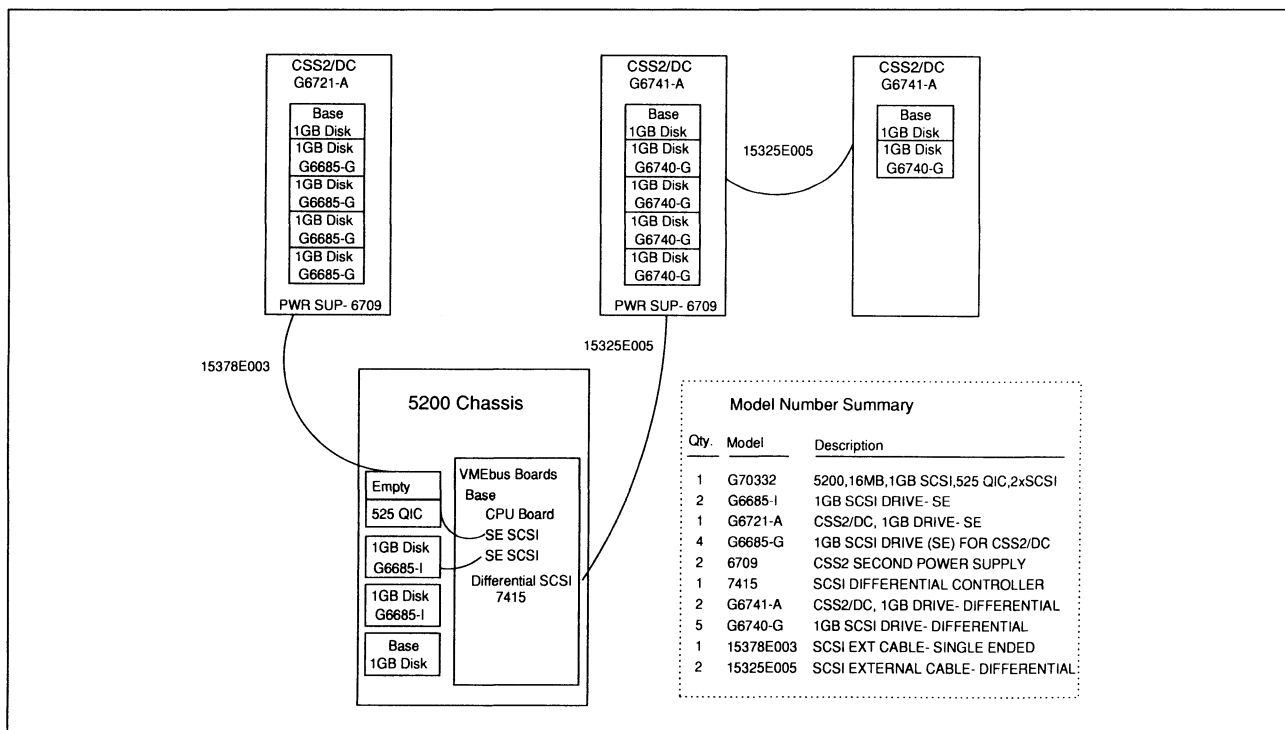


Figure 13. 5200 maximum storage configuration.

SCSI Bus Configuration Rules

SCSI is a daisy chained bus with specific bus length limits for the two interface types available. The single ended interface has a bus length limit of 19.6 ft. (6 meters). The differential interface has 81.2 ft. (25 meters) bus length. When calculating the SCSI bus length, all internal device cabling as well as external cabling must be added to determine total length. Figure 15 lists the internal cable length as well as the applicable external cables available for AViiON 5200 and 6200 systems. Examples on bus length calculations are also shown in figure 15.

All SCSI external cables must be ordered separately except in the packaged AV6200 models, where cables connecting the CPU and CSS2 chassis are included.

Disk Arrays for 6200 Systems

AViiON 6200 systems connect to either the standalone High Availability Disk Array cabinet or the rackmount Disk Array chassis. Two disk array IOP's can be configured in a 6200 or 6200-20 CPU chassis. These must be mounted in slots 6 and 10 of the 20 slot chassis. There are no slot specific requirements for the 10 slot rackmount chassis.

A single IOP connects to a single disk array cabinet. Because of the disk array bus length maximum, the disk array cabinet must be located directly adjacent to the CPU cabinet. The cables connecting the CPU and the disk array cabinet are included in the base disk array subsystem. See Figure 16 for disk array cabinet model numbers and examples on ordering subsystems.

Disk array cabinets can be dual ported from two separate 6200 chassis. The SCSI bus is routed from one processor to the next and continues to the disk array cabinet. Termination of the SCSI bus occurs on the first CPU chassis bulkhead.

A maximum configuration would consist of two IOP's cabled to two disk array cabinets positioned to the left and right of the CPU cabinet. Any other peripherals must be configured in the CPU cabinet or in a peripheral cabinet attached to the disk array cabinet. If a dual ported configuration with two 6220-20 systems were configured, the mounting space required by these two CPU chassis (56") would leave no room in a 71" cabinet (63" mounting space) for additional peripherals.

With the rackmount disk array chassis, a single IOP can connect to three chassis. Two IOP's are configurable.

For detailed information regarding disk array capabilities and technologies, see MAPS/PLUS articles beginning on page 230-41 and 239-53.

Asynchronous Connections

Two asynchronous RS232 connections are on the system board. These were designed to be used for the system console terminal and a remote terminal for service support. A cable for the system console is included with every system model.

The VAC/16 provides connections for 32 or less asynchronous devices on the 5200 and 6200 systems (note that the 10 slot rackmount chassis only has connections for a single VAC/16). 20 slot rackmount chassis do not support VAC/16's. Cabling for the VAC/16 RS232 ports is done directly from the system's bulkhead. Cables must be ordered separately.

Large numbers of asynchronous devices can be connected to the AV/5200 and AV/6200 systems with the VDA/255.

Table 7 lists the model numbers for asynch connect products.

Synchronous Connections

The VSC/4 provides connections for synchronous devices. Model 7404 for the 5200 systems, Model 7404-V for the 10 slot rackmount, and 7404-W for the 20 slot rackmount are the 6U VMEbus boards with four ports each.

On the 5200 systems, up to six Model 7404's can be configured in the system. Bulkhead connections used are the four DB25 connectors marked 'OPTION' and up to twenty of the thirty two DB25 slots at the top of the bulkhead that alternately are used for the VAC/16 connections.

<i>Model</i>	<i>Description</i>
7400	VAC/16 for AV5000
7406	VAC/16 for AV6200 10 slot system
7418	VDA/255 for 5200/6200
7418-W	VDA for 6200-20
7402	VDC/8P for VDA/128
7403	VDC/16 for VDA/128
7419	VDC/16 for VDA/255
7420	VDC/8P for VDA/255
7405	VLC for 5200 and 10 slot 6200
7405-W	VLC for 20 slot 6200-20
7404	VSC/4 for 5200 systems
7404-V	VSC/4 for 6200 10 slot systems
7404-W	VSC/4 for 6200 20 slot systems
7409	6U to 9U VME adaptor board

Table 7. VMEbus communications controller.

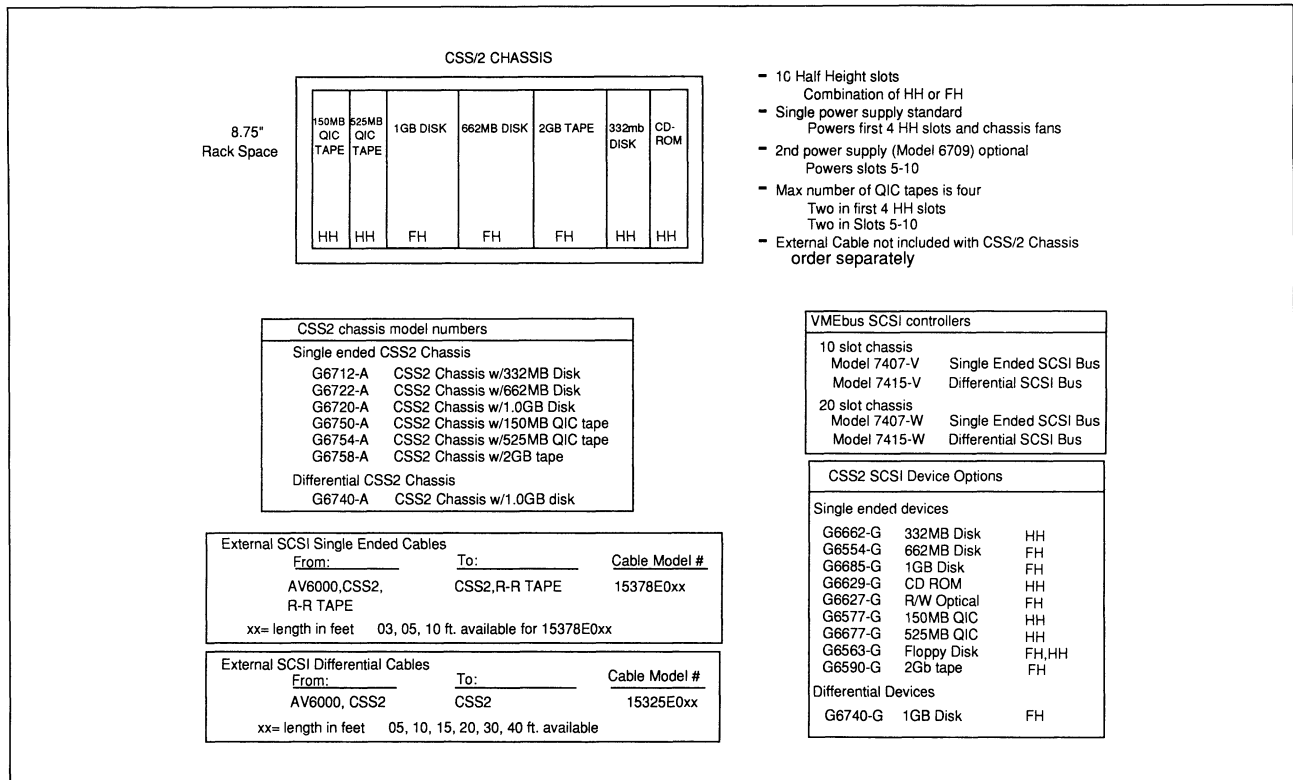


Figure 14. 6200 SCSI Options.

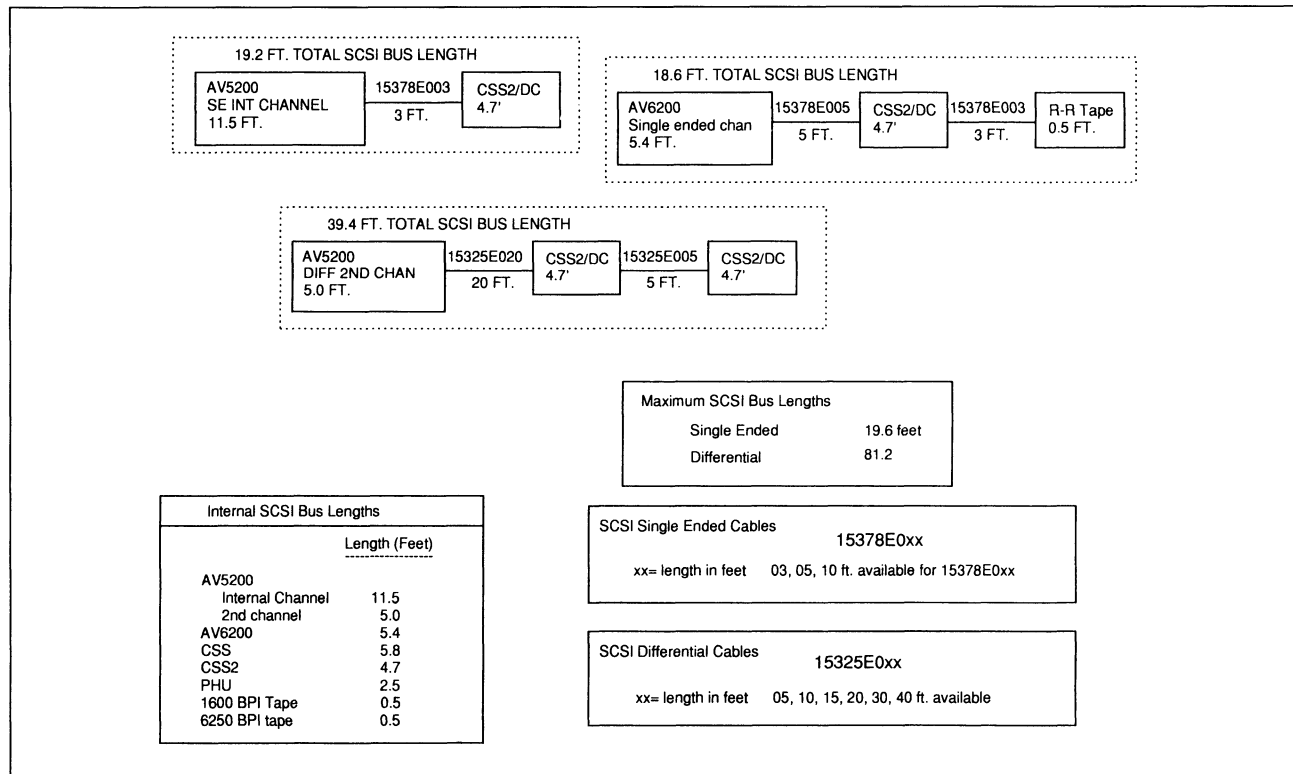


Figure 15. SCSI Configuration Rules.

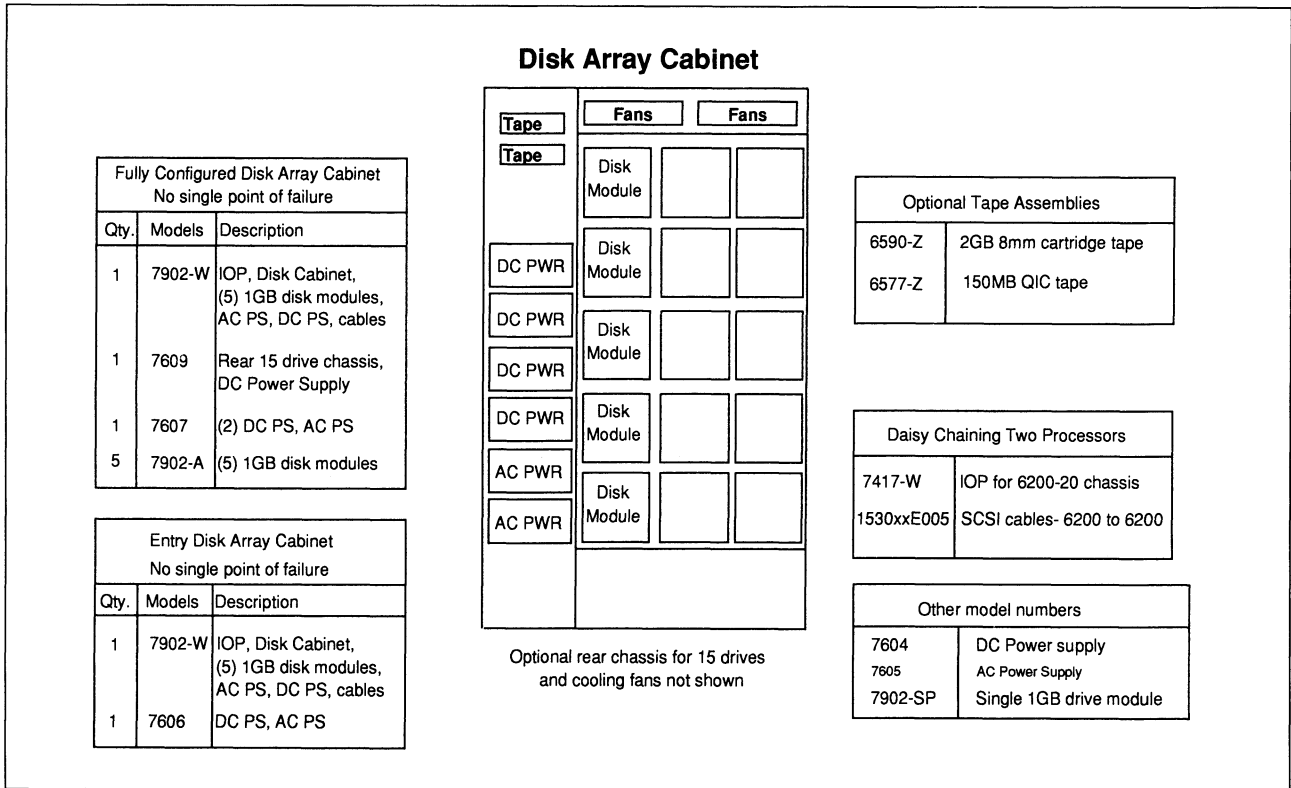


Figure 16. Disk array cabinet for 6220-20.

Model No.	Description
15338E025	25' cluster extension cable—VDA
15338E050	50' cluster extension cable—VDA
15338E100	100' cluster extension cable—VDA
15339E010	10' async system console cable
15339E015	15' async system console cable
15339E025	25' async system console cable
15340E010	10' async terminal cable
15340E015	15' async terminal cable
1540E025	25' async terminal cable
15369E010	modem cable, async
15369E015	modem cable, async
15369E025	modem cable, async
15290E006	synch device cable
15290E015	synch device cable
15290E025	synch device cable
15345E015	15' Centronics printer cable
15345E025	25' Centronics printer cable

Table 8. Async, synch, and printer cables.

Ethernet LAN Guidelines

The Ethernet controller board for VME bus-based AViiON Server Systems (VLC) has a standard DB-15 connector and uses the same drop cables and transceivers as do MV/Family systems (figure 12). Table 9 lists model numbers.

Model No.	Description
4540	N tap for Thick Ethernet
4540-A	BNC tap for Thin Ethernet
4540-B	Vampire tap for Thick Ethernet
4619	8-port transceiver (8PT-E)
1326	5-meter drop cable (for plenums)
1326-A	20-meter drop cable (for plenums)
15274E005	5-meter drop cable (PVC)
15274E020	20-meter drop cable (PVC)

Table 9. Transceivers and drop cables for Ethernet LANs.

Printers

RS232 interface printers are supported on the second RS232 port on the system board, the VAC/16, or the ports on VDC cluster controllers. In addition, the system board has a parallel port selectable for printers with Centronics interfaces. The VDC/8P cluster controllers each incorporate one Centronics interface along with their 8 RS232 ports. All Data General printers which meet these interface requirements are supported.

Printers using the Data Products interface that Data General uses on the MV systems DO NOT WORK reliably on AViiON systems. Initial product information on printer support indicated that the Data Product interface was supported from the parallel interface on the CPU board. This information was incorrect. Only the Centronics interface is supported from the parallel port on the 5200/6200 CPU board.

If your customer has a Data Products printer and wants to install this printer on an AViiON system, options are available to provide a Centronics port on recent generations of Data Products printers. These options are available with the band printers now sold by Data General. Below are the current DG printer models and the DG option model numbers that provide a Centronics and serial port.

<i>Printer Model</i>	<i>Option Model</i>
4598, 4603	4601-A
4599	4601-B

If your customer has previous generation Data Products printers purchased from Data General, options may be available for these with the Centronics interface. For details, call the Printer Products Product Manager within Corporate Marketing for availability of these products from Data Products.

To run a 1200LPM printer on an asynchronous port requires a 19.2k bps line. The printer line must have the highest priority on the VDA/255 to ensure that it operates at full speed.

Terminals

All asynchronous connections supported by Data General communications products on AViiON Server Systems comply with the RS232 specification. AViiON Server Systems support RS232 terminals with support for ANSI control codes.

Data General D211/410/460- and D215/411/461-generation terminals should use DG ANSI mode to operate on AViiON systems with DG/UX. DG ANSI mode works adequately with DG/UX, but some anomalies exist that may cause customer dissatisfaction. With the D216/412/462 terminals now sold by

Data General, customers should use the VT100/220 mode when connected to AViiON systems for complete compatibility and trouble-free terminal operation with DG/UX.

If a hardcopy terminal is used as the system console, it should have one of the following two features to properly display powerup error messages: not respond to backspace codes or process a line only after receiving an End-of-Line. DASHER D57x hardcopy terminals meet these requirements. TPI terminals do not.

All RS232 ports on AViiON Server Systems are female DB-25 (connected to by male DB-25 cables) as is the standard on VME bus-based systems. This is the opposite of the convention used on MV/Family systems, most personal computers, and the AVX 300 AViiON Workstation. The proper cable for user terminals will be automatically structured with terminals ordered with an AViiON Server System model designator. Model numbers for cables ordered by themselves are shown in the Cables section.

The cable for the system console is different from that used for user terminals. The system console terminal should be ordered with a -X suffix (to indicate no cable). A 25' console cable is included with all AV 5200 and AV 6200/6200-20 Series systems. The model numbers for additional console cables are given in the Cables section.

Cabinets for 6200 Systems

6200 systems use the Model 11000 Series cabinets. These cabinets provide the flexibility required to build large AViiON systems. See the '11000 Series Cabinets' MAPS/PLUS atticle beginning on page 289-45 for details on configuring these cabinets. Below are the mounting space requirements for the AV6200 systems.

<i>Chassis</i>	<i>Mounting space required</i>
6200 20 slot	28"
6200 10 slot	14"
CSS2	8.75"
6250 bpi tape	8.75"
16000 bpi	8.75"
Disk array-CSS2	8.75"

System Capacities

VMEbus boards capacities for the 5200 and 6200 systems are listed below. Not all of the configuration maxima identified below can be concurrently achieved. Configuration maximas will be determined by the number of I/O slots available (impacted by the number of expansion memory boards configured) and your customers choice of VMEbus boards.

VMEbus Board/ports	6200 10-slot			6200-20
	5200	with VAC/16	Standard	
Disk Array IOP	1	0	2	2
SCSI Controller	2	4	6	8
LAN Controller	2	2	2	8
VDA/255	4	1	5	5
VAC/16	2	1	0	0
VSC/4 boards	6	4	6	12
ports	24	6	24	48

6200 and 6200-20 I/O maxima available for immediate shipment are listed below. Configuration of VME bus controllers greater than this limit and up to the maximums listed above require a 90 day ARO:

Disk Array	2
SCSI	5
LAN	4
VDA/255	3
VAC/16	1
VSC/4	4

There are two separate bulkheads shipped with the 6200 10 slot chassis. The standard bulkhead offers the following for connections from VMEbus boards to external devices:

- 3 CPU board connectors—two asynch connectors—two asynch connectors, one parallel printer connection.
- 2 Ethernet LAN connectors
- 5 VDA connectors
- 31 Connectors for SCSI (one connector per board) or synch (4 connectors per board)

Note that this standard bulkhead began shipping in October 1990. Prior to this, bulkhead design did not have the mix and match scheme employed with the 31 connectors identified above that can connect either SCSI or Synch connections. Standard bulkheads shipped prior to this date had a fixed connection scheme similar to the AV5200's bulkhead. With the standard bulkhead shipped prior to October 1990, customers cannot expand to the I/O maxima cited above on the 6200 10 slot chassis for SCSI or Synch. Connection to the HADA disk array requires this bulkhead.

When a VAC/16 (Model 7406-V) is ordered with a 10 slot 6200 chassis, the correct bulkhead is automatically configured with the system. If a VAC/16 is ordered as an upgrade to an installed system, the bulkhead that accommodates the VAC/16 is shipped with the VMEbus board.

The bulkhead for the 6200-20 chassis is displayed in Figure 18. Optional I/O bulkhead subpanels let the chassis reach full configurability on I/O maxima. The configurability of the bulkhead is explained in Figure 18.

Microcode

Because AViiON systems are based on a RISC processor, they do not use microcode.

System Software

AViiON Server System model numbers do not include a bundled RTU for the operating systems.

A wide variety of DG/UX system software packages are available for both server and multi-user AViiON Server System configurations. Multi-user DG/UX licenses are classed by user count categories. For ordering information on system software packages, please refer to the MAPS/PLUS articles on AViiON Unix software.

Upgrades

System board upgrades are offered through the Upgrades Marketing Group of the Continuing Products Division and are listed in table 10. These upgrades require only a simple board swap and include Field Engineering installation and deinstallation. If you have any questions regarding upgrades or would like to upgrade a system or component not listed here, please call a CPD Marketing Specialist at 508-870-1400.

Model No.	Description
USTG12A	Upgrade a single CPU AV 5100 or AV 6100 with 16 MB memory to a dual CPU AV 5220 or AV 6220 with 16 MB memory
USTG12B	Upgrade a single CPU AV 5200 or AV 6200/6200-20 with 16 MB memory to a dual AV 5220 or AV 6220/6220-20 with 16 MB memory
USTG14A	Upgrade single CPU AV 5100/5200 or AV 6100/6200 to a quad CPU 5240 or 6240. Does not include memory
USTG24A	Upgrade dual CPU AV 5120/5220 or AV 6120/6220 to a quad CPU 5240 or 6240. Does not include memory

Table 10. AViiON Server System upgrade.

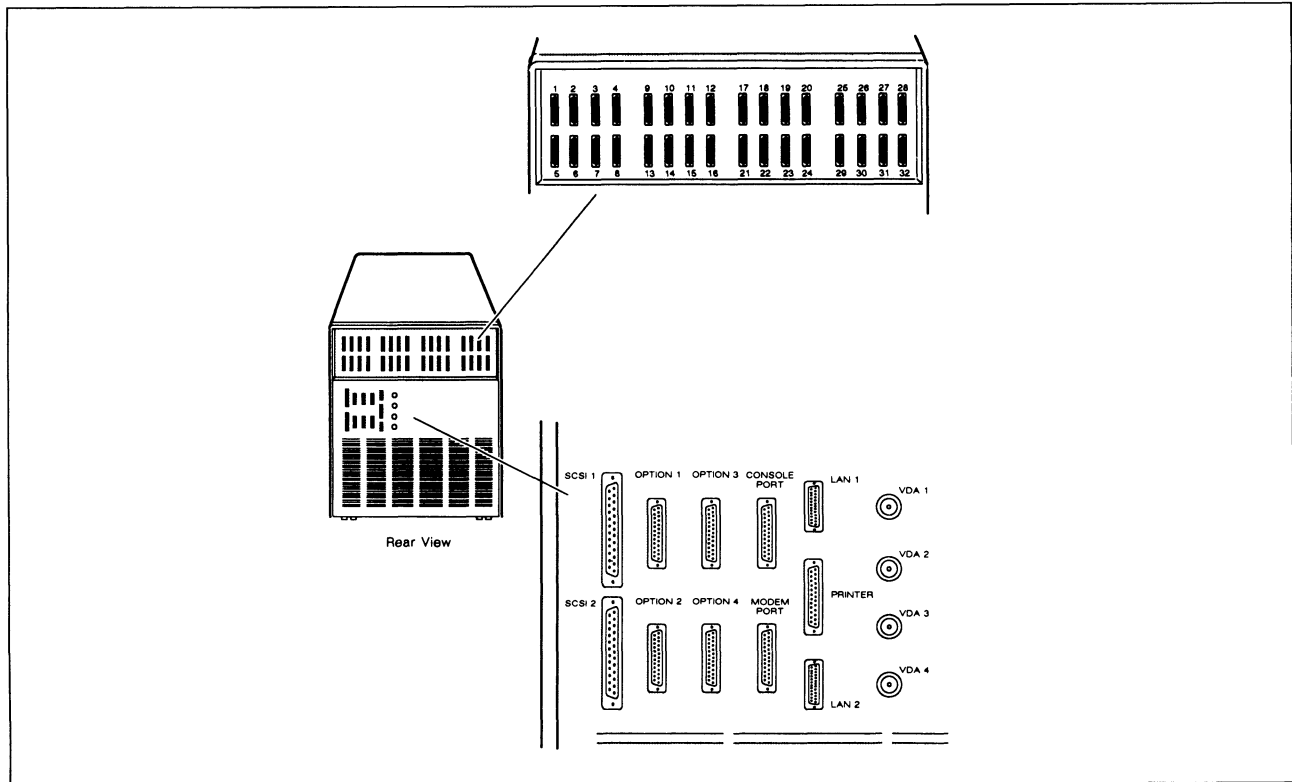


Figure 17. 5200 Bulkhead Configuration.

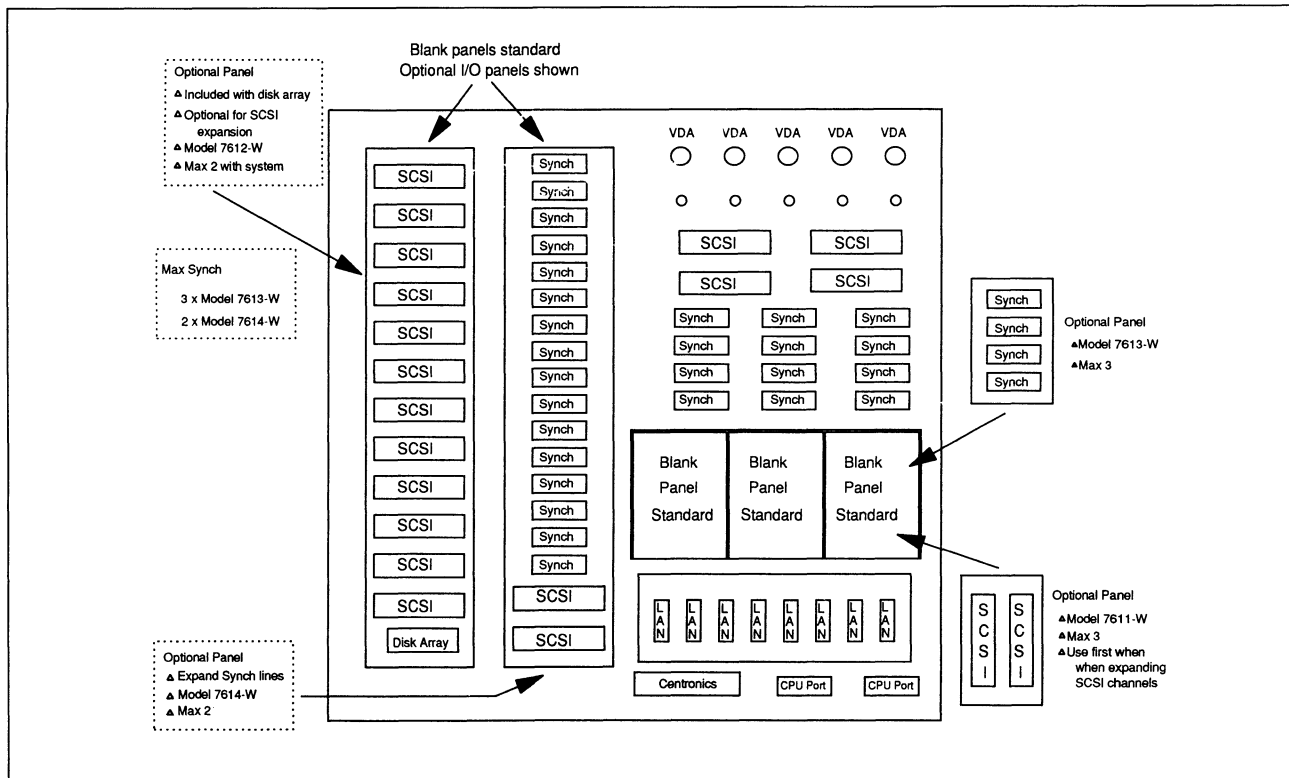


Figure 18. 6200-20 Bulkhead Configuration.

Related Information

Table 13 lists customer manuals for FCS; table 14, MAPS/PLUS articles.

<i>Part No.</i>	<i>Title</i>
<i>AViiON 5000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001806	Setting Up and Starting AViiON 5000 Series Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 5000 VAR/OEM DOC. PACKAGE</i>	
014-1850	Expanding AViiON 5000 Series Systems
<i>AViiON 6000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001807	Starting and Testing AViiON 6000 Series Systems
014-509389-00	Installing and Starting AViiON 6200-20 Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 6000 VAR/OEM DOC. PACKAGE</i>	
015-000345	Expanding AViiON 6000 Series Systems
<i>AViiON 5000 AND 6000 SERIES SYSTEMS PROGRAMMER'S DOC. PACKAGE</i>	
014-001805	AViiON 5000 and 6000 Series Systems: Programming System Control and I/O Registers
014-001808	MC88200 User's Manual, Cache Memory/Management Unit (CMMU)
014-001809	MC88100 User's Manual, Reduced Instruction Set Computer (RISC)
<i>MODEL 10565 MASS-STORAGE SUBSYSTEM OWNER'S PACKAGE</i>	
014-001810	Installing and Operating the Model 10565 Mass-Storage Subsystem
<i>MASS STORAGE DRIVE MANUALS</i>	
014-001699	Model 6536 Tape Drive Operations and Maintenance (-00 vendor manual on the shelf; -01 manual on the shelf 6/24-150 MB Cartridge Tape)
014-001692	6586/6587 Magnetic Tape Drive Installation Guide
014-001460	Disk Drive Model 6491 Series General Specifications (-01 now on the shelf; rackmount drive, not office systems)-322MB Winchester Disk Drive
<i>MASS STORAGE OEM/VAR MANUALS</i>	
014-001756	Rimfire 3500 VMEbus SCSI Host Adapter with Floppy Port Product Specification
014-001757	Rimfire 3400 VMEbus ESDI Driver Controller Product Specification
014-001758	Rimfire 3200 VMEbus SMD-E Disk Controller Product Specification
<i>COMMUNICATIONS OEM/VAR MANUALS</i>	
014-001813	HPS Cluster Controller Technical Manual (VDC/8P, VDC/16)
014-001814	HPS Cluster Controller Installation Guide (VDC/8P, VDC/16)
014-001815	HPS VMEbus Host Adapters Technical Manual (VDA/128)
014-001816	DCP 8820 Technical Manual (VSC/4)
014-001817	Model 6236 Technical Manual (VAC/16)
014-001818	High-Performance VMEbus Ethernet Communications Controller User's Guide (VLC)
069-000347	HPS Terminal Control Software User Manual
069-000348	HPS Application Installation Manual
069-000349	HPS Diagnostic Application User Manual
069-000361	HPS Cluster Controller Download Package User Manual

Table 13. List of customer manuals for FCS of AViiON Systems Servers.

<i>Part No.</i>	<i>Description</i>
046-001287	Disk Array (AViiON), page 230-41
046-001288	High Availability Disk Array, page 239-53
046-001196	VME Communications Controllers, page 271-113
046-001292	AV 7000, 8000 Packages, page 202-40.1
046-001274	AViiON Async. Connectivity, page 271-121.1
046-000924	AViiON Mass Storage, page 239-29
046-001013-02	DG/UX 4.30, page 301-12.3
046-000982-02	AViiON 4000 Servers, page 202-59
046-000959-01	AViiON 400 Workstations, page 202-47
046-001230-01	1100 Series Cabinets MAPS/PLUS article, page 289-45

Table 14. MAPS/PLUS articles.

Specifications

Processor

25 MHz Motorola 88100	HCMOS technology
32-bit RISC processor:	IEEE P754 floating point support on-chip
	Separate data and instruction memory ports
	Hardware register scoreboard
Motorola 88200 CMMU:	HCMOS technology
	16 KB, 4-way set-associative physical cache
	MMU with user/supervisor logical address space of 4 GB each

Memory

Minimum 16 MB to maximum 784 MB
ERCC with single-bit correction and double-bit detection
100ns 1 MBit and 4 MBit DRAMs in ZIP packaging

VME Bus

Slots:

10 9U slots: 6 slots also support the memory bus: Electrically compliant with Motorola VME specification. Revision C.1

Performance:

Sustained block mode VME bus transfer rate: 25 MByte/sec

Lines:

Data transfer master:

—D32, D16, D08(E0)
—A32, A24, A16
—ADO (Address Only Cycles)
—RMW (Read Modify Write)

Data transfer slave:

—D32, D16, D09(E0)
—UAT (Unaligned Address Transfer)
—A32, A24, A16
—ADO
—RMW
—BLT (Block Transfer)
—Location monitor A16

Requestor:

—Any one of BR (0-3)
—Any one of ROR, RWD, RONR

Interrupter:

—Any one of I(1-7)
—D08(O)
—ROAK (Release on Acknowledge)

Interrupt handler:

—IH(1-7), D08(O)

Slots 1 functions (selectable):

—SYSCLK driver
—Power Monitor (power supply)
—IACK daisy chain driver
—Bus timer (BTO(32, 64, 128))
—Arbiter (PRI, RRS, SGL)

Mass Storage

Winchester storage (SCSI devices)

332 MB 5.25" SCSI Winchester disk:

—1.9 MB/sec data transfer rate
—14ms average seek
—Half-height device

662 MB 5.25" SCSI Winchester disk:

—1.9MB/sec data transfer rate
—16.5ms average seek
—Full-Height device

Cartridge tape: 150MB QIC cartridge tape:
—Can read/write QIC 120 MB;
can read QIC 40 MB and
60MB
112 KB/sec sustained data
transfer rate
—Single-ended SCSI interface
2 GB Cartridge Tape:
—8mm Helical-scan;
246KB/sec sustained data rate;
Read-after-write with separate
erase head:
—Single-ended SCSI interface

Reel-to-reel tape
(desktop): 1600 bpi PE format reel-to-reel
tape drive:
—Auto-thread, auto-load,
horizontal mount
—25/100 ips selectable
—160 KB/sec PE transfer rate
(instantaneous)
—6 to 10.5" diameter reels
—Single-ended SCSI interface
6250 bpi GCR format reel-to-
reel tape:
—Auto load, auto thread;
125 ips streaming mode
—769kb/sec GCR instantaneous
transfer rate:
—Single-ended SCSI interface

SCSI controller: Single-ended SCSI interface with
support for both asynchronous
(2 MB/sec) and synchronous
(4 MB/sec) operation modes

Communications

VME bus asynchronous
controller (VAC/16): 16 full-duplex RS232 lines
16 x 9600bps aggregate maximum
transfer rate
Motorola 68020 with 192 KB static
RAM buffer, 128 KB EPROM,
2 custom VLSI octarts

VME bus distributed
asynchronous host
adapter (VDA/128): Hosts up to 128 asynchronous
devices connected on cluster
controllers via RG62 coaxial cable

VME bus distributed
cluster controllers (VDC/
16, VDC/8P): Support for 16 RS232 lines,
or 8 RS232 lines plus
Centronics printer port
Aggregate throughput (VDC/16):
16 x 9600 baud, half-duplex
(VDC/8: 8 x 19.2 KBps,
half duplex
Signals supported: CTS, DCD,
DSR, DTR, RTS, RXD, TXD,
Ground

AC Power

Office package: 120V: 12 amps, single-phase
220V: 10 amps, single-phase
100V: 12 amps, single-phase

10 Slot Rackmount: 120V: 10 amps, single-phase
220V: 5.5 amps, single-phase
100V: 12 amps, single-phase
240V: 5 amps, single-phase

20 Slot Rackmount: 120V: 15 amps, single-phase
220V: 7.5 amps, single-phase
240V: 8.2 amps, single-phase

Environmental

Temperature:
Office package: Operating: 50° to 100°F; 10° to
38°C
Rackmount
Packages: Operating: 50° to 100° F; 10° to
38° C
Rackmount
CPU chassis: Operating 32° to 131°F; 0° to
55°C
Rackmount and
office package: Storage -40° to +149° F;
-40° to 65° C
Humidity: Operating: 20% to 80%
noncondensing
Storage: 10% to 90%,
noncondensing
Altitude: 2,438 meters (8,000') maximum

BTU/Hour (Worst Case)

Office package: 2650
Rackmount 10-slot CPU chassis 1775
Rackmount 20-slot CPU chassis 5460

KVA Rating

Office package 1.5 KVA
Rackmount 10-slot chassis 1.2 KVA
Rackmount 20-slot chassis 2.0 KVA

Physical

Dimensions:
Office package: 17.25" wide x 24.75" high x
25.5" deep
Rackmount 10-slot: 17.52" wide x 13.84" high x
24.203" deep
Rackmount 20-slot: 18.75" wide x 28.0" high x
26.25" deep (for systems
mounted in cabinet positions
other than topmost an addi-
tional 3.5" of vertical rack
space is required)
Weight:
Office package: Approx. 160 lbs (fully con-
figured with mass storage)
Rackmount 10-slot chassis: Approx. 135 lbs. (fully
configured)
Rackmount 20-slot chassis: Approx. 150 lbs. (fully
configured)



AViiON 5200/6200 Multi-user Systems/Network Servers

Fact Sheet

The AV 5200, 5220 (office packaged) and AV 6200, 6220 (rack-mount) server/multi-user systems, based on Motorola 88000 RISC technology, are well-suited to addressing customer computing requirements for a mid-range system, both in multi-user client-server models.

As a *multi-user system* the AV 5200, 5220 connects up to 512 asynchronous devices using only 4 VME slots through the VME Distributed Async Host Adapter (VDA/128). The AV 6200, 6220 connects up to 640 asynchronous devices using 5 VME slots. As *servers in a distributed network*, AViiON Systems can be accessed through an industry-standard IEEE 802.3 Ethernet LAN. They provide the CPU resources and the high-capacity, high-performance mass storage capabilities required of compute or file servers, respectively.

- Industry-leading CMOS RISC technology
- Choice of single or dual 25 MHz Motorola 88100 CPUs:
 - 25 Dhrystone MIPS per CPU
 - Field upgradeable from single to dual
- Single- and double-precision IEEE hardware FPU
- Two Motorola 88200 memory management/cache chips per CPU with separate data and instruction ports (full Harvard architecture), and 4-way, set-associative 16 KB caches
- Up to 208 MB of ERCC memory (1 Mbit DRAM)
- 10-slot industry-standard VME bus:
 - Industry-standard Revision C.1
 - 25 MB/sec block transfers sustained
 - Full hardware cache coherency
 - 4 levels of bus arbitration
 - 7 levels of interrupt
- High-speed interface between CPU and memory:
 - VME/Motorola MBus superset bussed to 6 backplane slots
 - 4 byte/cycle peak transfer rate (100 MB/sec at 25 MHz)
- DG/UX operating system support:
 - Symmetrical multiprocessing
 - Robust file system and medium-term scheduler
 - Complies with 88open, POSIX, SVID 2, and other standards

<i>AV Models:</i>	<i>5200/5220</i>	<i>6200/6220</i>
Packaging	Office	Rackmt.
VME slots	10	10
Max. Memory	208 MB	208 MB
Std. memory	16 MB	16 MB
Asynchronous connects (VDA/VDC) max.	512	640
Asynchronous connects (VAC/16) max.	32	16
Ethernet LAN max.	2	2
Synch. boards/ports	4/4	4/8
Max. disk capacity:		
Integral	1944 MB	N/A
External	2648 MB	25.9 GB
Max. cartridge tapes (150 MB)	4	4
Max. reel-to-reel tapes	4	4
Model numbers	70034-36 70040-42	70037-39, 70043-48

Description

Overview

AViiON Server Systems can be configured to address a wide range of applications implemented in multi-user of network server models. AV 5200 and AV 6200 Series systems generally support 40 to 250 asynchronous users in typical commercial applications. This is only an estimate, however; appropriate user counts will vary greatly by application.

As servers, these systems provide file and compute resources for AViiON workstations, X-windows terminals, and DASHER/386 systems distributed across a local area network. Configured for multi-user applications, they can connect up to 512 (AV 5200) or 640 (AV 6200) asynchronous devices through VME distributed async host adapters and cluster controllers.

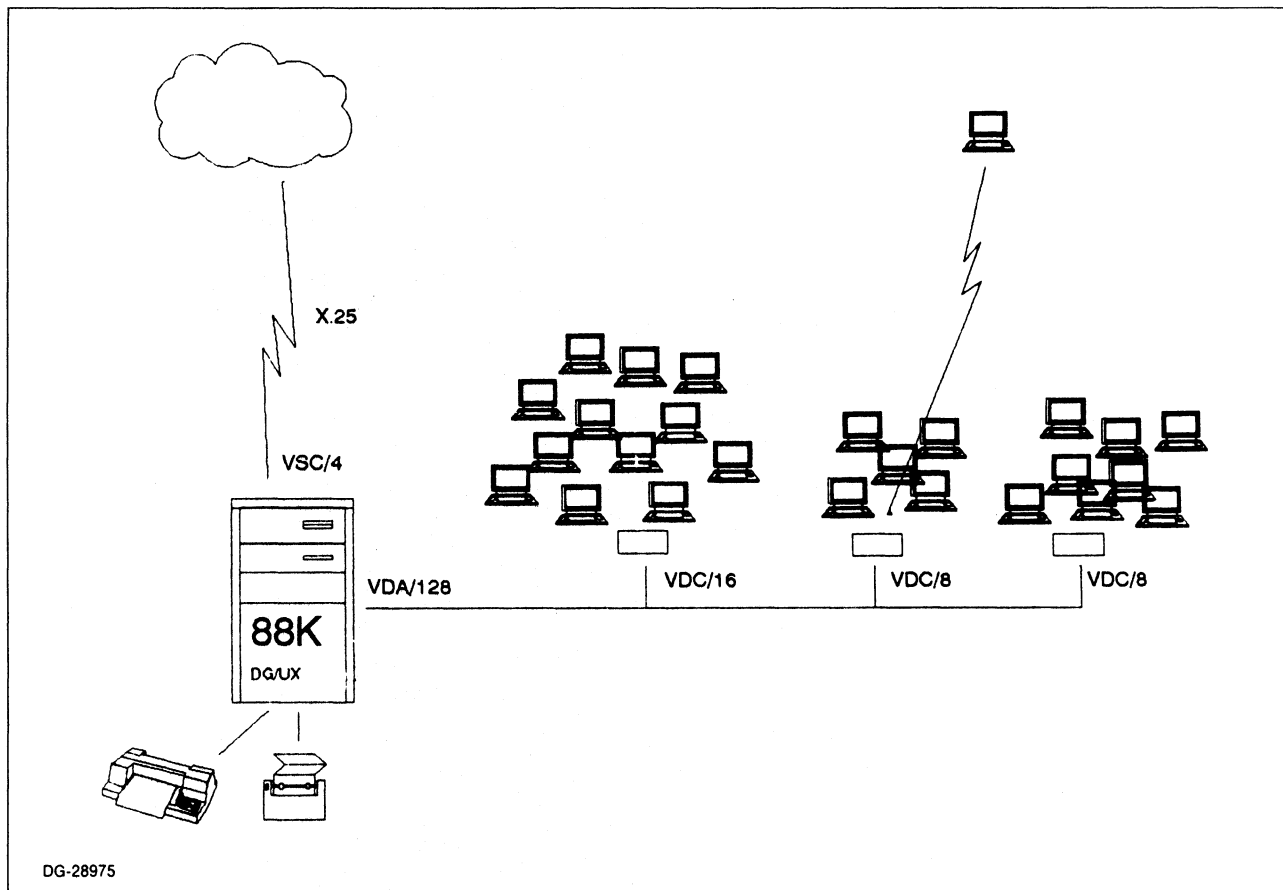


Figure 1. AViiON multi-user system configuration.

Industry-standard AViiON Server Systems offer customers superior price/performance in systems which are both configurable and balanced. Mass storage subsystems meet a range of user capacity and cost requirements, while providing high-performance I/O. The many configuration choices — single- or dual-processor, rackmount or office packaging — match the needs of many different customers.

AViiON system design is oriented towards performance; the Motorola 88000 chip set has a highly pipelined architecture, fast instruction execution, and integrated floating point. Equally important, the chip set architecture provides for multiprocessing (figure 3) so that customers can approximately double CPU performance with only a board swap.

The performance orientation of the AViiON systems carries through to the selection of peripherals and controller boards. For example, the mass storage controllers selected for the

AV 5000 and AV 6000 Series are among the highest speed available: they transfer data to the CPU and memory across an industry-standard 40 MB/sec VME bus.

CPU

The AViiON Server System CPU is the Motorola 88100, Implemented with Motorola's HCMOS technology, the MC88100 incorporates 32-bit registers, data paths, and addresses. Because of the importance of maintaining a filled pipeline in RISC processors, the MC88100 incorporates *four independent execution units* (integer, floating point, data, and instruction) which operate independently and concurrently. Data memory accesses are performed by the data unit while instruction prefetches are handled by the instruction unit.

A *common register file* provides data sharing and synchronization control among the register units through register scoreboarding.

IEEE P754 *floating point arithmetic* is fully supported by the processor's hardware which includes a 32-bit combinatorial

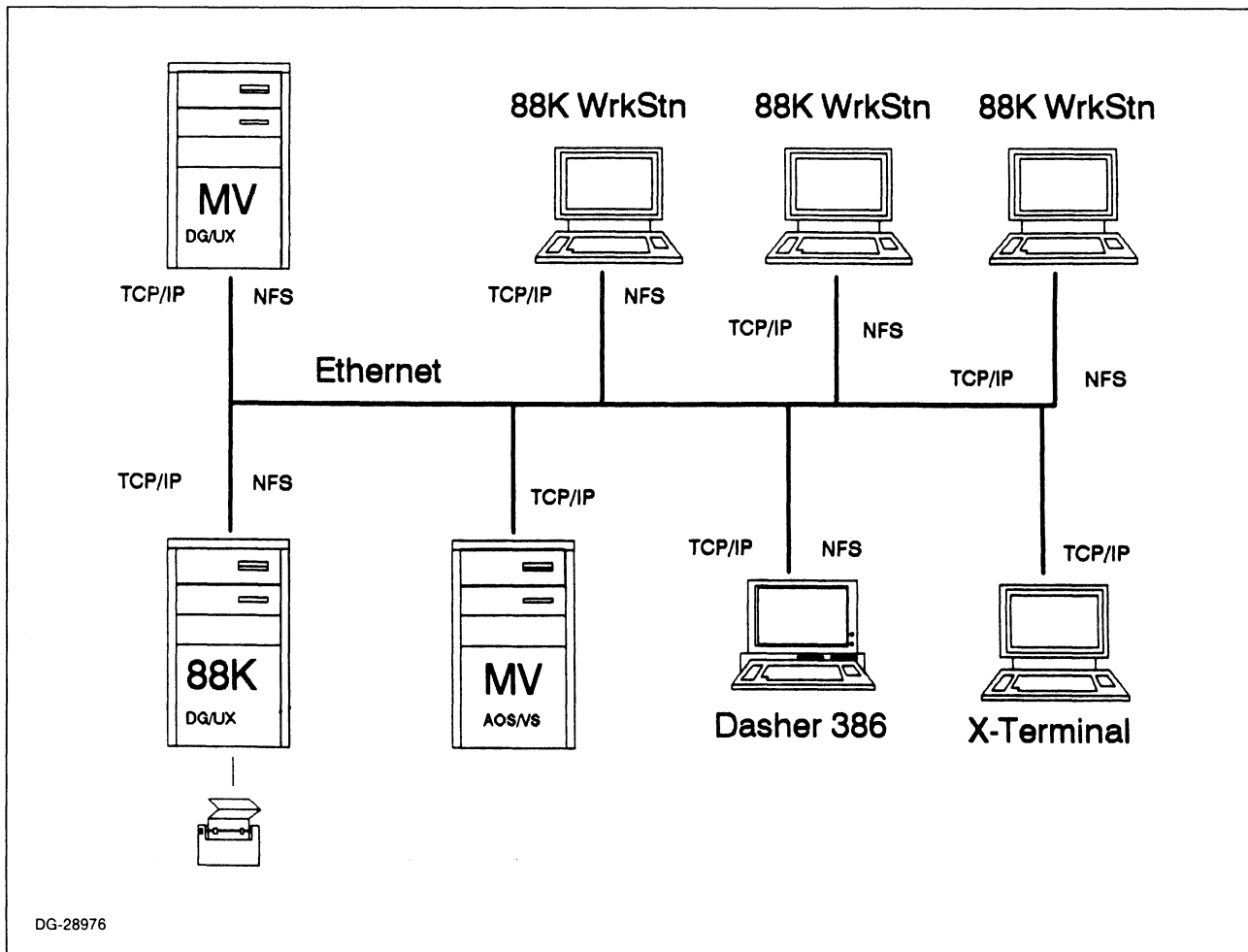


Figure 2. AViiON Network Server configuration.

multiplier. The FPU implements two pipelines: one for multiply instructions (6 stages) and one for all other floating point instructions (5 stages).

Parallel operations and pipelining are integral elements of the MC88100 design. The four execution units allow the MC88100 to perform up to five operations in parallel (figure 4):

- Access program memory
- Execute an arithmetic, logical, or bit-field instruction
- Access data memory
- Execute floating point or integer divide instructions
- Execute floating point or integer multiply instructions

In addition, the floating point, data, and instruction units themselves are pipelined and can complete an operation in every clock cycle:

- Up to five floating point add, subtract, compare, or convert instructions can execute simultaneously
- Up to six floating point or four integer multiply instructions execute simultaneously
- Up to three data memory accesses can be in progress simultaneously:
 - Two memory accesses on the external bus
 - One address calculation
- Up to two instruction fetches can be in progress simultaneously

The MC88100 instruction set contains 51 instructions. All integer arithmetic, logical, and bit field instructions, and certain flow control instructions can execute in a single

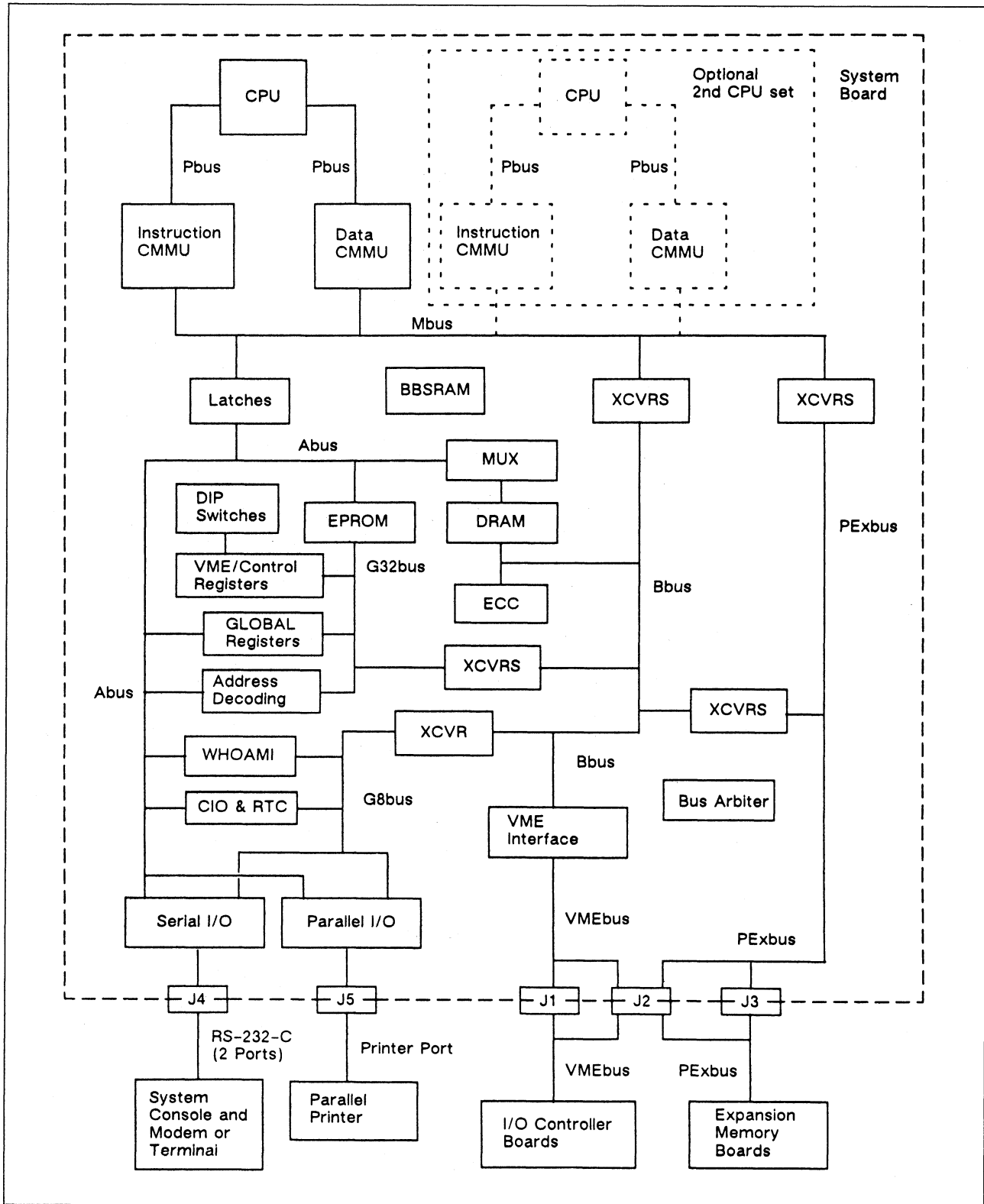


Figure 3. AV 5200/6200 system board architecture.

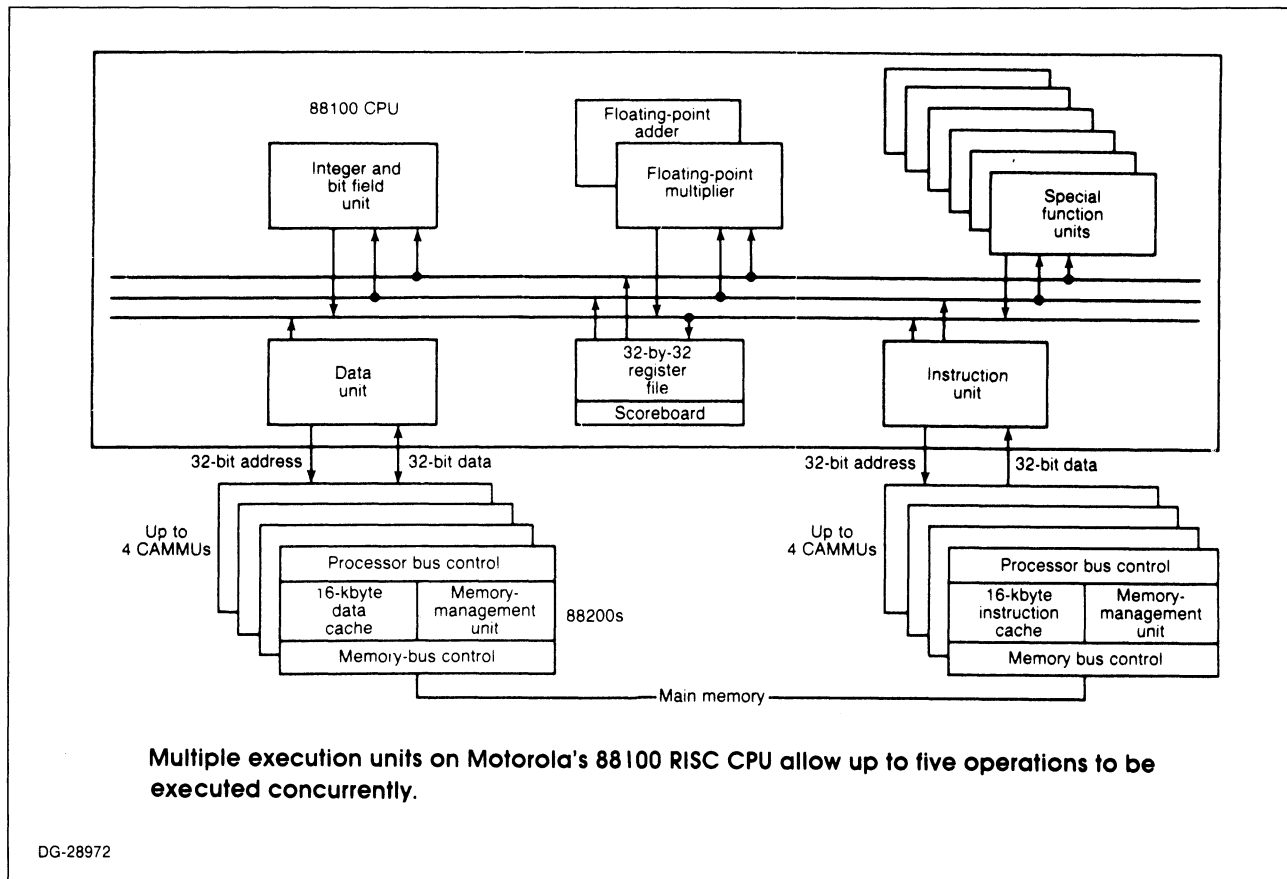


Figure 4. Parallel operations-5—performed by RISC CPU.

cycle. Figure 5 is the MC88100 programming model: figure 6, the MC88100 instruction set.

The MC88100 uses a two-port, non-multiplexed memory access scheme (Harvard architecture). Transfers to and from the CMMU chips are performed through dedicated address and data paths; instruction fetches also take place over dedicated paths. These ports operate concurrently, eliminating bus contention between data accesses and instruction fetches.

Memory Management/Caching

The MC88200 CMMU is a high-performance, HCMOS VLSI device which provides zero-wait-state memory management and data caching. The MMU (memory management unit) supports a demand-paged, virtual memory environment with two logical address ranges (user/supervisor) of 4 GB each.

Translated addresses are provided by one of two ATCs (address translation caches), providing address translation

in one clock cycle for most memory accesses. The PATC (page address translation cache) is a 56-entry, fully associative cache containing recently used translations for 4 KB memory pages and is maintained by MC88200 hardware. The BATC (block address translation cache) is a 10-entry cache, loaded by software, containing translations for 512 KB memory blocks.

The CMMU data cache is a 16 KB, four-way, set-associative cache for instruction or data storage. The cache incorporates memory-update policies and cache coherency mechanisms that support multiprocessor applications. Each cache set employs an LRU (least recently used) replacement algorithm to allocate cache entries. The AViiON Server System maintains cache coherency through a copy-back mechanism.

Memory

The AViiON 5200 and AV 6200 Series system board contains 16 MB of 100ns ERCC memory. The ERCC memory

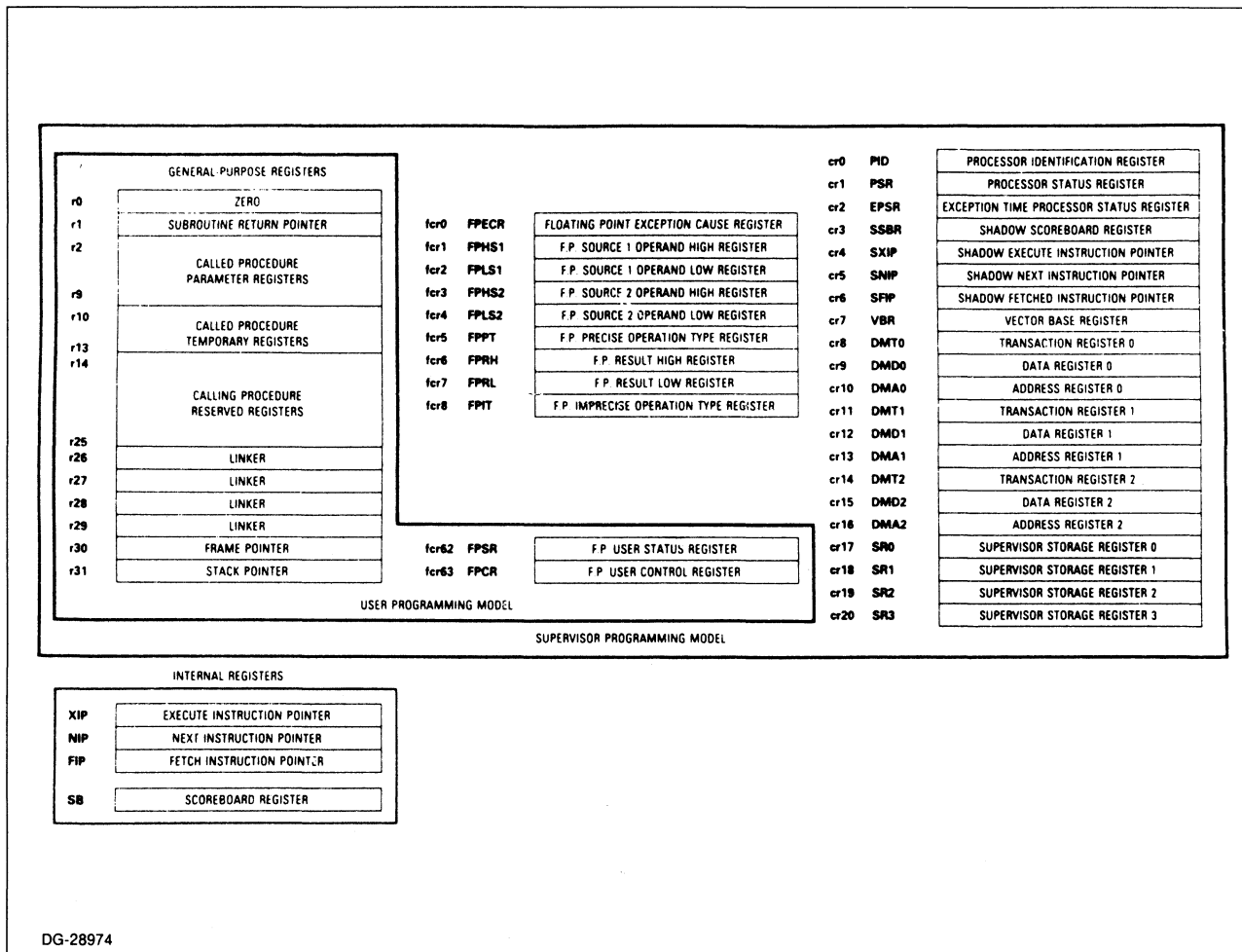


Figure 5. MC 88100 programming model.

performs single-bit error correction and double-bit error detection. Up to four expansion memory boards may be configured in either 16 MB, 32 MB, or 48 MB increments.

Both system board and expansion board memory are implemented in ZIP packaging with 1Mx1 bit DRAM elements organized into rows of 1Mx39 bits each, with a 2:1 interleave factor.

Expansion memory boards are a 9U form factor and interface to the system's memory bus.

Bus Structure

Two busses provide paths for all communications between boards in the system.

The VME bus on AV 5200 and AV 6200 Series systems is fully compliant electrically with Motorola's VME Bus

Specification, Revision C.1. The VME bus is an industry-standard 40 MB/sec bus which provides for data transfers between the system board and all controllers such as those for mass storage and communications. Data General's implementation of this bus incorporates high-performance features such as block transfers.

J1/J2 connectors are provided for all 10 chassis slots to connect to standard P1/P2 connectors on Eurocard 6U form factor (233mm x 160mm) VME boards. J3 connectors are provided for slots 1-6 and are reserved for the proprietary Pexbus. 9U form factor (400mm x 366mm) boards are also supported so long as they use VME standard signals on the J1/J2 connectors only. Since the slots themselves are all 9U form factor, an adapter is required to configure 6U boards. Such an adapter is included with all 6U form factor boards sold by Data General. Figure 7 displays 9U and 6U VME Eurocards.

Integer Arithmetic Instructions		Load/Store/Exchange Instructions	
Mnemonic	Description	Mnemonic	Description
add	Add	ld	Load Register from Memory
addu	Add Unsigned	lda	Load Address
cmp	Compare	ldcr	Load from Control Register
div	Divide	st	Store Register to Memory
divu	Divide Unsigned	stcr	Store to Control Register
mul	Multiply	xcr	Exchange Control Register
sub	Subtract	xmem	Exchange Register with Memory
subu	Subtract Unsigned		

Floating-Point Arithmetic Instructions		Flow-Control Instructions	
Mnemonic	Description	Mnemonic	Description
fadd	Floating-Point Add	bb0	Branch on Bit Clear
fcmp	Floating-Point Compare	bb1	Branch on Bit Set
fdiv	Floating-Point Divide	bcnd	Conditional Branch
fldcr	Load from Floating-Point Control Register	br	Unconditional Branch
flt	Convert Integer to Floating Point	bsr	Branch to Subroutine
fmul	Floating-Point Multiply	jmp	Unconditional Jump
fstcr	Store to Floating-Point Control Register	jsr	Jump to Subroutine
fsub	Floating-Point Subtract	rte	Return from Exception
fxcr	Exchange Floating-Point Control Register	tb0	Trap on Bit Clear
int	Round Floating-Point to Integer	tb1	Trap on Bit Set
nint	Round Floating-Point to Nearest Integer	tbnd	Trap on Bounds Check
trnc	Truncate Floating-Point to Integer	tcnd	Conditional Trap

Logical Instructions		Bit-Field Instructions	
Mnemonic	Description	Mnemonic	Description
and	AND	clr	Clear Bit Field
mask	Logical Mask Immediate	ext	Extract Signed Bit Field
or	OR	extu	Extract Unsigned Bit Field
xor	Exclusive OR	ff0	Find First Bit Clear
		ff1	Find First Bit Set
		mak	Make Bit Field
		rot	Rotate Register
		set	Set Bit Field

DG-28973

Figure 6. MC88100 instruction set.

Mechanically, in order for a 6U form factor board to mate with the DG 6U-9U adapter, it must operate without a front panel and that front panel must be user removeable. This is the case with all the 6U VME boards sold by Data General and is the case with the large majority of third-party boards. It is a limitation of which the customer should be aware, however, should he intend to configure third-party VME bus products. More expensive third-party adapter products such as the Dawn Model #9U400/6U-1 (Dawn VME Products, 47073 Warm Springs Blvd., Fremont, CA 94539 (415/657-4444) do not have this limitation, but do violate the VME bus specification by extending by three inches the distance from a driver on the VME board to the backpanel. It should be noted that this

mechanical discussion also applies to Sun Microsystems VME-based systems and is, therefore, not unique to Data General.

The *Pexbus (buffered memory bus)* is also bussed to the backplane of slots 1 through 6 for communication between the system board and all system memory, on-board and expansion. *Slots 1-6 utilize not only J3/P3 but also user-defined pins on J2/P2. Therefore, third-party or custom boards using the user-defined pins on J2/P2 should be configured only in slots 7-10.* It is a superset of Motorola's Mbus used by the MC88200 cache chips to provide a high-speed data path to system memory. The Pexbus is

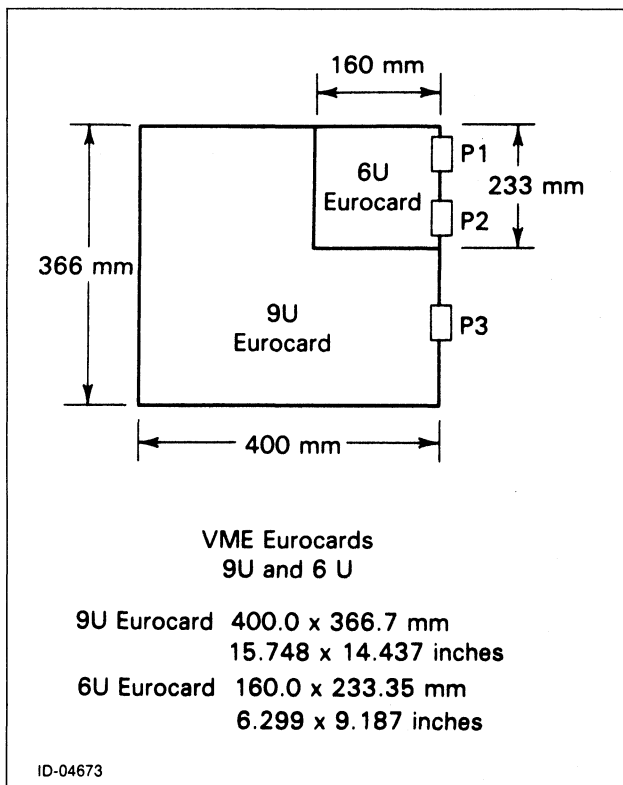


Figure 7. 9U and 6U VME Eurocards

not an industry standard and is used only by the system board and DGC expansion memory for the AV 5200 and AV 6200 Series systems.

DG/UX

DG/UX for RISC Systems is an advanced implementation of the UNIX Operating System based on AT&T's V.3 Release 1 and the Berkeley Software Distribution (BSD) 4.3 operating systems, as well as the POSIX application interface standard. It also incorporates the 88open Binary Compatibility Standards and the X Windows Version 11 Release 3.0 standard among other industry, government, or de facto standards. DG/UX supports TCP/IP protocols for file transfer; remote disk access is provided by the Network File System (NFS).

DG/UX offers a number of capabilities not generally available from other vendors. These capabilities include fully symmetric multiprocessing, an advanced file system with data security and recovery features as well as support for large file systems and files, a medium-term scheduler for superior throughput and guaranteed forward response under heavy load, and enhanced error-reporting.

Packaging

Two packaging schemes are available: free-standing office (AV 5200 Series) and rackmount (AV 6200 Series) (figures 8 and 9).

The *office package* is an attractive 17.25" W x 24.75" H x 25.5" D caster-mounted, integrated system suitable for an office environment. In addition to the 10-slot card cage and a 750 watt power supply, the office system can incorporate up to three full-height 5.25" disks and up to two half-height 5.25" removeable media devices such as the 150 MB QIC cartridge tape. Additional mass storage, such as a desktop reel-to-reel tapes, can be added externally.

The *rackmount chassis* incorporates the 10-slot card cage with a 520 watt power supply in a NEMA-standard 14"-high chassis.

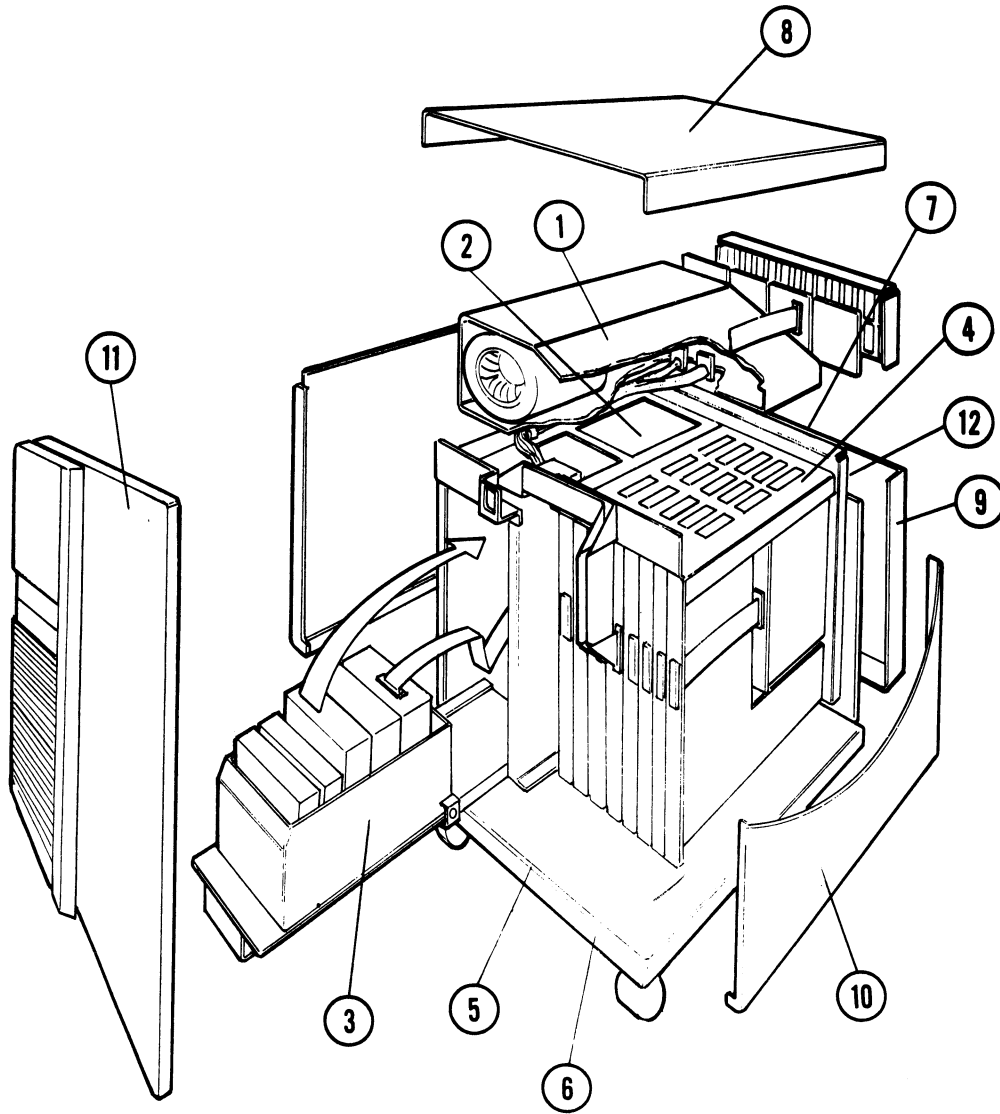
System Capacities

Table 1 shows maximum capacities for AV 5200 and AV 6200 Series systems. Slot and bulkhead restrictions prevent all maxima from being configured simultaneously. For example, the synch board has been qualified to configure up to 4 boards in both the office and rackmount chassis. Bulkhead connector limitations would only allow 4 ports to be used on the office package and 8 ports with the rackmount chassis. See the Configurations/Ordering section for more information.

Features	AV 5200/5220	AV 6200/6220
VME slots	10	10
Memory	208 MB	208 MB
Asynchronous connects (VDA/VDC)	512	640
Asynchronous connects (VAC/16)	32	16
Ethernet LAN	2	2
Synchronous boards/ports	4/4	4/8
Disk capacity:		
Integral	1944 MB	N/A
External	2648 MB	25.9 GB*
Cartridge tapes (150 MB)	4	4
Reel-to-reel tapes	4	4

*Based on 4 SCSI controllers connected to 4 Combined Storage Subsystems for a total of 15 x 662 MB SCSI disks and 1 x 150 MB cartridge tape plus 4 SMD controllers connected to a total of 16 x 1 GB SMD disks.

Table 1. AV 5200 and AV 6200 system capacities.



Front View

- | | |
|------------------|-----------------|
| 1. Blower Baffle | 7. J Box PCB |
| 2. Power Supply | 8. Top Skin |
| 3. Peripherals | 9. Rear Skin |
| 4. Card Cage | 10. Side Skin |
| 5. Base | 11. Front Bezel |
| 6. Screen/Baffle | 12. Back Plane |

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Figure 8. AV 5200/5220 office packaging.

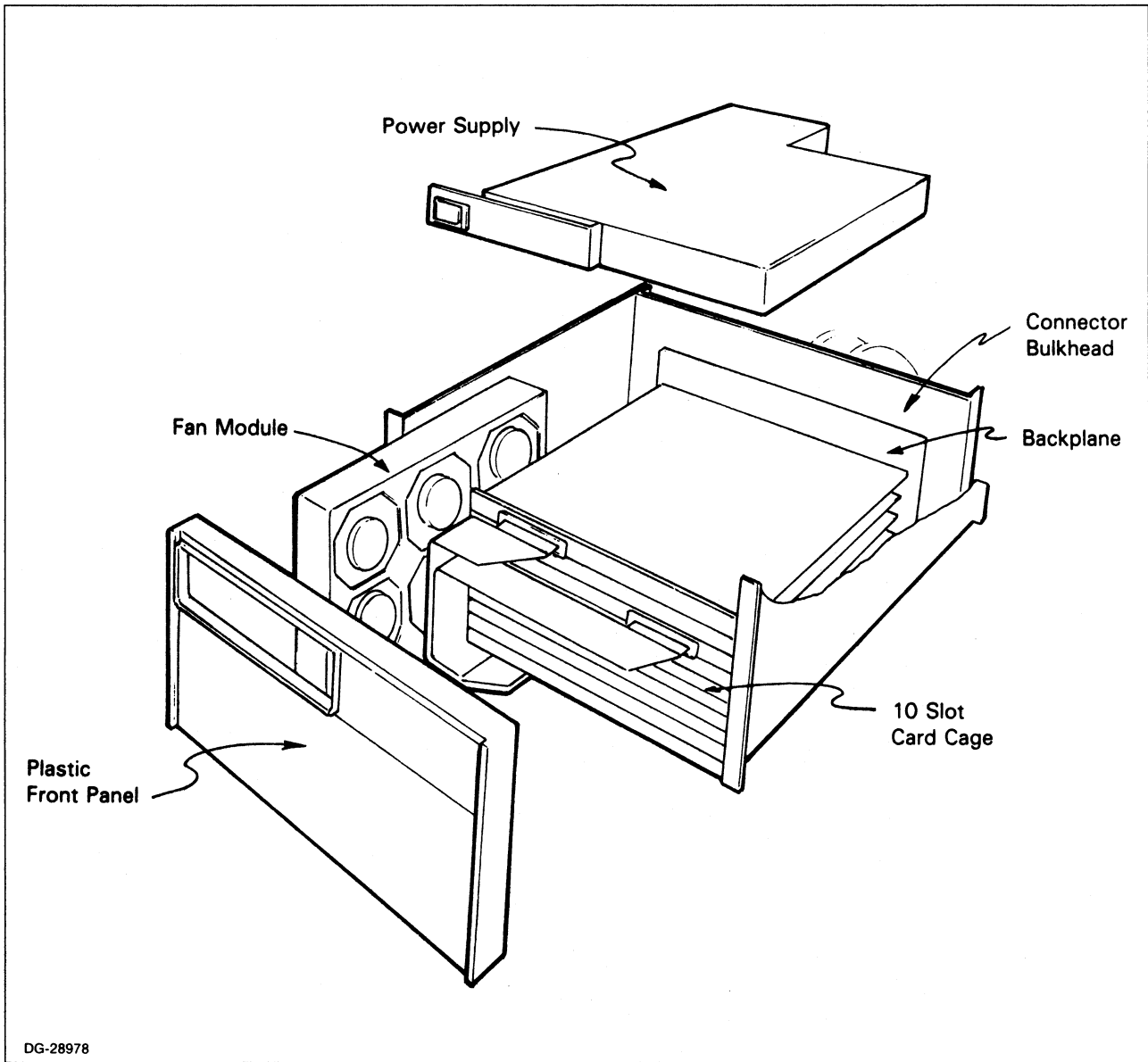


Figure 9. AV 6200/6220 rackmount packaging.

Communications

Asynchronous Communications

Three methods are provided to connect asynchronous devices to AV 5200 and AV 6200 Systems.

For low-connect counts, up to 16 RS232 devices can be connected through the *VAC/16 (VME Asynchronous Controller/16)*. Each VAC/16 is a 6U form factor board which includes a Motorola 68020 processor, 192 KB static RAM buffer, 128 KB EPROM, and two custom VLSI octarts. All sixteen lines are full duplex. The board has an aggregate maximum data rate of 16×19.2 KBPS full duplex. All 16 ports support modem connection.

A *TCP/IP Ethernet LAN based terminal server connection scheme* is available from Data General Network Services. In early 1990, DGNS will publish standard prices for TCP/IP network components and services.

Also available is *terminal services host adapter* solution. Terminal services should not be confused with the traditional terminal server which permits terminals to be simultaneously logged onto multiple systems. The terminal services host adapter merely allows the concentration of terminal hook-ups some distance from the rear bulkhead of the system via a single coax cable. This relieves cabling concentration problems at the rear of the bulkhead and also dramatically increases the number of connects per VME slot.

The *VDA/128 (VME Distributed Async)* is the 6U form factor board which plugs into a VME slot in the AViiON Server System and connected to the *VDC (VME Distributed Cluster)* boxes through an RG62 coax cable. Up to 128 lines per VDA/128 may be connected through distributed clusters. For typical commercial applications, however, the users per VDA/128 should be limited to approximately 64 for performance reasons.

The VDA/128 is based on a 12.5 MHz 68010 processor with 512 KB of zero-wait-state DRAM and 16 KB of dual-ported memory. It supports a 2.5 Mbit/second serial bus interface to the cluster controllers. The distributed clusters are based on a 10 MHz 68000 processor with 32 KB of static RAM for buffering and microprocessor support and 2 KB of static RAM for coaxial serial interface buffer support.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines) (figure 10). The aggregate throughput of the eight-line cluster is 8×19.2 KBps half-duplex; that of the sixteen-line cluster is 16×9600 bps half-duplex. All cluster controllers support the following

RS232C signals: CTS, DCD, DSR, DTR, RTS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

Synchronous Communications

Synchronous communications for the AV 5200 and AV6200 Systems are handled by the *VSC/4 (VME Bus Synchronous Controller)*. This 6 U form factor controller offers four multi-protocol serial communications channels (RS232C/RS422) with full duplex DMA operation using two Zilog 8530 SCC chips. The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. Two independent sync protocols can be handled simultaneously by this board. Aggregate throughput is 1.6 Mbit/sec.

LAN Communications

Ethernet LAN communications are provided by the *VLC (VME Bus Ethernet LAN Controller)*, an OEM'd version of the Interphase Hawk Communications Controller. This board implements IEEE 802.3 Ethernet on a 6U VME board with an intelligent Ethernet controller chip (7990 LANCE) and a 256 KB dual-ported data buffer, providing high-speed, 32-bit bus slave data access. The controller chip communicates with the on-board memory for all command and data transactions. The data packet is placed or retrieved from the buffer on the VME bus from main memory via a software process which handles cache coherency.

Mass Storage

AViiON Server Systems take full advantage of high-performance, industry-standard peripherals to provide users with a wide range of mass storage options. This variety gives customers the ability to closely match their peripheral configurations with their application needs as well as allowing for the configuration of balanced systems, i.e., systems in which mass storage does not act as a bottleneck to total system throughput.

The rest of this section describes the specific mass storage options available on the AV 5200 and AV 6200 systems. Not all peripherals are available on both the office-packaged and the rackmount system. Configurability also varies between the two styles. Therefore, it is important to your customer that the system style be matched with his peripheral expansion needs. It is also important to read the

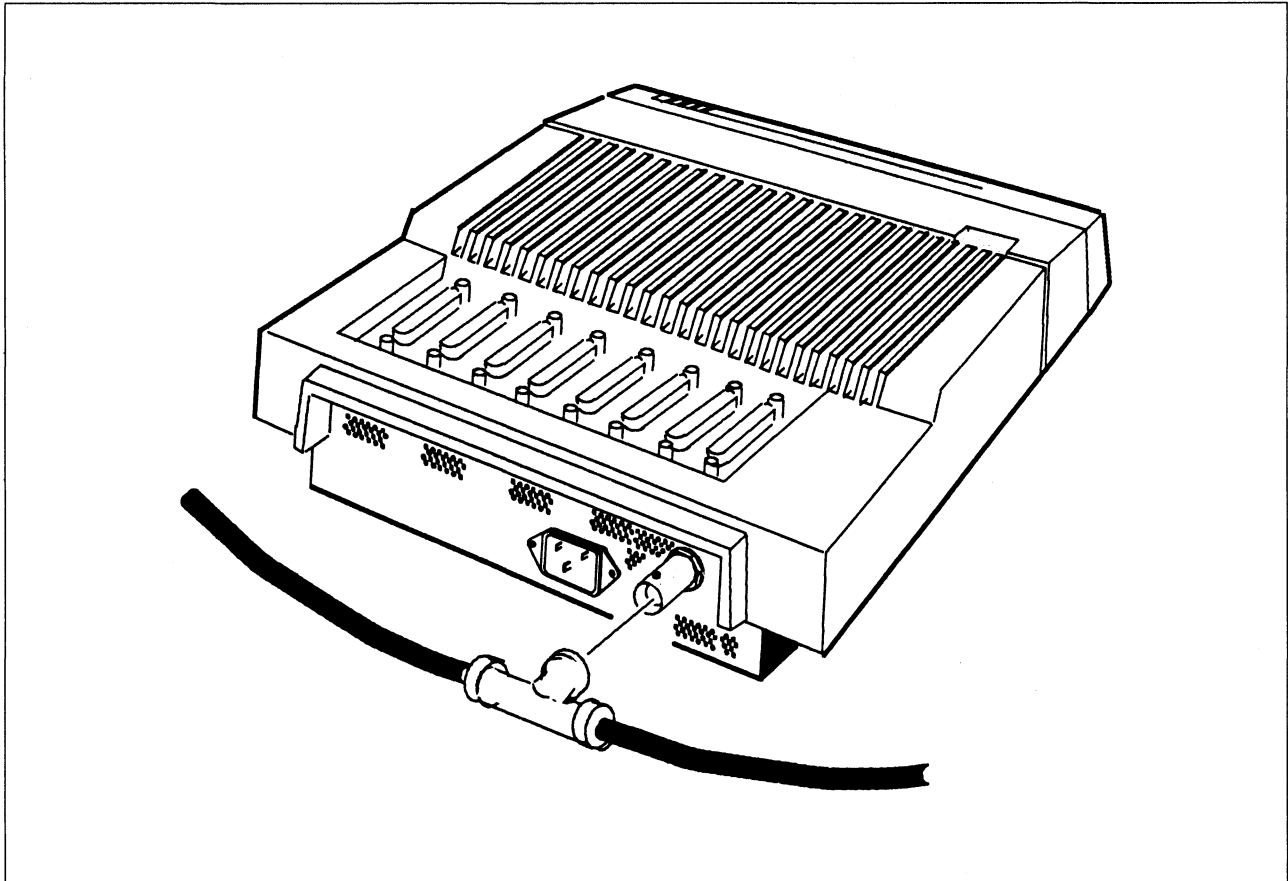


Figure 10. VME distributed cluster controller (VDC). T-connector shipped with VDC. Cables are Model 15338Exxx cluster extension cables.

explanations in this section and the appropriate mass storage MAPS/PLUS articles to fully understand the performance implications of various mass storage choices.

Winchester Disks AV 5200 Systems

Winchester disk storage within the AV 5200 Series integrated cabinet is provided by the Model 6442-I and Model 6555-I Winchester disks. These 5.25" full-height ESDI interface disks have a 322 MB and 648 MB formatted capacity respectively. A total of three of these disks can be integrated within the package with a maximum integral capacity of 1944 MB.

SCSI Disks in Peripheral Housing Unit

Additional 5.25" disk storage can be provided outside of the AV 5200 System package through the Model 10565 Peripheral Housing Unit. Each Peripheral Housing Unit can support up to 3 half-height (or 1 full-height and 1 half-height) SCSI-interface 5.25" peripherals. One Periph-

eral Housing Unit can be configured off the SCSI controller included with the base AV 5200 system package. By adding a second SCSI controller, 3 additional Peripheral Housing Units can be configured. Therefore, a total of 4 full-height disks can be added externally to an AV 5200 system.

Either Model 6491-E (322 MB) or Model 6554-E (662 MB) can be configured with the Peripheral Housing Unit. Both of these disks are full-height devices.

Cartridge Tape Drives

All AV 5200 systems come packaged with an integral 150 MB QIC cartridge tape drive. In addition to reading and writing QIC-150MB formats, this tape can read and write QIC-120MB and read QIC-60MB or QIC-40MB. This cartridge tape is the standard distribution media specified by the 88Open Committee and also features full-boot functionality as well as offering high-speed, reliable (read-after-write) backup. The 150 MB cartridge tape is a half-height 5.25" SCSI device.

The 150 MB cartridge tape is also required for media distribution (diagnostics and software) purposes on the AV 6200 rackmount systems although it is not integrated in the base package. For these systems, it may be configured in the rackmount Combined Storage Subsystem.

Available on both the AV 5200 and AV 6200 systems is the 8mm, 2GB Backup/Retrieval Subsystem. This full height, 5.25' SCSI peripheral can be configured in a Peripheral Housing Unit for AV 5200 systems. Models 6591-E and 6591-A. For AV 6200 systems, the tape is mounted in a CSS chassis, Model 6590-M.

Reel-to-Reel Tape

A 1600bpi, 100ips reel-to-reel tape option is provided for both AV 5200 and AV 6200 systems. Model 6587-A includes an attractive enclosure designed for placement upon a desk or table. The Model 6586-A is a 19' rackmountable model which requires only 8.75' of rack space. Both models operate off a SCSI bus and offer easy front-loading capabilities for standard half-inch magnetic tape with reels from 6' to 10.5'.

Disks: AV 6200 Systems

Available disk configuration for the rackmount AV 6200 systems have both similarities and differences to those available on the office-packaged AV 5200 systems. Both systems share the ability to configure the 322 MB and 662 MB 5.25' SCSI disks. While these are configured in the Peripheral Housing Unit on AV 5200 systems, they would be configured in a Combined Storage Subsystem when used with AV 6200 systems.

On the other hand, the 322 MB and 648 MB ESDI disks are not available for the rackmount system. This is primarily because ESDI disks are less suitable for non-integrated systems because of the limited cable length allowed with ESDI connections.

Instead, **1 GB SMD-interface disks** are offered. These high-capacity, 8" drives offer the highest performance option for AV 6200 systems while also featuring dual-porting hardware capability. Operating system support for this hardware capability is planned for future releases of DG/UX. These 16ms seek drives are packaged in the same manner as the 727MB 8" disk subsystem in the MV line, with large configurations being housed in the meter-high cabinet modified to accommodate 8 of these disks (Model 6585).

One **SMD controller (9U form factor)** controls 4 disks. With the maximum 4 SMD controllers, the AV 6200 and AV 6225 can accommodate a maximum of 16 SMD disks of 16 GB of disk.

VME Controller Boards

VME SCSI Controller Board (Office and Rackmount): This 6U form-factor controller board controls up to 7 devices on an asynchronous SCSI bus with a 1.5 MB/sec asynchronous transfer rate, synchronous 95MB/sec. The board is designed around an 8 MHz Intel 80186 processor and a Western Digital 33C96 SCSI chip. This board is an OEM'd version of the Ciprico Rimfire 3500. One of these boards is included in all AV 5200 and 6200 package configurations to support the 150 MB cartridge tape.

VME ESDI Controller Board (Office): This 6U form-factor controller board controls the one to three ESDI disks contained in the AV 5200 and AV 5220 integrated package. The board is designed around an 8MHz Intel 80186 processor grid contains a 512KB segmented read-ahead cache. This board is an OEM'd version of the Ciprico Rimfire 3400 and is included in all AV 5200 Series package configurations. It is not sold separately.

VME SMD Controller Board (Rackmount): This 9U form-factor controller board controls from 1 to 4 SMD drives for AV 6200 Series systems with a 3.0MB/sec data transfer rate. It is based on an Intel 80186 processor and uses a 8466 National disk controller, 512 KB of on-board cache RAM, separate processor and system data buses, and a proprietary VME FIFO gate array. This controller achieves its high reliability and performance through a variety of special functional features including: bad sector remapping, scatter/gather DMA operations, overlapped seeks, command queuing, command optimization, and command coalescing (block address optimization) with a segmented read-ahead cache. This board is an OEM'd version of the Ciprico Rimfire 3221.

Winchester Disk Selection: AV 5200 Systems

The ESDI interface was chosen for the internal disks on the AV 5000 office-packaged systems because of the superior performance it offers on single-spindle accesses relative to SCSI. This is primarily a function of the 512 KB segmented read-ahead cache on the VME/ESDI controller board as well as the lower controller overhead associated with the ESDI interface. The ESDI interface cannot be used for external disks because of cable length restrictions inherent in the ESDI specification.

The SCSI interface disks which can be added externally in the Peripheral Housing Unit, however, are also high-performance disks. They use the same head-disk assembly (HDA) as the ESDI-interface version and thus have the same 18 ms average seek and 1.25MB/sec data transfer rate.

Winchester Disk Selection: AV 6200 Systems

The customer who purchases a rackmount AV 6200 system has two basic paths he can follow in selecting Winchester disk storage: SMD and SCSI. Although there is no physical or electrical reason that the two interfaces cannot be mixed on a single system, it is expected that most customers will want to choose a single disk storage interface type.

The 1 GB, 8-inch SMD disk subsystems provide the following advantages over the SCSI disk subsystems: significantly higher data transfer rate and greater capacity per VME slot. The higher data transfer rates result from the greater numbers of sectors/track on the SMD drives relative to the SCSI drives. SMD also maximizes storage per VME slot since each 9U form-factor SMD controller controls up to four 1 GB SMD drives for a total of 4 GB per controller. Each VME/SCSI controller, although it has a theoretical limit of 7 peripheral devices, is limited by the 6-meter SCSI bus to controlling the devices in a single CSS chassis. With 662 MB disks, this represents 2648 MB per controller.

Under many circumstances, the SMD interface also provides the greatest overall performance. Like ESDI, SMD is a dumb interface and hence has lower overhead in the controller than does SCSI. The SMD controller used in the AV 6200 systems also has a 512 KB segmented read-ahead cache. However, overall performance can be very sensitive to spindle count; therefore, some system configurations — especially those with mass storage requirements in the 1 GB to 2 GB range — may benefit from the larger number of spindles in a SCSI configuration.

Hardware Support Services

Field Engineering

Data General Field Engineering supports the AViiON systems with state-of-the-art service technology. There are two types of service programs which offer a full array of options designed to satisfy users' uptime requirements.

The On-Call Agreement allows the flexibility of selecting coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. In conjunction with the terms of the basic agreement, users may also purchase additional options such as

Extended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The Multiyear Plus Agreement offers all the benefits of an On-Call Agreement and more. By signing a Multiyear Plus Agreement with a term of 2 to 5 years, users receive discounts of up to 10 percent over the life of their agreement.

Both agreements include 7-day, 24-hour on-line remote diagnostic service. PCB Resume, a tool used in conjunction with remote diagnostics, enables the field engineer or remote staff to access valuable information on the performance history, specs, revision level, and compatibility of the board in question. The result is fast, accurate diagnosis and an increase in system uptime.

Additional information on service is available from a Data General salesperson or by calling the Data General Field Engineering Telemarketing Group at 1-800-325-3065, (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Users may take advantage of a warranty conversion option by signing up for a Multiyear Plus Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server-specific, shared with AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Configurations/Ordering

Color

The AViiON 5200/5220 (office package) uses a new Gray (G prefix) color scheme. The AViiON 6200/6220 (rackmount) uses the existing earthtone color scheme.

CPU and Memory Guidelines

Each system model number comes with a single- or dual-processor system board with either 8 MB (single-processor only) or 16 MB of on-board memory. Only one system board may reside in a system. To upgrade from a single to a dual processor, it is necessary for Field Engineering to swap the system board. See the Upgrades section for details and ordering information.

Up to 4 memory boards may reside in a system. Any combination of 16 MB, 32 MB, and 48 MB memory boards are supported. Memory boards may also be upgraded.

A maximum of 9 VME Controller boards may be configured if no expansion memory boards are present. Each memory board configured reduces this number by one to a minimum of 5. Additional constraints are applied by the bulkheads used by both office-packaged and rackmount AViiON Server Systems. Table 2 lists limits.

Controller Board	Office	Bulkhead for Rackmount	Standard Bulkhead for Rackmount
		with VAC/16	
VAC/16	2	1	0
VDA/128	4	1	5
VSC/4	4 ports	6 ports	8 ports
VLC	2	2	2
SCSI controller	2	4	4
ESDI controller	1	0	0
SMD controller	0	3	4

Table 2. VME controller board configuration limits.

When a VAC/16 is ordered with an AV 6200 Series system, the correct bulkhead is automatically configured with the system. If a VAC/16 is ordered later for a rackmount system, the correct bulkhead is structured with the controller board. Note that, for this reason, the model number for the VAC/16 for rackmount systems is different from that for the integrated system.

All controller boards except for the SMD controller are a 6U Eurocard form factor and require an adapter board to be configured in the 9U form factor chassis. This adapter board is structured with all 6U controller cards sold by Data General.

Mass Storage Guidelines: Office Package

All office-packaged systems come packaged with one ESDI disk and one 150 MB QIC cartridge tape. The ESDI and SCSI controllers required for these peripherals are also included. Within the package, a customer may add up to 2 additional 5.25" FH ESDI interface Winchester disk drives and one additional 5.25" HH SCSI interface removable media device.

Additional mass storage may be added externally to AV 5200 Series systems in the form of desktop reel-to-reel tape drives and the Peripheral Housing Unit. The base SCSI controller on an AV 5200 system may be extended externally to accommodate a maximum of one external

housing (reel-to-reel tape or Peripheral Housing Unit). A maximum of one additional VME Bus SCSI controller may be added to an AV 5200 system. This additional controller can be configured with up to 3 additional external housings containing mass storage devices.

Additional ESDI devices cannot be configured externally because of cable length limitations in the ESDI specification.

Mass Storage Guidelines: Peripheral Housing Unit

The Peripheral Housing Unit can physically accommodate either 3 half-height or 1 full-height/1 half-height 5.25" SCSI mass storage peripheral. Presently, the 150 MB QIC cartridge tape, the 322 MB 5.25" SCSI Winchester disk, the 5.25" 662 MB disk, and the 2GB cartridge tape are supported in a Peripheral Housing Unit attached to an AV 5200 System.

The Peripheral Housing Unit is not currently supported on rackmount systems.

Mass Storage Guidelines: Rackmount Package

Unlike the office package, an AV 6200 system chassis does not incorporate integrated mass storage. (Although packaged AV 6200 systems may include mass storage, it is not integrated with the chassis.) Rather, rackmount mass storage peripherals are added in the same manner as with rackmount MV/Family systems such as the MV/7800 XP.

AV 6200 Series systems accommodate both SMD and SCSI interface peripheral devices.

The VME Bus SMD Controller can accommodate up to four 8" SMD disks per controller. These disks require 7" of rack space and fit two across in a cabinet (as with the R.A.M.S. disks on the MVs). Up to 4 SMD controllers can be configured on rackmount systems without the VAC/16 bulkhead. On systems with the VAC/16 bulkhead, 3 SMD controllers can be configured. Large SMD disk configurations are best accommodated in meter-high cabinets using the modified 8-outlet MHC for the second cabinet.

The VME Bus SCSI Controller can be used to interface to SCSI peripherals in either:

- Standalone rackmount configurations (e.g. reel-to-reel tape) or
- Combined Storage Subsystem configurations (e.g. 150 MB QIC cartridge tape)

Each SCSI Controller can handle a maximum of 7 peripheral devices but, in general, the 6-meter maximum SCSI cable length will be the limiting factor in configuring devices. Note that this 6-meter, industry-standard cable length is less than that allowed on MV/Family systems

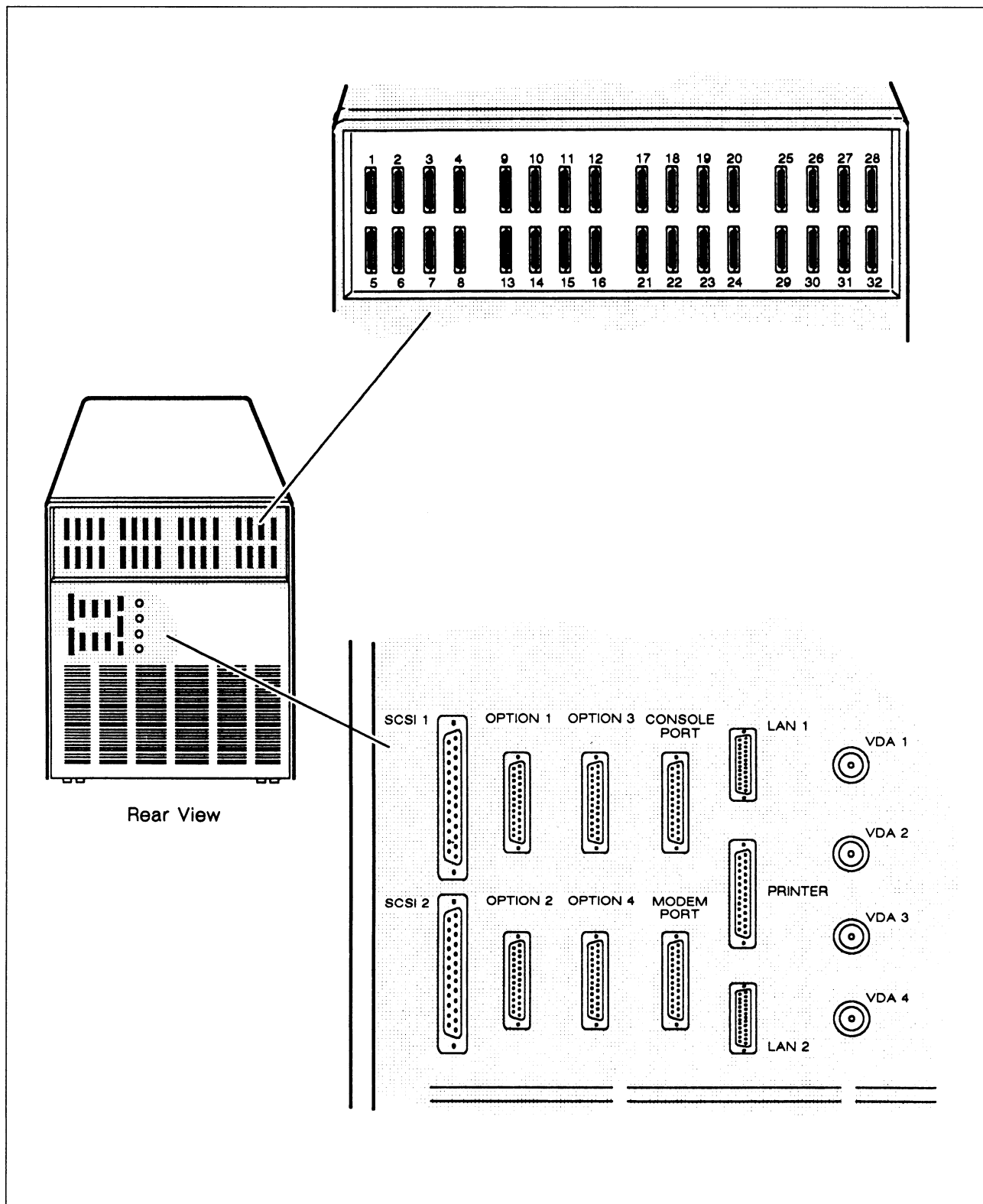


Figure 11. Rear bulkhead on AV 5200/5220 systems.

with DGC's modified SCSI. The VME Mass Storage Peripherals MAPS/PLUS article discusses configuration requirements in depth.

Slot Assignments

The system board must reside in slot 1. Expansion memory must reside in slots 2 through 5. VME boards can be configured in slots 2 through 10. Third-party or custom VME boards which utilize the user-defined pins on J2/P2 may be configured in slots 7 through 10 only. Table 3 displays slot assignments.

Slot No.	Slot Assignment
1	System board
2	Expansion Memory or I/O
3	Expansion Memory or I/O
4	Expansion Memory or I/O
5	Expansion Memory or I/O
6	I/O
7	I/O
8	I/O
9	I/O
10	I/O

Table 3. AV 5200, AV 6200 slot assignments.

Power

The integrated office package includes a 750-watt power supply and the rackmount package includes a 520-watt power supply. If only Data General controller boards and peripherals are configured with these systems, no configuration restrictions are imposed by available power.

Below are the amperes required for each of the boards and mass storage devices that draw current from the 5200 and 6200 series power supplies.

	Amperes Required		
	+5V dc	+12V dc	-12V dc
Single CPU/8MB	22	.01	.01
Single CPU/16MB	23	.01	.01
Dual CPU/16MB	24	.01	.01
16MB expansion memory	7.7	—	—
32MB expansion memory	9	—	—
48 MB expansion memory	10.5	—	—
SCSI Controller	4	—	—
ESDI Controller	5	—	.5
SMD Controller	5	.5	—
VDA/128	3	.2	—
VSC/4	3	.1	.06
VAC/16	3	.25	.15
VLC	2.5	—	—
150MB QIC tape	.66	1.5	—
322MB ESDI drive	2.0	2.5	—
648M ESDI	2.0	2.5	—

The 5200 Series power supply provides 750 watts of power for the office package configuration. In Japan, output of the power supply must be limited to 670 watts because of the AC input line cord maximum rating. The maximum DC amperes output for the 5200 series power supply is listed below.

	Amperes	Watts
+ 5 dc	105	525
+ 12 dc	17	204
- 12 dc	4	48
Total		777 watts

The limiting factor is the 750 watts maximum output. Therefore, power draw cannot go to the maximum of each of the dc outputs listed above. The total wattage cannot exceed 750 watts.

In Japan, NDG has recommended that the following guidelines be used for configuring 5200 Series systems to the 670 watt maximum.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	88	440
+ 12 dc	15	180
- 12 dc	4	48
Total		668 watts

The NDG guidelines for each of the dc outputs can be exceeded up to the maximum output of the power supply as long as total watts does not exceed 670. For example, in Japan a total of 95A + 5, 12A + 12, and 4A - 12 could be configured for a total of 667 watts.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	95	475
+ 12 dc	12	144
- 12 dc	4	48
Total		667 watts

The 6200 series power supply is rated at 520 watts with the following maximum dc outputs.

	<i>Amperes</i>	<i>Watts</i>
+ 5 dc	92	460
+ 12 dc	3	36
- 12 dc	2	24
Total		520 watts

Terminals

All asynchronous connections supported by Data General communications products on AViiON Server Systems comply with the RS232 specification. AViiON Server Systems support RS232 terminals with support for ANSI control codes. These include Data General DASHER D21x, D22x, D41x, D46x, D555, and D470C.

If a hardcopy terminal is used as the system console, it should have one of the following two features to properly display powerup error messages: not respond to backspace codes or process a line only after receiving an End-of-Line. DASHER D57x hardcopy terminals meet these requirements. TP1 terminals do not.

All RS232 ports on AViiON Server Systems are female DB-25 (connected to by male DB-25 cables) as is the standard on VME bus-based systems. This is the opposite of the convention used on MV/Family systems, most personal computers, and the AVX 300 AViiON Workstation. The proper cable for user terminals will be automatically structured with terminals ordered with an AViiON Server System model designator. Model numbers for cables ordered by themselves are shown in the Cables section.

The cable for the system console is different from that used for user terminals. The system console terminal should be ordered with a -X suffix (to indicate no cable). A 25' console cable is included with all AV 5200 and AV 6200 Series systems. The model numbers for additional console cables are given in the Cables section.

Printers

RS232 interface printers are supported on the second RS232 port on the system board, the VAC/16, or the ports on VDC cluster controllers. In addition, the system board has a parallel port selectable for Data Products or Centronics interfaces. The VDC/8P cluster controllers each incorporate one Centronics interface along with their 8 RS232 ports. All Data General printers which meet these interface requirements are supported.

Models 4595-4599, Data General's fully formed, impact line printers can be used on the 5200 and 6200 series. Any of these models can be driven directly from the parallel printer port (using the Data Products interface) located on the CPU board. In addition, models 4595-4597 can be connected to the VDC/8P parallel Centronics port or off of any VDC asynchronous port. Connection to VDC ports (Centronics parallel or RS232 and RS422 asynchronous) requires the addition of Model 4601 printed circuit board in the printers.

To run a 1200LPM printer (Model 4597) on a asynchronous port requires a 19.2 bps line. The printer line must have the highest priority on the VDA/128 to ensure that it operates at full speed.

Ethernet LAN Guidelines

The Ethernet controller board for VME bus-based AViiON Server Systems (VLC) has a standard DB-15 connector and uses the same drop cables and transceivers as do MV/Family systems (figure 12). Table 4 lists model numbers.

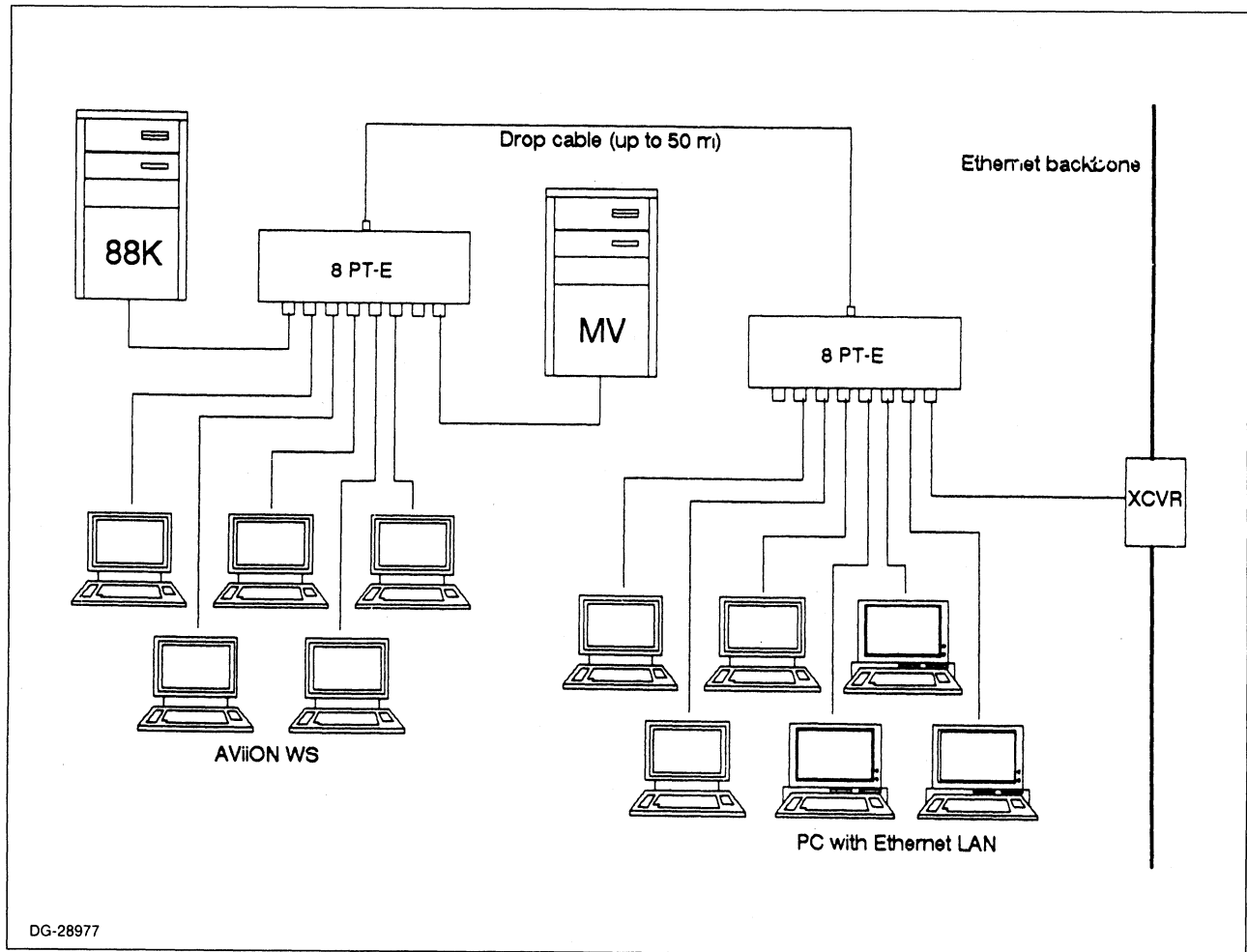


Figure 12. Client-server network with multiport transceivers

Model No.	Description
4540	N tap for Thick Ethernet
4540-A	BNC tap for Thin Ethernet
4540-B	Vampire tap for Thick Ethernet
4619	8-port transceiver (8PT-E)
1326	5-meter drop cable
1326-A	20-meter drop cable

Table 4. Transceivers and drop cables for Ethernet LANs.

Cabling

Cabling must be ordered separately to connect:

- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing Unit (PHU), Combined Storage Subsystem (CSS), and 1600 bpi reel-to-reel tape drive

- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- AViiON Server Systems to SMD Winchester disk drives
- VDA/128 to VDC/16 and VDC/8P cluster controller boxes (cluster extension cables)

SCSI champ connectors are used by the Peripheral Housing Unit, 1600 bpi reel-to-reel tape drive, and the AViiON Server Systems themselves. The RT Sub-D SCSI connectors are used by the Combined Storage Subsystem (applicable to AV 6200 Series Systems only). Table 5 lists cable model numbers.

<i>Model No.</i>	<i>Description</i>
15338EO25	25' cluster extension cable—VDA/12 ⁸
15338EO50	50' cluster extension cable—VDA/128
15338E100	100' cluster extension cable—VDA/128
15339E010	10' async system console cable
15339E015	15' async system console cable
15339E025	25' async system console cable
15340E010	10' async terminal cable
15340E015	15' async terminal cable
1540E025	25' async terminal cable
15325E001	1.3' SCSI champ x champ cable
15325E005	SCSI champ x champ cable, 5'
15325E010	SCSI champ x champ cable, 10'
15326E005	SCSI RT Sub-D x champ cable, 5'
15326E010	SCSI RT Sub-D x champ cable, 10'
15345E015	15' Centronics printer cable
15345E025	25' Centronics printer cable
15346E015	15' Data Products printer cable
15346E025	25' Data Products printer cable

Table 5. AViiON Server System cables.

<i>Model No.</i>	<i>Description</i>
15342K005	5' ext A I/F cable kit
15342K010	10' ext A I/F cable kit
15342K020	20' ext A I/F cable kit
15342K030	30' ext A I/F cable kit
15342K040	40' ext A I/F cable kit
15343K001	1.3' ext A daisy cable kit
15343K005	5' ext A daisy cable kit
15343K010	10' ext A daisy cable kit
15343K020	20' ext A daisy cable kit
15344K0055	5' ext B I/F cable kit
15344K010	10' ext B I/F cable kit
15344K020	20' ext B I/F cable kit
15344K030	30' ext B I/F cable kit
15344K040	40' ext B I/F cable kit

Table 6. SMD cabling for AV 6200 systems.

SMD Winchester Disks

Table 6 lists model numbers for the required cabling for SMD Winchester disk storage on AV 6200 Series systems.

The required cabling is included with AV 6200 packaged systems which include SMD Winchester disks.

Additional SMD disk ordering information:

- Model 6541-A includes the rack tray for two 8" drives, one drive, and 15344K010
- Model 6542-A includes the rack tray for two 8" drives, two drives, 15343K001, and (2) 15344K010

- Model 6541-K includes an expansion 8" disk only, 15344K010, and 15343K001
- Model 7408 (SMD Controller) includes one 15342K010 with the controller board

If a customer has previously purchased a Model 6541-A and wishes to add a second drive to the pair, a 6541-K should be ordered—not a second 6541-A.

Additional cables must be ordered with Models 6541-A and 6542-A if these are the third and fourth disks in a sub-system. In these cases, the "A" daisy chain control cable (15343Kxxx) must be ordered between drive 2 and drive 3. See the AViiON Mass Storage article for a complete explanation of SMD subsystem cabling.

Model Numbers

Table 7 lists model numbers for AViiON AV 5200 Series (office-packaged) systems, table 8, for AV 6200 Series (rackmount) base systems, and table 9 for AV 6200 Series system packages. Table 10 lists model numbers for expansion memory; and table 11, for VME bus communications controllers. Tables 12 through 14 list mass storage options for AV 5200 systems, for the Peripheral Housing Unit, and for AV 6200 systems.

<i>Model No.</i>	<i>Description</i>
G 70078@*	AV 5200 with single 25 MHz CPU, 16 MB memory, 322 MB ESDI disk, 150 MB QIC cartridge tape
G 70079@*	av 5200 with single 25 MHz CPU, 16 MB memory, 648 MB ESDI disk, 150 MB QIC cartridge tape
G 70080@*	AV 5220 with dual 25 MHz CPU, 16 MB memory, 648 MB ESDI disk, 150 MB QIC cartridge tape

"@" = AC power. For the AV 5000 Series.
@ = A(-,1,5,6,7,8,9,0).

Table 7. AV 5200 Series (office-packaged) systems.

<i>Model</i>	<i>Description</i>
E 70081@*	AV 6200 with single 25 MHz CPU, 8 MB memory
E 70082@*	AV 6200 with single 25 MHz CPU, 16 MB memory
E 70083@*	AV 6220 with dual 25 MHz CPU, 16 MB memory

"@" = AC power. For the AV 6200 Series.
@ = A(-,1,2,4).

Table 8. AV 6200 Series (rackmount) base systems.

<i>Model</i>	<i>Description</i>
E 70084	AV 6200 w/single 25 MHz, CPU, 16 MB memory, two 1 GB 8" SMD disks, 150 MB cartridge tape in CSS, SMD and SCSI VMEbus controllers. VMEbus Ethernet LAN controller, required cabling, meter-high cabinet (1605-B)
E 70085	AV 6220 w/dual 25 MHz CPU, 16 MB memory, two 1 GB 8" SMD disks, 150 MB cartridge tape in CSS, SMD, and SCSI VMEbus controllers. VMEbus Ethernet LAN controller, required cabling, meter-high cabinet (1605-B)
E 70086AV	6200 with single 25 MHz CPU, 16 MB memory, two 1 GB 8" SMD disks, 150 MB cartridge tape in CSS, SMD and SCSI VMEbus controllers, VMEbus Ethernet LAN controller, required cabling and I344-A 60" cabinet. Power receptacles for 8 rackmount devices are included.
E 70087	AV 6220 with dual 25 MHz CPU, 16 MB memory, two 1 GB 8" SMD disks, 150 MB cartridge tape in CSS chassis, SMD and SCSI VMEbus controllers, VME bus Ethernet LAN controller, required cabling, and I344-A 60" cabinet. Power receptacles for 8 rackmount devices are included.
E 70088	AV 6200 with single 25 MHz CPU, 16 MB memory, three 662 5.25" SCSI disks and 150 MB QIC cartridge tape housed in a CSS cabinet, VMEbus SCSI controller, VMEbus Ethernet controller, required cabling, 60" I344-A cabinet
E 70089	AV 6220 with dual 25 MHz, CPU, 16MB memory, three 662 5.25" SCSI disks and 150 MB QIC cartridge tape housed in a CSS cabinet, VMEbus SCSI controller, VMEbus Ethernet LAN controller, required cabling, 60" I344-A cabinet

Table 9. AV 6200 Series system packages.

<i>Model</i>	<i>Description</i>
7001	16 MB expansion memory board
7002	32 MB expansion memory board
7003	48 MB expansion memory board

Table 10. AV 5200, AV 6200 expansion memory.

<i>Model</i>	<i>Description</i>
7406	VAC/16
7400	VAC/16 for integrated systems
7401	VDA/128
7402	VDC/8P
7403	VDC/16
7405	VLC
7404	VSC/4 for 5200 systems
7404-V	VSC/4 for 6200 systems
7409	6U/9U VME Adapter Board*

*Required to configure third-party 6 U boards only.

Table 11. VME bus communications controllers.

Microcode

Because AViiON systems are based on a RISC processor, they do not use microcode.

System Software

AViiON Server System model numbers do not include a bundled RTU for the operating systems.

A wide variety of DG/UX system software packages are available for both server and multi-user AViiON Server System configurations. Multi-user DG/UX licenses are classes by user count categories. For ordering information on system software packages, please refer to the MAPS/PLUS articles on 88000 Unix software.

Upgrades

System board upgrades are offered through the Upgrades Marketing Group of the Continuing Products Division and are listed in table 15. These upgrades require only a simple board swap and include Field Engineering installation and deinstallation. If you have any questions regarding upgrades or would like to upgrade a system or component not listed here, please call a CPD Marketing Specialist at 508-870-1400.

<i>Model No.</i>	<i>Description</i>
USTG12A	Upgrade a single CPU AV 5100 or AV 6100 with 16 MB memory to a dual CPU AV 5220 or AV 6220 with 16 MB memory
USTG12B	Upgrade a single CPU C 5200 or AV 6200 with 16 MB memory to a dual AV 5220 or AV 6220 with 16 MB memory

Table 15. AViiON Server System upgrade.

Related Information

Table 16 lists customer manuals for FCS; table 17, MAPS/PLUS articles and sales collateral.

<i>Model No.</i>	<i>Description</i>	<i>Size, I/F</i>
G6577-I	150 MB QIC cartridge tape (integral add-on)	5.25" HH SCSI
G6442-I	322 MB ESDI disk (integral add-on)	5.25" FH ESDI
G6555-I	648 MB ESDI disk (integral add-on)	5.25" FH ESDI
7407	VMEbus SCSI controller (add-on) for AViiON 5000 systems	
G6587-A	1600bpi reel-to-reel tape (external tabletop)	SCSI

Table 12. Mass storage options for AV 5200 systems.

<i>Model No.</i>	<i>Description</i>	<i>Size, I/F</i>
G10565-@*	Peripheral Housing Unit (PHU)	
G6577-E	150 MB QIC cartridge tape	5.25 HH SCSI
G6591-E	2 GB cartridge tape	5.25" FH SCSI
G6491-E	322 MB SCSI 5.25" Winchester disk	5.25" FH SCSI
G6554-E	662 MB SCSI 5.25" Winchester disk	5.25" FH SCSI
G6601-@	PHU w/ 322 MB disk	
G6605-@	PHU w/ 662 MB disk	
G6602-@	PHU w/ 150 MB tape	
G6591-A@	PHU w/ 2 GB cartridge tape	
G6604-@	PHU w/322 MB disk and 150 MB tape	

*'@' = AC power. For Peripheral Housing Unit. @ = -,1,5,6,7,8,9.

Table 13. Mass storage options for Peripheral Housing Unit.

<i>Model No.</i>	<i>Description</i>	<i>Size, I/F</i>
6577-A	150 MB QIC cartridge tape with CSS chassis	
6590-A	2 GB cartridge tape with CSS chassis	
6443-A	322 MB SCSI 5.25" disk with CSS chassis	
6593-A	662 MB SCSI 5.25" disk with CSS chassis	
6577-M	150 MB QIC cartridge tape for CSS (add-on)	5.25" HH SCSI
6590-M	2 GB cartridge tape for CSS (add-on)	5.25" FH SCSI
6491-M	322 MB SCSI 5.25" disk for CSS (add-on)	5.25" FH SCSI
6554-M	662 MB SCSI 5.25" disk for CSS (add-on)	5.25" FH SCSI
6541-A	1 GB 8" SMD Winchester disk with tray for 2 drives	
6542-A	Two x 1 GB 8" SMD Winchester disk with mounting hardware	8" SMD
6541-K	1 GB 8" SMD disk (no mounting tray). Upgrade for 6541-A.	8" SMD
7407-V	VMEbus SCSI controller for AViiON 6000 systems	
7408	VMEbus SMD controller	
6585	Modified meter-high cabinet (8 receptacles) for SMD drives	
6586-A	1600 bpi reel-to-reel tape drive (rackmount)	SCSI

Table 14. Mass storage options for AV 6200 systems.

<i>Part No.</i>	<i>Title</i>
<i>AViiON 5000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001806	Setting Up and Starting AViiON 5000 Series Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 5000 VAR/OEM DOC. PACKAGE</i>	
015-000355	Expanding AViiON 5000 Series Systems
<i>AViiON 6000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001807	Starting AViiON 6000 Series Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 6000 VAR/OEM DOC. PACKAGE</i>	
015-000345	Expanding AViiON 6000 Series Systems
<i>AViiON 5000 AND 6000 SERIES SYSTEMS PROGRAMMER'S DOC. PACKAGE</i>	
014-001805	AViiON 5000 and 6000 Series Systems: Using the System Board Architecture and Programming Its Registers
014-001808	MC88200 User's Manual, Cache Memory/Management Unit (CMMU)
014-001809	MC88100 User's Manual, Reduced Instruction Set Computer (RISC)
<i>MODEL 10565 MASS-STORAGE SUBSYSTEM OWNER'S PACKAGE</i>	
014-001810	Installing and Operating the Model 10565 Mass-Storage Subsystem
<i>MASS STORAGE DRIVE MANUALS</i>	
014-001699	Model 6536 Tape Drive Operations and Maintenance (-00 vendor manual on the shelf; -01 manual on the shelf 6/24-150 MB Cartridge Tape)
014-001692	6586/6587 Magnetic Tape Drive Installation Guide
014-001460	Disk Drive Model 6491 Series General Specifications (-01 now on the shelf; rackmount drive, not office systems)-322MB Winchester Disk Drive
<i>MASS STORAGE OEM/VAR MANUALS</i>	
014-001756	Rimfire 3500 VMEbus SCSI Host Adapter with Floppy Port Product Specification
014-001757	Rimfire 3400 VMEbus ESDI Driver Controller Product Specification
014-001758	Rimfire 3200 VMEbus SMD-E Disk Controller Product Specification
<i>COMMUNICATIONS OEM/VAR MANUALS</i>	
014-001813	HPS Cluster Controller Technical Manual (VDC/8P, VDC/16)
014-001814	HPS Cluster Controller Installation Guide (VDC/8P, VDC/16)
014-001815	HPS VMEbus Host Adapters Technical Manual (VDA/128)
014-001816	DCP 8820 Technical Manual (VSC/4)
014-001817	Model 6236 Technical Manual (VAC/16)
014-001818	High-Performance VMEbus Ethernet Communications Controller User's Guide (VLC)
069-000347	HPS Terminal Control Software User Manual
069-000348	HPS Application Installation Manual
069-000349	HPS Diagnostic Application user Manual

Table 16. List of customer manuals for FCS of AViiON Systems Servers.

Part No.	Description
046-001195	AViiON 300 Workstation MAPS/PLUS article, page 202-3
046-001196	VME Communications Controllers MAPS/PLUS article, page 271-113
046-000924	AViiON Mass Storage MAPS/PLUS article, page 239-29
046-001013-01	DG/UX 4.20 MAPS/PLUS article, page 301-12.3
046-000848-03	DG/UX TCP/IP MAPS/PLUS article, page 330-15
046-001139	Green Hillscompilers MAPS/PLUS article, page 320-73
012-3583	AViiON Server Systems brochure
012-3582	AViiON 300 Workstation brochure
012-3584	DG/UX brochure
012-3568	DG/UX 4.10 for AViiON Systems product brief
012-3518	88K Concept flyer

Table 17. MAPS/PLUS articles and sales collateral.

Specifications

Processor

CPU:

25 MHz Motorola 88100 HCMOS technology
 32-bit RISC processor: IEEE P754 floating point support on-chip
 Separate data and instruction memory ports
 Hardware register scoreboard

Motorola 88200 CMMU: HCMOS technology
 16 KB, 4-way set-associative physical cache
 MMU with user/supervisor logical address space of 4 GB each

Memory

Minimum 8 MB to maximum 208 MB
 ERCC with single-bit correction and double-bit detection
 100ns 1 MBit DRAMs in ZIP packaging

VME Bus

Slots:

10 9U slots: 6 slots also support the memory bus: Electrically compliant with Motorola VME specification. Revision C.1

Performance:

Sustained block mode VME bus transfer rate: 25 MByte/sec

Lines:

Data transfer master:

—D32, D16, D08[EO]
 —A32, A24, A16
 —ADO (Address Only Cycles)
 —RMW (Read Modify Write)

Data transfer slave:

—D32, D16, D09(EO)
 —UAT (Unaligned Address Transfer)
 —A32, A24, A16
 —ADO
 —RMW
 —BLT (Block Transfer)
 —Location monitor A16

Requestor:

—Any one of BR (0-3)
 —Any one of ROR, RWD, RONR

Interrupter:

—Any one of I(1-7)
 —D08(O)
 —ROAK (Release on Acknowledge)

Interrupt handler:

—IH(1-7), D08(O)

Slots 1 functions (selectable):

—SYSCLK driver
 —Power Monitor (power supply)
 —IACK daisy chain driver
 —Bus timer (BTO(32, 64, 128))
 —Arbiter (PRI, RRS, SGL)

Mass Storage

Winchester storage (integral to office system):

322 MB 5.25" ESDI Winchester disk:
 —Maximum of 3
 —1.25 MB/sec data transfer rate
 —18ms average seek

Winchester storage (CSS and PHU):	322 MB 5.25" SCSI Winchester disk: —1.5 MB/sec data transfer rate —18ms average seek
Winchester storage (rackmount):	1 GB 8" SMD Winchester disk: —3.0 MB/sec data transfer rate —16ms average seek
Cartridge tape:	150 MB QIC cartridge tape: —Can read/write QIC 120 MB; can read QIC 40 MB and 60 MB 112 KB/sec sustained data transfer rate —Single-ended SCSI interface
Reel-to-reel tape (desktop):	1600 bpi PE format reel-to-reel tape drive: —Auto-thread, auto-load, horizontal mount —25/100 ips selectable —160 KB/sec PE transfer rate (instantaneous) —6 to 10.5" diameter reels —Single-ended SCSI interface
ESDI controller:	2.5 MB/sec data transfer rate 512 KB on-board cache
SCSI controller:	Single-ended SCSI interface with support for both asynchronous (2 MB/sec) and synchronous (5 MB/sec) operation modes
SMD controller:	3.0 MB/sec data transfer rate 30 MB/sec burst rates on VME bus 512 KB on-board segmented read-ahead cache

Communications

VME bus asynchronous controller (VAC/16):	16 full-duplex RS232 lines 16 x 9600bps aggregate maximum transfer rate Motorola 68020 with 192 KB static RAM buffer, 128 KB EPROM, 2 custom VLSI octarts
VME bus distributed asynchronous host adapter (VDA/128):	Hosts up to 128 asynchronous devices connected on cluster controllers via RG62 coaxial cable
VME bus distributed cluster controllers (VDC/16, VDC/8, VDC/8P):	Support for 16 RS232 lines, 8 RS232 lines, or 8 RS232 lines plus Centronics printer port Aggregate throughput (VDC/16): 16 x 9600 baud, half-duplex (VDC/8: 8 x 19.2 Kbps, half duplex Signals supported: CTS, DCD, DSR, DTR, RTS, RXD, TXD, Ground
VME bus synchronous controller (VSC/4):	4 multi-protocol communications channels (RS232/RS422) Full duplex operation 8 MHz Intel 80186 processor with 512 KB on-board RAM with parity 2 Zilog 8530 SCC chips Dual-ported memory buffer 1.6 MBit/sec aggregate transfer rate
VME bus Ethernet LAN controller (VLC):	7990 LANCE Ethernet controller chip and 256 KB dual-ported data buffer

AC Power

Office package:	120V: 12 amps, single-phase 220V: 10 amps, single-phase 100V: 12 amps, single-phase
Rackmount package:	120V: 10 amps, single-phase 220V: 5.5 amps, single-phase 100V: 12 amps, single-phase 240V: 5 amps, single-phase

Environmental

Temperature:

Office package: Operating: 50° to 100°F; 10° to 38°C

Rackmount Packages: Operating: 50° to 100°F; 10° to 38°C

Rackmount CPU chassis: Operating 32° to 131°F; 0° to 55°C

Rackmount and office package: Storage -40° to +149°F; -40° to 65°C

Humidity: Operating: 20% to 80% noncondensing
Storage: 10% to 90%, noncondensing

Altitude: 2,438 meters (8,000') maximum

BTU/Hour (Worst Case)

Office package: 2650

Rackmount CPU chassis 1775

KVA Rating

Office package 1.5 KVA

Rackmount chassis .95 KVA

Physical

Dimensions:

Office package: 17.25'' wide x 24.75'' high x 25.5'' deep

Rackmount: 17.52'' wide x 13.84'' high x 24.203'' deep

Weight:

Office package: Approx. 160 lbs (fully configured with mass storage)

Rackmount: Approx. 135 lbs. (fully configured)



AViiON 5000/6000 Servers

Fact Sheet

New features include:

- **Mass storage for AV 5000 and AV 6000:**
 - 8mm, 2 GB, SCSI Backup/Retrieval Subsystem
 - 662 MB SCSI Winchester disk
 - 648 MB ESDI disk

The AV 5100, 5120 (office packaged) and AV 6100, 6120 (rackmount) server/multi-user systems, based on Motorola 88000 RISC technology, are well-suited to addressing customer requirements for a mid-range system, whether their computing needs are for traditional multi-user applications or fall under the newer client-server model.

As a multi-user system, the AV 5100, 5120 connects up to 512 asynchronous devices using only 4 VME slots through the VME Distributed Async Host Adapter (VDA/128). The AV 6000, 6120 connects up to 640 asynchronous devices using 5 VME slots. As servers in a distributed network, AViiON Systems can be accessed through an industry-standard IEEE 802.3 Ethernet LAN. They provide the CPU resources and the high-capacity and performance mass storage capabilities required of compute or file servers, respectively.

- Industry-leading CMOS RISC technology
- Choice of single or dual 20 MHz Motorola 88100 CPUs:
 - 20 Dhrystone MIPS per CPU
 - Field upgradeable from single to dual
- Single- and double-precision IEEE hardware FPU
- Two Motorola 88200 memory management/cache chips per CPU with separate data and instruction ports (full Harvard architecture), and 4-way, set-associative 16 KB caches
- Up to 208 MB of ERCC memory (1 Mbit DRAM)
- 10-slot industry-standard VME bus:
 - Industry-standard Revision C.1
 - 25 MB/sec block transfers sustained
 - Full hardware cache coherency
 - 4 levels of bus arbitration
 - 7 levels of interrupt

- High-speed interface between CPU and memory:
 - VME/Motorola MBus superset bussed to 6 backplane slots
 - 4 byte/cycle peak transfer rate (80 MB/sec at 20 MHz)
- DG/UX operating system support:
 - Symmetrical multiprocessing
 - Robust file system and medium-term scheduler
 - Complies with 88open, POSIX, SVID 2, and other standards

AV Models:	5100/5120	6100/6120
Packaging	Office	Rackmt.
VME slots	10	10
Max. Memory	208 MB	208 MB
Std. memory	8, 16 MB	8, 16 MB
Asynchronous connects (VDC/VDC) max.	512	640
Asynchronous connects (VAC/16) max.	32	16
Ethernet LAN max.	2	2
Synch. boards/ports	4/4	4/8
Max. disk capacity:		
Integral	1944 MB	N/A
External	2648 MB	25.9 GB
Max. cartridge tapes (150 MB)	4	4
Max. reel-to-reel tapes	4	4
Model numbers	70034-36 70040-42	70037-39, 70043-48

Selling Strengths

Open architecture at many levels. The DG/UX operating system, the VME bus, communications and mass storage options are all based on de jure or de facto industry standards. In addition, the 88open Consortium is developing a set of Binary Compatibility Standards which will greatly ease the development of applications across all 88K platforms.

Wide range of configurations. The AV 5000 and AV 6000 can be configured flexibly to act as either servers or multi-user systems; unlike many competitive systems they are not targeted at only one mode of computing.

Worldwide sales and service organization. Data General's position as an established full-service systems vendor positions it favorably against many of its small UNIX competitors.

Advanced implementation of UNIX. DG/UX 4.1 is a technically advanced implementation of industry-standard UNIX with significant enhancements such as symmetrical multiprocessing, a commercial-quality robust file system, and a medium-term scheduler.

Superior price/performance, especially relative to proprietary systems. Motorola's high performance 88K chip set, combined with the multiprocessing capability of the AV 5120 and AV 6120, provide an exceptional price/performance story. It is important, however, not to oversell these capabilities to the exclusion of other AViiON Server System features especially in sales situation where raw CPU performance is not relevant (such as file servers).

Important Issues

The following points may need to be addressed in AViiON Server System sales situations:

Availability of software offerings. This issue is best addressed through telling the customer about the 88open Consortium and their Software Initiative and Binary Compatibility Standards. Related sales literature describes the goals of this organization and lists the vendors who are publicly committed to porting to the 88K platform.

Lack of DGC presence in the UNIX marketplace. The customer may be interested to know that:

- DG/UX has been sold on MVs since March, 1985; the latest MV version, DG/UX 4.0, has been praised in the press for its technical sophistication.
- DGC has the systems expertise and worldwide organization required by an increasingly sophisticated UNIX market.

Target Markets

The AV 5000 and AV 6000 Series are well-suited to addressing customer requirements for a mid-range system, whether their computing needs are for traditional multi-user applications or fall under the newer client-server model (figures 1 and 2).

As a multi-user system, the AV 5100 and AV 5120 can connect up to 512 asynchronous devices using only 4 VME

slots through the VME Distributed Async Host Adapter (VDA/128). The AV 6000 and AV 6120 can connect up to 640 asynchronous devices using 5 VME slots. As a server in a distributed network, AViiON Server Systems can be accessed through an industry-standard IEEE 802.3 Ethernet LAN. They provide the CPU resources and the high-capacity and performance mass storage capabilities required of compute or file servers respectively.

Client/Server Model of Computing

Since the client/server model of computing is expected to predominate in the 1990s, the role of AViiON Server Systems in such a model is worth discussing briefly.

Data General has already begun to introduce the client/server model into proprietary systems, provided support in the underlying systems and networks, and exploited these capabilities in business automation and database management systems. In the second stage of this advanced architecture, Distributed Applications Architecture (DAA), workstations will be clients of many servers, and applications and servers will be transparently distributed throughout the network. The network itself becomes a backplane for distributing all services to the desktop and the user.

DAA will employ UNIX servers such as the AV 5000 and AV 6000 systems to provide essential services such as authentication, directories, gateways, and system management. These servers will also stage the basic components of workgroup computing, such as shared file systems, mail, and time management.

Description

Overview

AViiON Server Systems are configurable to address a wide range of uses, but are optimized for midrange multi-user and server applications. AV 5000 and AV 6000 Series systems will generally support 40 to 250 asynchronous users for typical commercial applications. This is only an estimate, however, and the appropriate user counts will vary greatly by application.

As servers, these systems provide file and compute services for AViiON workstations, X-windows terminals, and DASHER/386 systems distributed across a local area network. Configured for multi-user applications, they can connect up to 512 (AV 51x0) or 640 (AV 61x0) asynchronous devices through VME distributed async host adapters and cluster controllers.

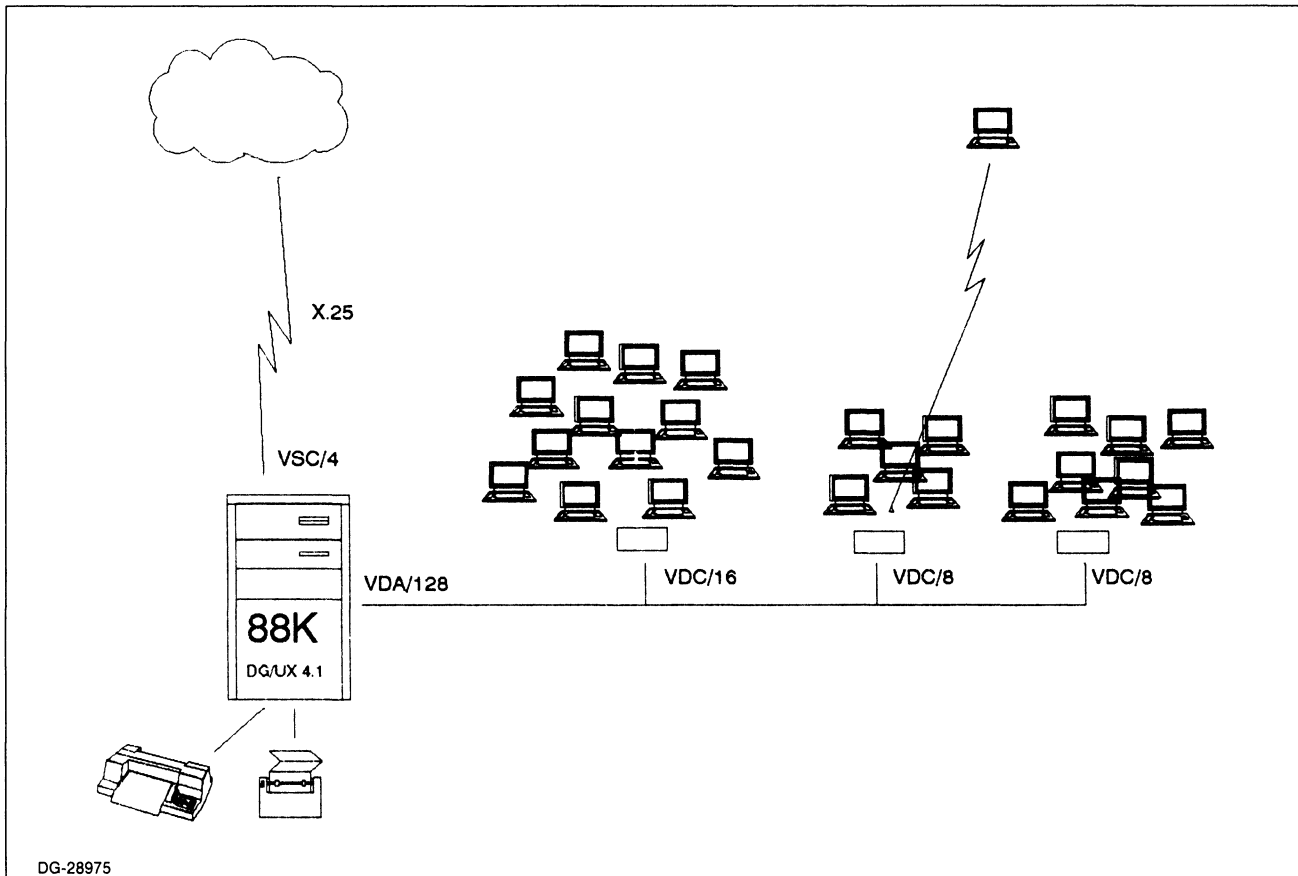


Figure 1. AViiON Server multi-user configuration.

Industry-standard AViiON Server Systems offer customers superior price/performance in systems which are both configurable and balanced. Mass storage subsystems meet a range of user capacity and cost requirements, while providing performance levels which minimize I/O bottlenecks. The many configuration choices – single- or dual-processor, rackmount or office packaging – match the needs of many different customers.

The orientation of the AViiON system design process was towards performance. The Motorola 88000 chip set provides that performance directly through its highly pipelined architecture, fast instruction execution, and integrated floating point. Equally important, the chip set architecture provides for multiprocessing (figure 3) allowing a customer to approximately double his CPU performance with only a board swap.

The performance orientation of the AViiON systems carries through to the selection of peripherals and controller boards. For example, the mass storage controllers selected

for the AV 5000 and AV 6000 Series are among the highest speed available: they transfer data to the CPU and memory across an industry-standard 40 MB/sec VME bus.

CPU

The AViiON Server System CPU is a Motorola 88100. Implemented with Motorola's HCMOS technology, the MC88100 incorporates 32-bit registers, data paths, and addresses. Because of the importance of maintaining a filled pipeline in RISC processors, the MC88100 incorporates *four independent execution units* (integer, floating point, data, and instruction) which operate independently and concurrently. Data memory accesses are performed by the data unit while instruction prefetches are handled by the instruction unit.

A *common register file* provides data sharing and synchronization control among the register units through register scoreboarding.

IEEE P754 *floating point arithmetic* is fully supported by the processor's hardware which includes a 32-bit combi-

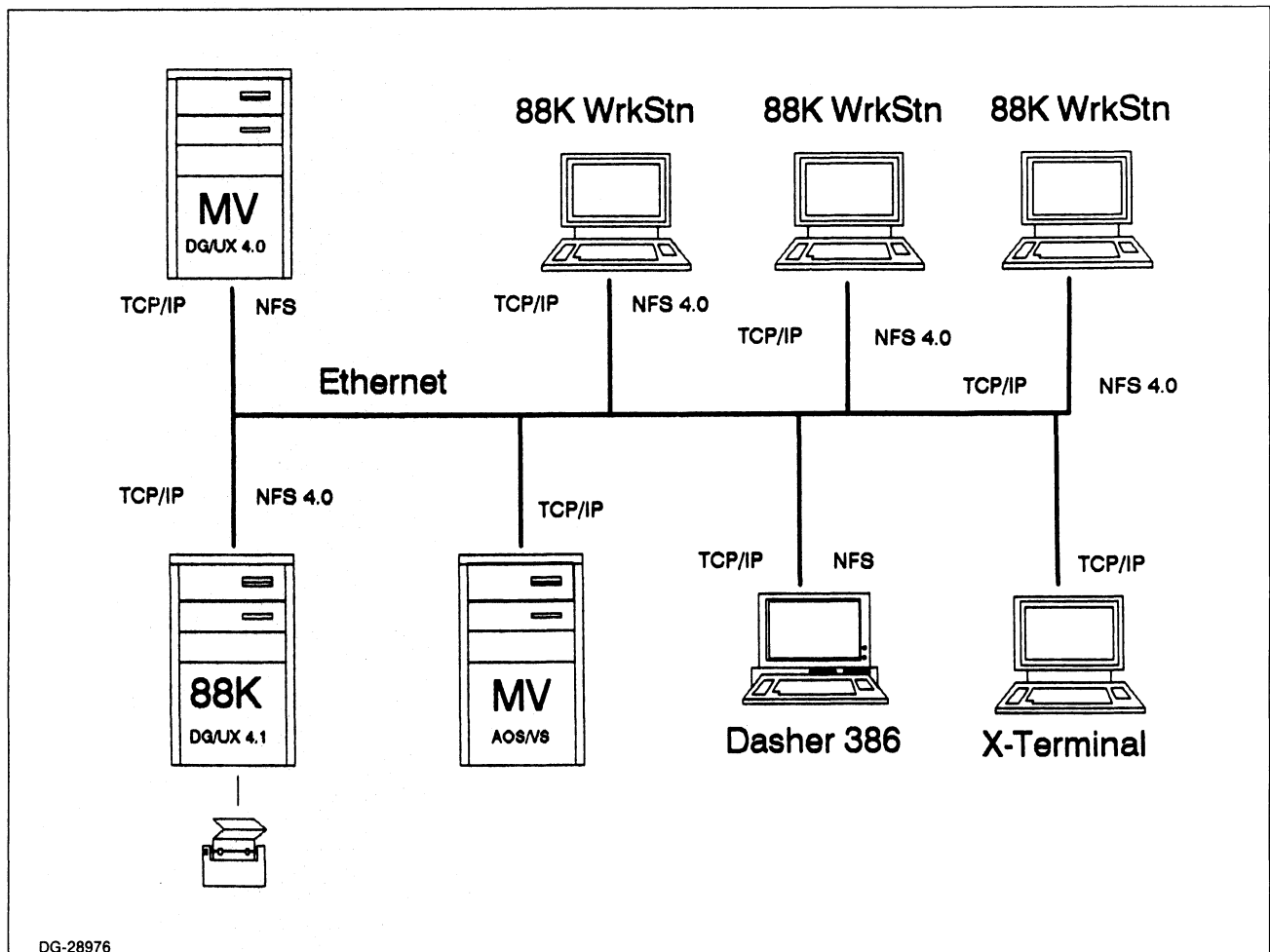


Figure 2. AViiON Server LAN configuration.

natorial multiplier. The FPU implements two pipelines: one for multiply instructions (6 stages) and one for all other floating point instructions (5 stages).

Parallel operations and pipelining are integral elements of the MC88100 design. The four execution units allow the MC88100 to perform up to five operations in parallel (figure 4):

- Access program memory
- Execute an arithmetic, logical, or bit-field instruction
- Access data memory
- Execute floating point or integer divide instructions
- Execute floating point or integer multiply instructions

In addition, the floating point, data, and instruction units themselves are pipelined and can complete an operation in every clock cycle:

- Up to five floating point add, subtract, compare, or convert instructions can execute simultaneously
- Up to six floating point or four integer multiply instructions execute simultaneously
- Up to three data memory accesses can be in progress simultaneously:
 - Two memory accesses on the external bus
 - One address calculation
- Up to two instruction fetches can be in progress simultaneously

The MC88100 instruction set contains 51 instructions. All integer arithmetic, logical, and bit field instructions, and certain flow control instructions can execute in a single

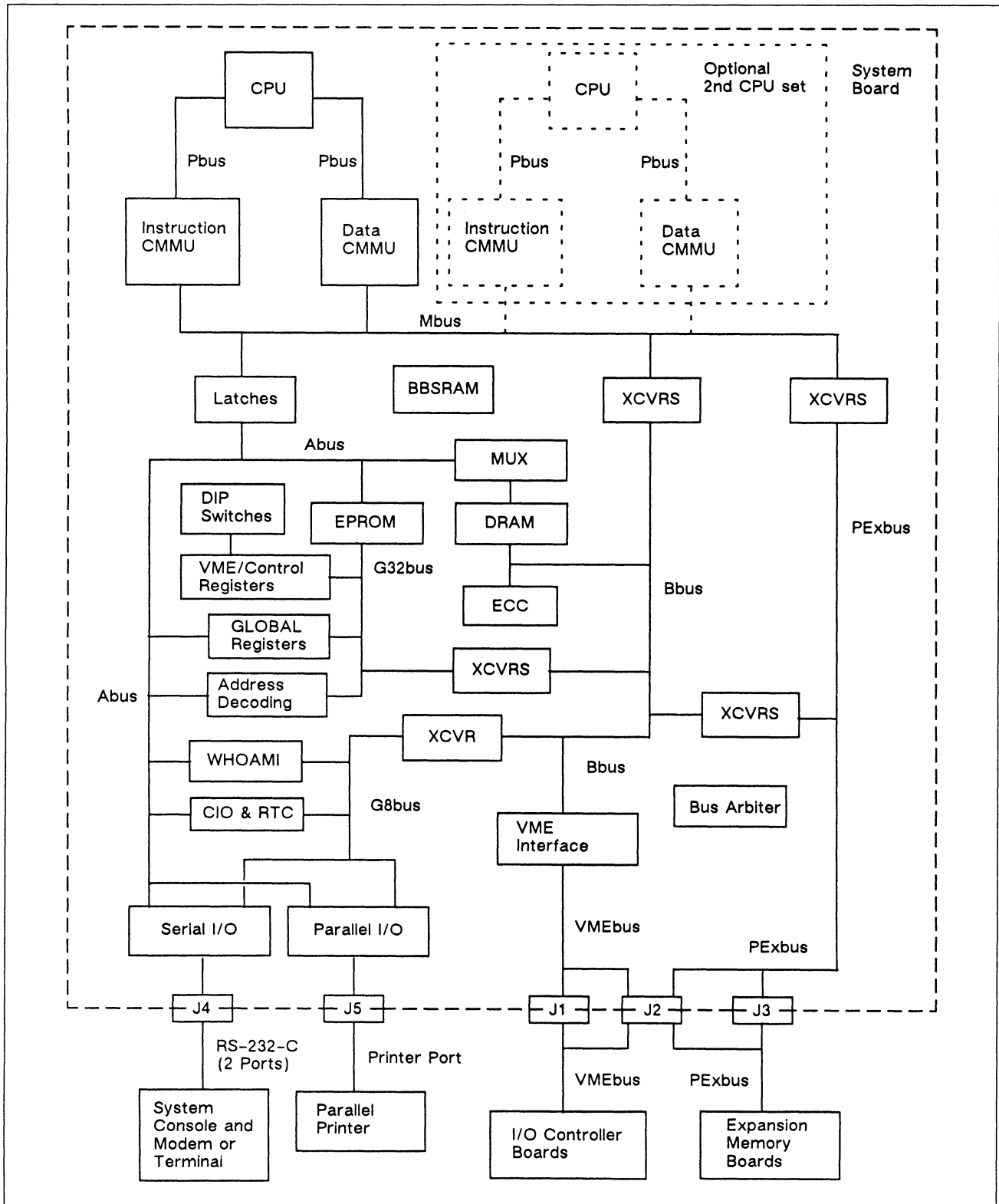


Figure 3. AV 5000/6000 system board architecture.

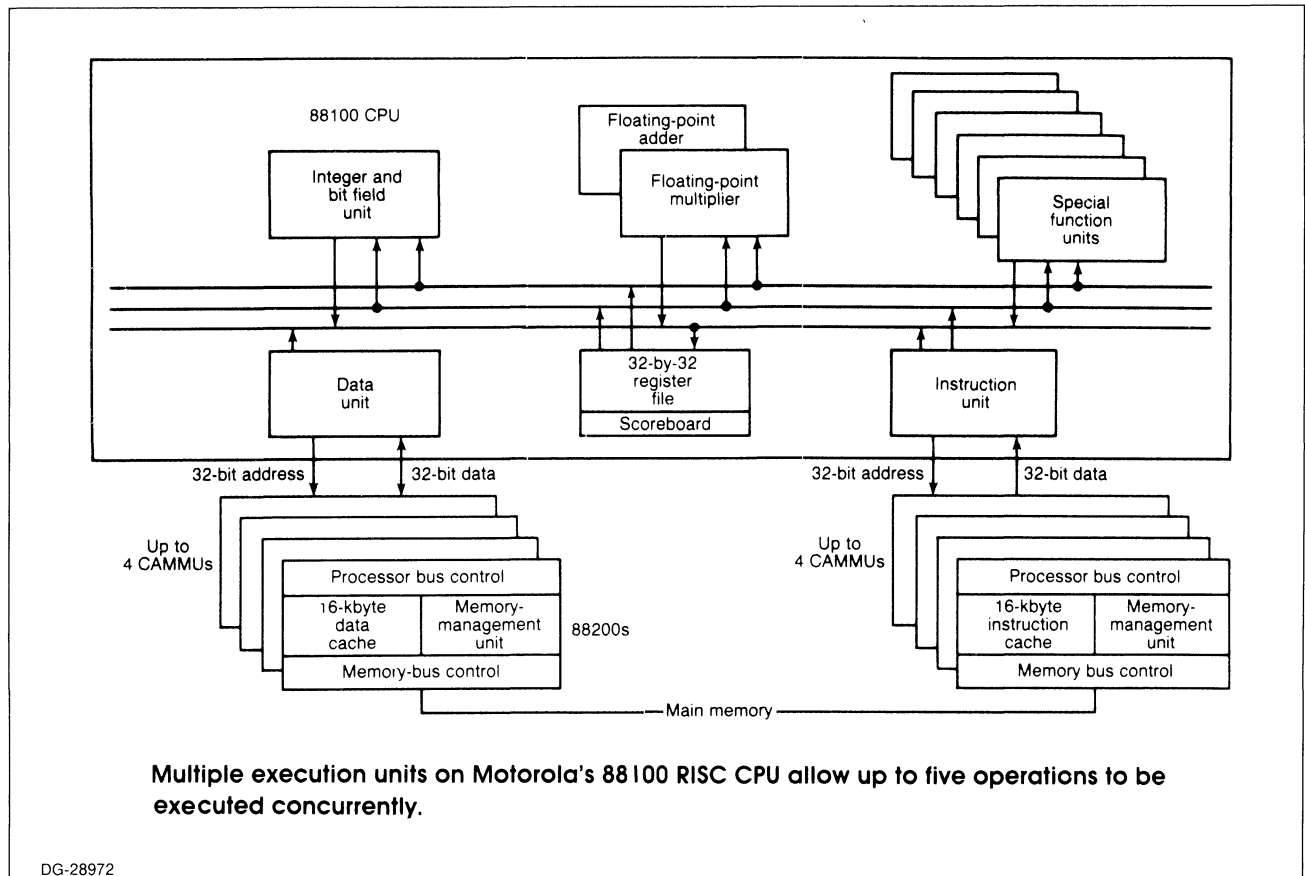


Figure 4. Parallel operations—5—per formed by RISC CPU.

cycle. Figure 5 is the MC88100 programming model; figure 6, the MC88100 instruction set.

The MC88100 uses a two-port, non-multiplexed memory access scheme (Harvard architecture). Transfers to and from the CMMU chips are performed through dedicated address and data paths; instruction fetches also take place over dedicated paths. These ports operate concurrently, eliminating bus contention between data accesses and instruction fetches.

Memory Management/Caching

The MC88200 CMMU is a high-performance, HCMOS VLSI device which provides zero-wait-state memory management and data caching. The MMU (memory management unit) supports a demand-paged, virtual memory environment with two logical address ranges (user/supervisor) of 4 GB each.

Translated addresses are provided by one of two ATCs (address translation caches), providing address translation

in one clock cycle for most memory accesses. The PATC (page address translation cache) is a 56-entry, fully associative cache containing recently used translations for 4 KB memory pages and is maintained by MC88200 hardware. The BATC (block address translation cache) is a 10-entry cache, loaded by software, containing translations for 512 KB memory blocks.

The CMMU data cache is a 16 KB, four-way, set-associative cache for instruction or data storage. The cache incorporates memory-update policies and cache coherency mechanisms that support multiprocessor applications. Each cache set employs an LRU (least recently used) replacement algorithm to allocate cache entries. The AViiON Server System maintains cache coherency through a copy-back mechanism.

Memory

The AViiON 5000 and AV 6000 Series system board contains either 8 MB (on the single CPU AV 5100 and AV 6100 only) or 16 MB of 100ns ERCC memory. The

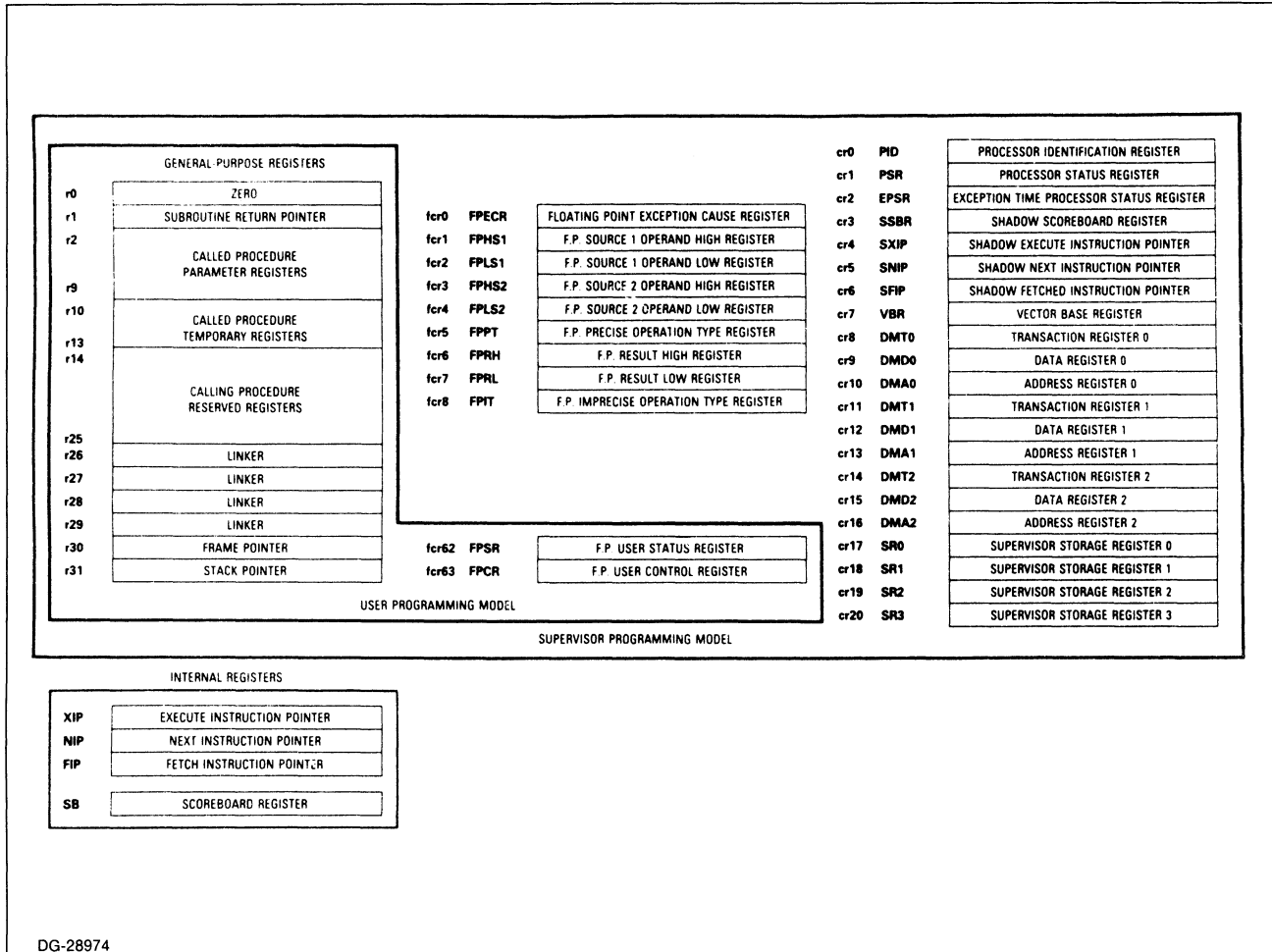


Figure 5. MC88100 programming model.

ERCC memory performs single-bit error correction and double-bit error detection. Up to four expansion memory boards may be configured in either 16 MB, 32 MB, or 48 MB increments.

Both system board and expansion board memory are implemented in ZIP packaging with 1M x 1 bit DRAM elements organized into rows of 1M x 39 bits each, with a 2:1 interleave factor.

Expansion memory boards are a 9U form factor and interface to the system's memory bus.

Bus Structure

Two busses provide paths for all communications between boards in the system.

The *VME bus* on AV 5000 and AV 6000 Series systems is fully compliant electrically with Motorola's VME Bus

Specification, Revision C.1. The VME bus is an industry-standard 40 MB/sec bus which provides for data transfers between the system board and all controllers such as those for mass storage and communications. Data General's implementation of this bus incorporates high-performance features such as block transfers.

J1/J2 connectors are provided for all 10 chassis slots to connect to standard P1/P2 connectors on Eurocard 6U form factor (233mm x 160mm) VME boards. 9U form factor (400mm x 366mm) boards are also supported so long as they use VME standard signals on the J1/J2 connectors only. Since the slots themselves are all 9U form factor, an adapter is required to configure 6U boards. Such an adapter is included with all 6U form factor boards sold by Data General. Figure 7 displays 9U and 6U VME Eurocards.

Integer Arithmetic Instructions	
Mnemonic	Description
add	Add
addu	Add Unsigned
cmp	Compare
div	Divide
divu	Divide Unsigned
mul	Multiply
sub	Subtract
subu	Subtract Unsigned

Floating-Point Arithmetic Instructions	
Mnemonic	Description
fadd	Floating-Point Add
fcmp	Floating-Point Compare
fdiv	Floating-Point Divide
fldcr	Load from Floating-Point Control Register
flt	Convert Integer to Floating Point
fmul	Floating-Point Multiply
fstcr	Store to Floating-Point Control Register
fsub	Floating-Point Subtract
fxcr	Exchange Floating-Point Control Register
int	Round Floating-Point to Integer
nint	Round Floating-Point to Nearest Integer
trnc	Truncate Floating-Point to Integer

Logical Instructions	
Mnemonic	Description
and	AND
mask	Logical Mask Immediate
or	OR
xor	Exclusive OR

Load/Store/Exchange Instructions	
Mnemonic	Description
ld	Load Register from Memory
lda	Load Address
ldcr	Load from Control Register
st	Store Register to Memory
stcr	Store to Control Register
xcr	Exchange Control Register
xmem	Exchange Register with Memory

Flow-Control Instructions	
Mnemonic	Description
bb0	Branch on Bit Clear
bb1	Branch on Bit Set
bcnd	Conditional Branch
br	Unconditional Branch
bsr	Branch to Subroutine
jmp	Unconditional Jump
jsr	Jump to Subroutine
rte	Return from Exception
tb0	Trap on Bit Clear
tb1	Trap on Bit Set
tbn0	Trap on Bounds Check
tcnd	Conditional Trap

Bit-Field Instructions	
Mnemonic	Description
clr	Clear Bit Field
ext	Extract Signed Bit Field
extu	Extract Unsigned Bit Field
ff0	Find First Bit Clear
ff1	Find First Bit Set
mak	Make Bit Field
rot	Rotate Register
set	Set Bit Field

DG-28973

Figure 6. MC88100 instruction set.

Mechanically, in order for a 6U form factor board to mate with the DG 6U-9U adapter, it must operate without a front panel and that front panel must be user removable. This is the case with all the 6U VME boards sold by Data General and is the case with the large majority of third-party boards. It is a limitation of which the customer should be aware, however, should he intend to configure third-party VME bus products. More expensive third-party adapter products such as the Dawn Model #9U400/6U-1 (Dawn VME Products, 47073 Warm Springs Blvd., Fremont, CA 94539 (415/657-4444)) do not have this limitation, but do violate the VME bus specification by extending by three inches the distance from a driver on the VME board to the backpanel. It should be noted that

this mechanical discussion also applies to Sun Microsystems VME-based systems and is, therefore, not unique to Data General.

The **Pexbus (buffered memory bus)** is also bussed to the backplane of slots 1 through 6 for communication between the system board and all system memory, on-board and expansion. **Slots 1-6 utilize not only J3/P3 but also user-defined pins on J2/P2. Therefore, third-party or custom boards using the user-defined pins on J2/P2 should be configured only in slots 7-10.** It is a superset of Motorola's Mbus used by the MC88200 cache chips to provide a high-speed data path to system memory. The Pexbus is

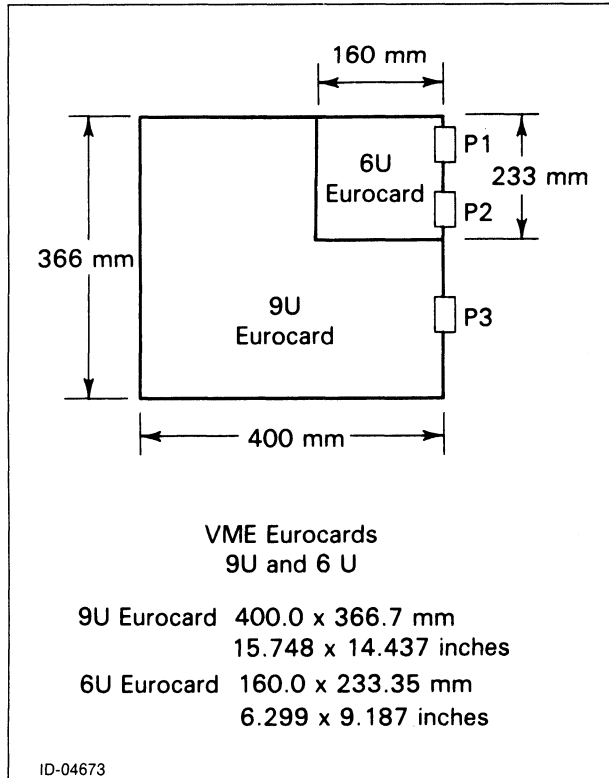


Figure 7. 9U and 6U VME Eurocards.

not an industry standard and is used only by the system board and DGC expansion memory for the AV 5000 and AV 6000 Series systems.

DG/UX

DG/UX 4.10 for RISC Systems is an advanced implementation of the UNIX Operating System based on AT&T's V.3 Release 1 and the Berkeley Software Distribution (BSD) 4.3 operating systems, as well as the POSIX application interface standard. It also incorporates the 88open Binary Compatibility Standards and the X Windows Version 11 Release 3.0 standard among other industry, government, or de facto standards. DG/UX supports TCP/IP protocols for file transfer; remote disk access is provided by the Network File System (NFS).

DG/UX 4.1 offers a number of capabilities not generally available from other vendors. These capabilities include fully symmetric multiprocessing, an advanced file system with data security and recovery features as well as support for large file systems and files, a medium-term scheduler for superior throughput and guaranteed forward response under heavy load, and enhanced error-reporting.

Packaging

Two packaging schemes are available: free-standing office (AV 5000 Series) and rackmount (AV 6000 Series) (figures 8 and 9).

The **office package** is an attractive 17.25" W x 24.75" H x 25.5" D caster-mounted, integrated system suitable for an office environment. In addition to the 10-slot card cage and a 780 watt power supply, the office system can incorporate up to three full-height 5.25" disks and up to two half-height 5.25" removeable media devices such as the 150 MB QIC cartridge tape. Additional mass storage, such as a desktop reel-to-reel tape, can be added externally.

The **rackmount chassis** incorporates the 10-slot card cage with a 520 watt power supply in a NEMA-standard 14"-high chassis.

System Capacities

Table 1 shows maximum capacities for AV 5000 and AV 6000 Series systems. Slot and bulkhead restrictions prevent all maxima from being configured simultaneously. For example, the synch board has been qualified to configure up to 4 boards in both the office and rackmount chassis. Bulkhead connector limitations would only allow 4 ports to be used on the office package and 8 ports with the rackmount chassis. See the Configurations/Ordering section for more information.

Features	AV 5100/5120	AV 6100/6120
VME slots	10	10
Memory	208 MB	208 MB
Asynchronous connects (VDA/VDC)	512	640
Asynchronous connects (VAC/16)	32	16
Ethernet LAN	2	2
Synchronous boards/ports	4/4	4/8
Disk capacity:		
Integral	1944 MB	N/A
External	2648 MB	25.9 GB*
Cartridge tapes (150 MB)	4	4
Reel-to-reel tapes	4	4

*Based on 4 SCSI controllers connected to 4 Combined Storage Subsystems for a total of 15 x 662 MB SCSI disks and 1 x 150MB cartridge tape plus 4 SMD controllers connected to a total of 16 x 1 GB SMD disks.

Table 1. AV 5000 and AV 6000 system capacities.

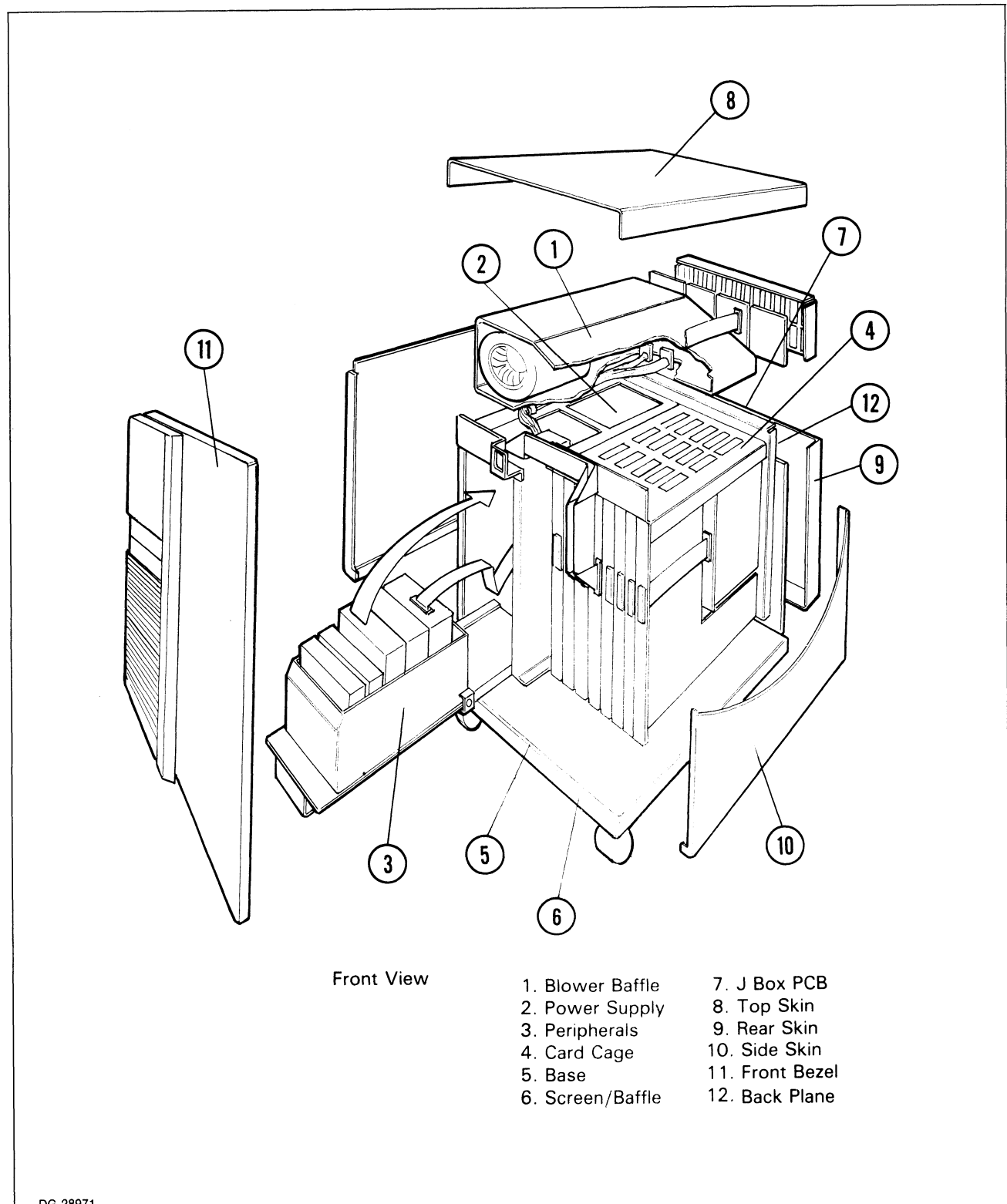


Figure 8. AV 5100/5120 office packaging.

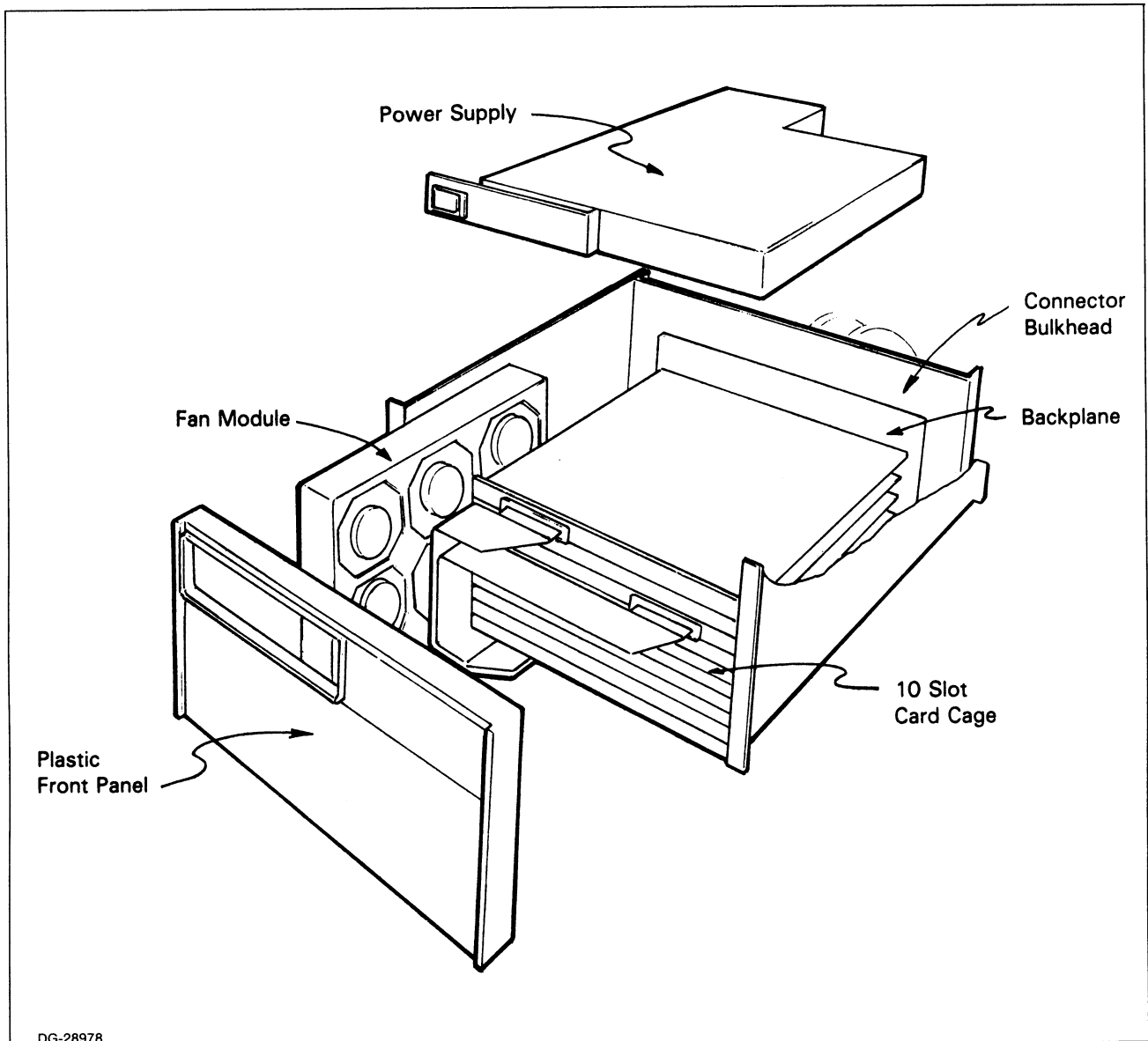


Figure 9. AV 6100/6120 rackmount packaging.

Communications

Asynchronous Communications

Three methods are provided to connect asynchronous devices to AV 5000 and AV 6000 Systems.

For low-connect counts, up to 16 RS232 devices can be connected through the *VAC/16 (VME Asynchronous Controller/16)*. Each VAC/16 is a 6U form factor board which includes a Motorola 68020 processor, 192 KB static RAM buffer, 128KB EPROM, and two custom VLSI octarts. All sixteen lines are full duplex. The board has an aggregate maximum data rate of 16 x 19.2 Kbps full duplex. All 16 ports support modem connection.

A *TCP/IP Ethernet LAN based terminal server connection scheme* is available from Data General Network Services. In late 1989, DGNS will publish standard prices for TCP/IP network components and services.

Also available is *terminal services host adapter* solution. Terminal services should not be confused with the traditional terminal server which permits terminals to be simultaneously logged onto multiple systems. The terminal services host adapter merely allows the concentration of terminal hook-ups some distance from the rear bulkhead of the system via a single coax cable. This relieves cabling concentration problems at the rear of the bulkhead and also dramatically increases the number of connects per VME slot.

The *VDA/128 (VME Distributed Async)* is the 6U form factor board which plugs into a VME slot in the AViiON Server System and connects to the *VDC (VME Distributed Cluster)* boxes through an RG62 coax cable. Up to 128 lines per VDA/128 may be connected through distributed clusters. For typical commercial applications, however, the users per VDA/128 should be limited to approximately 64 for performance reasons.

The VDA/128 is based on a 12.5 MHz 68010 processor with 512 KB of zero-wait-state DRAM and 16 KB of dual-ported memory. It supports a 2.5 Mbit/second serial bus interface to the cluster controllers. The distributed clusters are based on a 10 MHz 68000 processor with 32 KB of static RAM for buffering and microprocessor support and 2 KB of static RAM for coaxial serial interface buffer support.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines) (figure 10). The aggregate throughput of the eight-line cluster is 8 x 19.2 KBps half-duplex; that of the sixteen-line cluster is 16 x 9600 bps half-duplex. All cluster controllers support the following

RS232C signals: CTS, DCD, DSR, DTR, RTS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

Synchronous Communications

Synchronous communications for the AV 5000 and AV 6000 Systems are handled by the *VSC/4 (VME Bus Synchronous Controller)*. This 6U form factor controller offers four multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips. The board is built around an 8 MHz Intel 80186 processor and contains 512 KB or on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. Two independent sync protocols can be handled simultaneously by this board. Aggregate throughput is 1.6 Mbit/sec.

LAN Communications

Ethernet LAN communications are provided by the *VLC (VME Bus Ethernet LAN Controller)*, an OEM'd version of the Interphase Hawk Communications Controller. This board implements IEEE 802.3 Ethernet on a 6U VME board with an intelligent Ethernet controller chip (7990 LANCE) and a 256 KB dual-ported data buffer, providing high-speed, 32-bit bus slave data access. The controller chip communicates with the on-board memory for all command and data transactions. The data packet is placed or retrieved from the buffer on the VME bus from main memory via a software process which also handles cache coherency.

Mass Storage

AViiON Server Systems take full advantage of high-performance, industry-standard peripherals to provide users with a wide range of mass storage options. This variety gives customers the ability to closely match their peripheral configurations with their application needs as well as allowing for the configuration of balanced systems, i.e., systems in which mass storage does not act as a bottleneck to total system throughput.

The rest of this section describes the specific mass storage options available on the AV 5000 and AV 6000 systems. Not all peripherals are available on both the office-packaged and the rackmount system. Configurability also varies between the two styles. Therefore, it is important to your customer that the system style be matched with his peripheral expansion needs. It is also important to read the

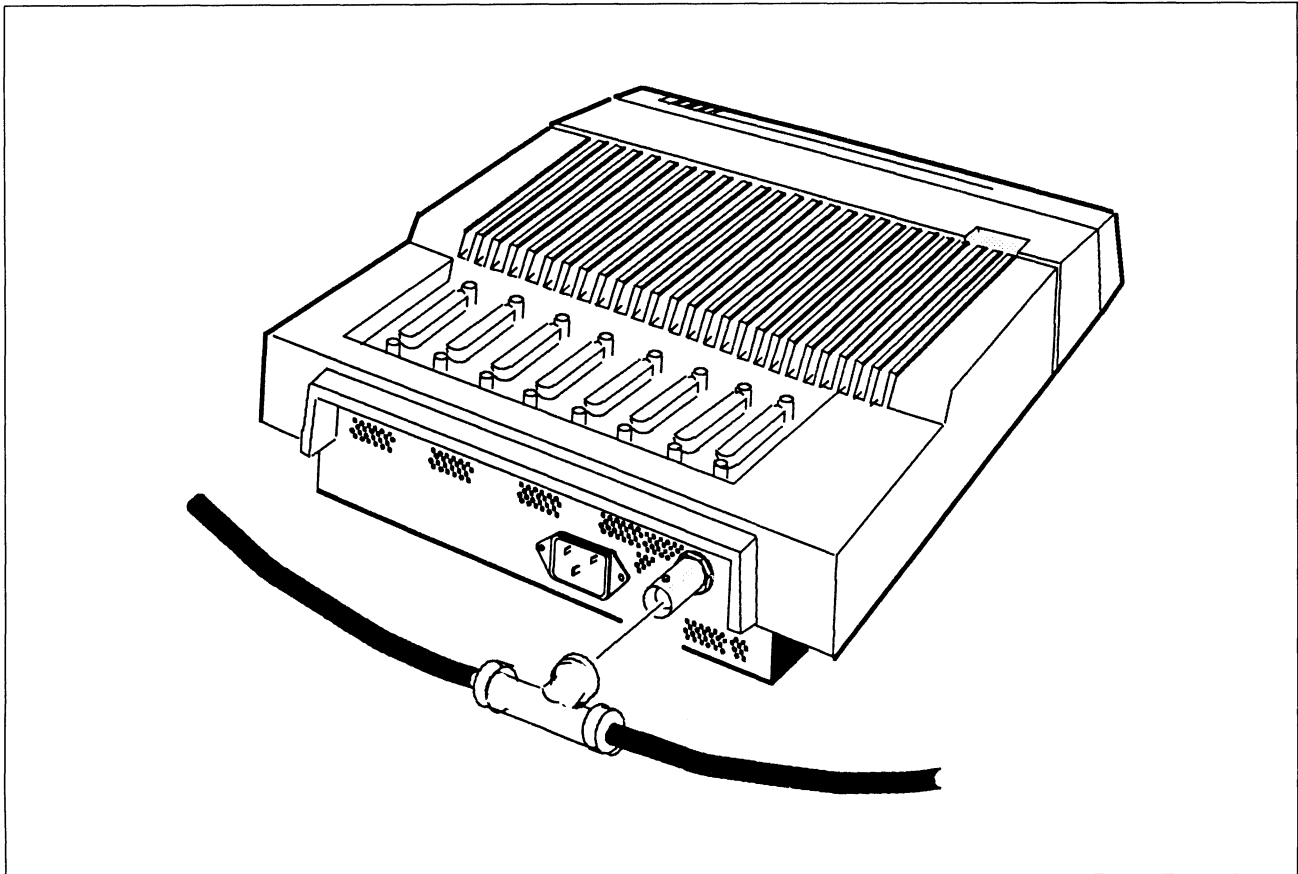


Figure 10. VME distributed cluster controller (VDC). T-connector shipped with VDC. Cables are Model 15338Exxx cluster extension cables.

explanations in this section and the appropriate mass storage MAPS/PLUS articles to fully understand the performance implications of various mass storage choices.

Winchester Disks AV 5000 Systems

Winchester disk storage within the AV 5000 Series integrated cabinet is provided by the Model 6442-I and Model 6555-I Winchester disks. These 5.25" full-height ESDI interface disks have a 322 MB and 648 MB formatted capacity respectively. A total of three of these disks can be integrated within the package with a maximum integral capacity of 1944 MB.

SCSI Disks in Peripheral Housing Unit

Additional 5.25" disk storage can be provided outside of the AV 5000 System package through the Model 10565 Peripheral Housing Unit. Each Peripheral Housing Unit can support up to 3 half-height (or 1 full-height and 1 half-height) SCSI-interface 5.25" peripherals. One Periph-

eral Housing Unit can be configured off the SCSI controller included with the base AV 5000 system package. By adding a second SCSI controller, 3 additional Peripheral Housing Units can be configured. Therefore, a total of 4 full-height disks can be added externally to an AV 5000 system.

Either Model 6491-E (322 MB) or Model 6554-P (662 MB) can be configured with the Peripheral Housing Unit. Both of these disks are full-height devices.

Cartridge Tape Drives

All AV 5000 systems come packaged with an integral 150 MB QIC cartridge tape drive. In addition to reading and writing QIC-150MB formats, this tape can read and write QIC-120MB and read QIC-60MB or QIC-40MB. This cartridge tape is the standard distribution media specified by the 88Open Committee and also features full-boot functionality as well as offering high-speed, reliable (read-after-write) backup. User-selectable software ERCC is pro-

vided through the driver in DG/UX. The 150 MB cartridge tape is a half-height 5.25" SCSI device.

The 150 MB cartridge tape is also required for media distribution (diagnostics and software) purposes on the AV 6000 rackmount systems although it is not integrated in the base package. For these systems, it may be configured in the rackmount Combined Storage Subsystem.

Available on both the AV 5000 and AV 6000 systems is the 8mm, 2GB Backup/Retrieval Subsystem. This full height, 5.25" SCSI peripheral can be configured in a Peripheral Housing Unit for AV 5000 systems, Models 6591-E and 6591-A. For AV 6000 systems, the tape is mounted in a CSS chassis, Model 6590-M.

Reel-to-Reel Tape

A 1600bpi, 100ips reel-to-reel tape option is provided for both AV 5000 and AV 6000 systems. Model 6587-A includes an attractive enclosure designed for placement upon a desk or table. The Model 6586-A is a 19" rackmountable model which requires only 8.75" of rack space. Both models operate off a SCSI bus and offer easy front-loading capabilities for standard half-inch magnetic tape with reels from 6" to 10.5".

Disks: AV 6000 Systems

Available disk configurations for the rackmount AV 6000 systems have both similarities and differences to those available on the office-packaged AV 5000 systems. Both systems share the ability to configure the 322 MB and 662 MB 5.25" SCSI disks. While these are configured in the Peripheral Housing Unit on AV 5000 systems, they would be configured in a Combined Storage Subsystem when used with AV 6000 systems.

On the other hand, the 322MB and 648 MB ESDI disks are not available for the rackmount system. This is primarily because ESDI disks are less suitable for non-integrated systems because of the limited cable length allowed with ESDI connections.

Instead, **1 GB SMD-interface disks** are offered. These high-capacity, 8" drives offer the highest performance option for AV 6000 systems while also featuring dual-porting hardware capability. Operating system support for this hardware capability is planned for future releases of DG/UX. These 16ms seek drives are packaged in the same manner as the 727MB 8" disk subsystem in the MV line, with large configurations being housed in the meter-high cabinet modified to accommodate 8 of these disks (Model 6585).

One **SMD controller (9U form factor)** controls 4 disks. With the maximum 4 SMD controllers, the AV 6100 and AV 6120 can accommodate a maximum of 16 SMD disks or 16 GB of disk.

VME Controller Boards

VME SCSI Controller Board (Office and Rackmount): This 6U form-factor controller board controls up to 7 devices on an asynchronous SCSI bus with a 1.5 MB/sec asynchronous transfer rate, synchronous @ 5MB/sec. The board is designed around an 8 MHz Intel 80186 processor and a Western Digital 33C93 SCSI chip. This board is an OEM'd version of the Ciprico Rimfire 3500. One of these boards is included in all AV 5100 and AV 5120 package configurations to support the 150 MB cartridge tape.

VME ESDI Controller Board (Office): This 6U form-factor controller board controls the one to three ESDI disks contained in the AV 5100 and AV 5120 integrated package. The board is designed around an 8MHz Intel 80186 processor grid contains a 512KB segmented read-ahead cache. This board is an OEM'd version of the Ciprico Rimfire 3400 and is included in all AV 5100 Series package configurations. It is not sold separately.

VME SMD Controller Board (Rackmount): This 9U form-factor controller board controls from 1 to 4 SMD drives for AV 6100 Series systems with a 3.0 MB/sec data transfer rate. It is based on an Intel 80186 processor and uses a 8466 National disk controller, 512 KB of on-board cache RAM, separate processor and system data buses, and a proprietary VME FIFO gate array. This controller achieves its high reliability and performance through a variety of special functional features including: bad sector remapping, scatter/gather DMA operations, overlapped seeks, command queuing, command optimization, and command coalescing (block address optimization) with a segmented read-ahead cache. This board is an OEM'd version of the Ciprico Rimfire 3221.

Winchester Disk Selection: AV 5000 Systems

The ESDI interface was chosen for the internal disks on the AV 5000 office-packaged systems because of the superior performance it offers on single-spindle accesses relative to SCSI. This is primarily a function of the 512 KB segmented read-ahead cache on the VME/ESDI controller board as well as the lower controller overhead associated with the ESDI interface. The ESDI interface cannot be used for external disks because of cable length restrictions inherent in the ESDI specification.

The SCSI interface disks which can be added externally in the Peripheral Housing Unit, however, are also high-

performance disks. They use the same head-disk assembly (HDA) as the ESDI-interface version and thus have the same 18 ms average seek and 1.25MB/sec data transfer rate.

Winchester Disk Selection: AV 6000 Systems

The customer who purchases a rackmount AV 6000 system has two basic paths he can follow in selecting Winchester disk storage: SMD and SCSI. Although there is no physical or electrical reason that the two interfaces cannot be mixed on a single system, it is expected that most customers will want to choose a single disk storage interface type.

The 1 GB, 8-inch SMD disk subsystems provide the following advantages over the SCSI disk subsystems: significantly higher data transfer rate and greater capacity per VME slot. The higher data transfer rates result from the greater numbers of sectors/track on the SMD drives relative to the SCSI drives. SMD also maximizes storage per VME slot since each 9U form-factor SMD controller controls up to four 1 GB SMD drives for a total of 4 GB per controller. Each VME/SCSI controller, although it has a theoretical limit of 7 peripheral devices, is limited by the 6-meter SCSI bus to controlling the devices in a single CSS chassis. With 662 MB disks, this represents 2648 MB per controller.

Under many circumstances, the SMD interface also provides the greatest overall performance. Like ESDI, SMD is a dumb interface and hence has lower overhead in the controller than does SCSI. The SMD controller used in the AV 6000 systems also has a 512 KB segmented read-ahead cache. However, overall performance can be very sensitive to spindle count; therefore, some system configurations – especially those with mass storage requirements in the 1 GB to 2 GB range – may benefit from the larger number of spindles in a SCSI configuration.

Hardware Support Services

Field Engineering

Data General Field Engineering supports the AViiON systems with state-of-the art service technology. There are two types of service programs which offer a full array of options designed to satisfy users' uptime requirements.

The On-Call Agreement allows the flexibility of selecting coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. In conjunction with the terms of the basic agreement, users may also purchase additional options such as Ex-

tended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The Multiyear Plus Agreement offers all the benefits of an On-Call Agreement and more. By signing a Multiyear Plus Agreement with a term of 2 to 5 years, users receive discounts of up to 10 percent over the life of their agreement.

Both agreements include 7-day, 24-hour on-line remote diagnostic service. PCB Resume, a tool used in conjunction with remote diagnostics, enables the field engineer or remote staff to access valuable information on the performance history, specs, revision level, and compatibility of the board in question. The result is fast, accurate diagnosis and an increase in system uptime.

Additional information on service is available from a Data General salesperson or by calling the Data General Field Engineering Telemarketing Group at 1-800-325-3065, (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Users may take advantage of a warranty conversion option by signing up for a Multiyear Plus Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server-specific, shared with AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Configurations/Ordering

Color

The AViiON 5100/5120 (office package) uses a new Gray (G prefix) color scheme. The AViiON 6100/6120 (rack-mount) uses the existing earthtone color scheme.

CPU and Memory Guidelines

Each system model number comes with a single- or dual-processor system board with either 8 MB (single-processor only) or 16 MB of on-board memory. Only one system board may reside in a system. To upgrade from a single to a dual processor, it is necessary for Field Engineering to swap the system board. See the Upgrades section for details and ordering information.

Up to 4 memory boards may reside in a system. Any combination of 16 MB, 32 MB, and 48 MB memory boards are supported. Memory boards may also be up-graded.

A maximum of 9 VME Controller boards may be configured if no expansion memory boards are present. Each memory board configured reduces this number by one to a minimum of 5. Additional constraints are applied by the bulkheads used by both office-packaged and rackmount AViiON Server Systems. Table 2 lists limits.

Controller Board	Rackmount with		
	Office	VAC/16	Rackmount
VAC/16	2	1	0
VDA/128	4	1	5
VSC/4	4 ports	6 ports	8 ports
VLC	2	2	2
SCSI controller	2	4	4
ESDI controller	1	0	0
SMD controller	0	3	4

Table 2. VME controller board configuration limits.

When a VAC/16 is ordered with an AV 6000 Series system, the correct bulkhead is automatically configured with the system. If a VAC/16 is ordered later for a rackmount system, the correct bulkhead is structured with the controller board. Note that, for this reason, the model number for the VAC/16 for rackmount systems is different from that for the integrated system.

All controller boards except for the SMD controller are a 6U Eurocard form factor and require an adapter board to be configured in the 9U form factor chassis. This adapter board is structured with all 6U controller cards sold by Data General.

Mass Storage Guidelines: Office Package

All office-packaged systems come packaged with one ESDI disk and one 150 MB QIC cartridge tape. The ESDI and SCSI controllers required for these peripherals are also included. Within the package, a customer may add up to 2 additional 5.25" FH ESDI interface Winchester disk drives and one additional 5.25" HH SCSI interface removeable media device.

Additional mass storage may be added externally to AV 5000 Series systems in the form of desktop reel-to-reel tape drives and the Peripheral Housing Unit. The base SCSI controller on an AV 5000 system may be extended externally to accommodate a maximum of one external

housing (reel-to-reel tape or Peripheral Housing Unit). A maximum of one additional VME Bus SCSI controller may be added to an AV 5000 system. This additional controller can be configured with up to 3 additional external housings containing mass storage devices.

Additional ESDI devices cannot be configured externally because of cable length limitations in the ESDI specification.

Mass Storage Guidelines: Peripheral Housing Unit

The Peripheral Housing Unit can physically accommodate either 3 half-height or 1 full-height/1 half-height 5.25" SCSI mass storage peripheral. Presently, the 150 MB QIC cartridge tape and the 322 MB 5.25" SCSI Winchester disk are supported in a Peripheral Housing Unit attached to an AV 5000 System.

The Peripheral Housing Unit is not currently supported on rackmount systems.

Mass Storage Guidelines: Rackmount Package

Unlike the office package, an AV 6000 system chassis does not incorporate integrated mass storage. (Although packaged AV 6000 systems may include mass storage, it is not integrated with the chassis.) Rather, rackmount mass storage peripherals are added in the same manner as with rackmount MV/Family systems such as the MV/7800 XP.

AV 6000 Series systems accommodate both SMD and SCSI interface peripheral devices.

The VME Bus SMD Controller can accommodate up to four 8" SMD disks per controller. These disks require 7" of rack space and fit two across in a cabinet (as with the R.A.M.S. disks on the MVs). Up to 4 SMD controllers can be configured on rackmount systems without the VAC/16 bulkhead. On systems with the VAC/16 bulkhead, 3 SMD controllers can be configured. Large SMD disk configurations are best accommodated in meter-high cabinets using the modified 8-outlet MHC for the second cabinet.

The VME Bus SCSI Controller can be used to interface to SCSI peripherals in either:

- Standalone rackmount configurations (e.g. reel-to-reel tape) or
- Combined Storage Subsystem configurations (e.g. 150 MB QIC cartridge tape)

Each SCSI Controller can handle a maximum of 7 peripheral devices but, in general, the 6-meter maximum SCSI cable length will be the limiting factor in configuring devices. Note that this 6-meter, industry-standard cable length is less than that allowed on MV/Family systems

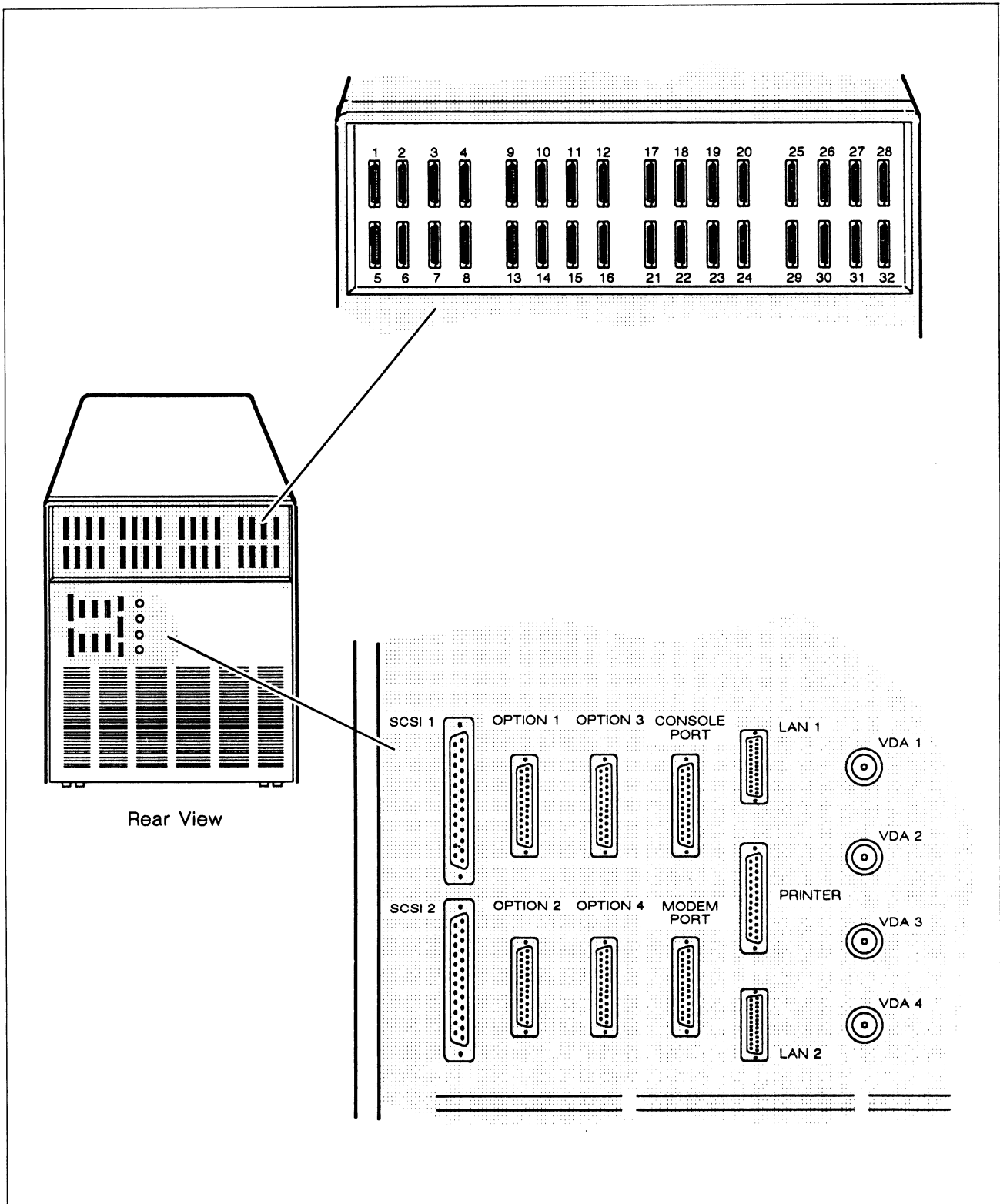


Figure 11. Rear bulkhead on AV 5100/5120 systems.

with DGC's modified SCSI. The VME Mass Storage Peripherals MAPS/PLUS article discusses configuration requirements in depth.

Slot Assignments

The system board must reside in slot 1. Expansion memory must reside in slots 2 through 5. VME boards can be configured in slots 2 through 10. Third-party or custom VME boards which utilize the user-defined pins on J2/P2 may be configured in slots 7 through 10 only. Table 3 displays slot assignments.

<i>Slot No.</i>	<i>Slot Assignment</i>
1	System board
2	Expansion Memory or I/O
3	Expansion Memory or I/O
4	Expansion Memory or I/O
5	Expansion Memory or I/O
6	I/O
7	I/O
8	I/O
9	I/O
10	I/O

Table 3. AV 5000, AV 6000 slot assignments.

Power

The integrated office package includes a 780-watt power supply and the rackmount package includes a 520-watt power supply. If only Data General controller boards and peripherals are configured with these systems, no configuration restrictions are imposed by available power.

Terminals

All asynchronous connections supported by Data General communications products on AViiON Server Systems comply with the RS232 specification. AViiON Server Systems support RS232 terminals with support for ANSI control codes. These include Data General DASHER D21x, D22x, D41x, D46x, D555, and D470C.

If a hardcopy terminal is used as the system console, it should have one of the following two features to properly

display powerup error messages: not respond to backspace codes or process a line only after receiving an End-of-Line. DASHER D57x hardcopy terminals meet these requirements. TP1 terminals do not.

All RS232 ports on AViiON Server Systems are female DB-25 (connected to by male DB-25 cables) as is the standard on VME bus-based systems. This is the opposite of the convention used on MV/Family systems, most personal computers, and the AVX 300 AViiON Workstation. The proper cable for user terminals will be automatically structured with terminals ordered with an AViiON Server System model designator. Model numbers for cables ordered by themselves are shown in the Cables section.

The cable for the system console is different from that used for user terminals. The system console terminal should be ordered with a -X suffix (to indicate no cable). A 25' console cable is included with all AV 5000 and AV 6000 Series systems. The model numbers for additional console cables are given in the Cables section.

Printers

RS232 interface printers are supported on the second RS232 port on the system board, the VAC/16, or the ports on VDC cluster controllers. In addition, the system board has a parallel port selectable for Dataproducts or Centronics interfaces. The VDC/8P cluster controllers each incorporate one Centronics interface along with their 8 RS232 ports. All Data General printers which meet these interface requirements are supported.

Ethernet LAN Guidelines

The Ethernet controller board for VME bus-based AViiON Server Systems (VLC) has a standard DB-15 connector and uses the same drop cables and transceivers as do MV/Family systems (figure 12). Table 4 lists model numbers.

<i>Model No.</i>	<i>Description</i>
4540	N tap for Thick Ethernet
4540-A	BNC tap for Thin Ethernet
4540-B	Vampire tap for Thick Ethernet
4619	8-port transceiver (8PT-E)
1326	5-meter drop cable
1326-A	20-meter drop cable

Table 4. Transceivers and drop cables for Ethernet LANs.

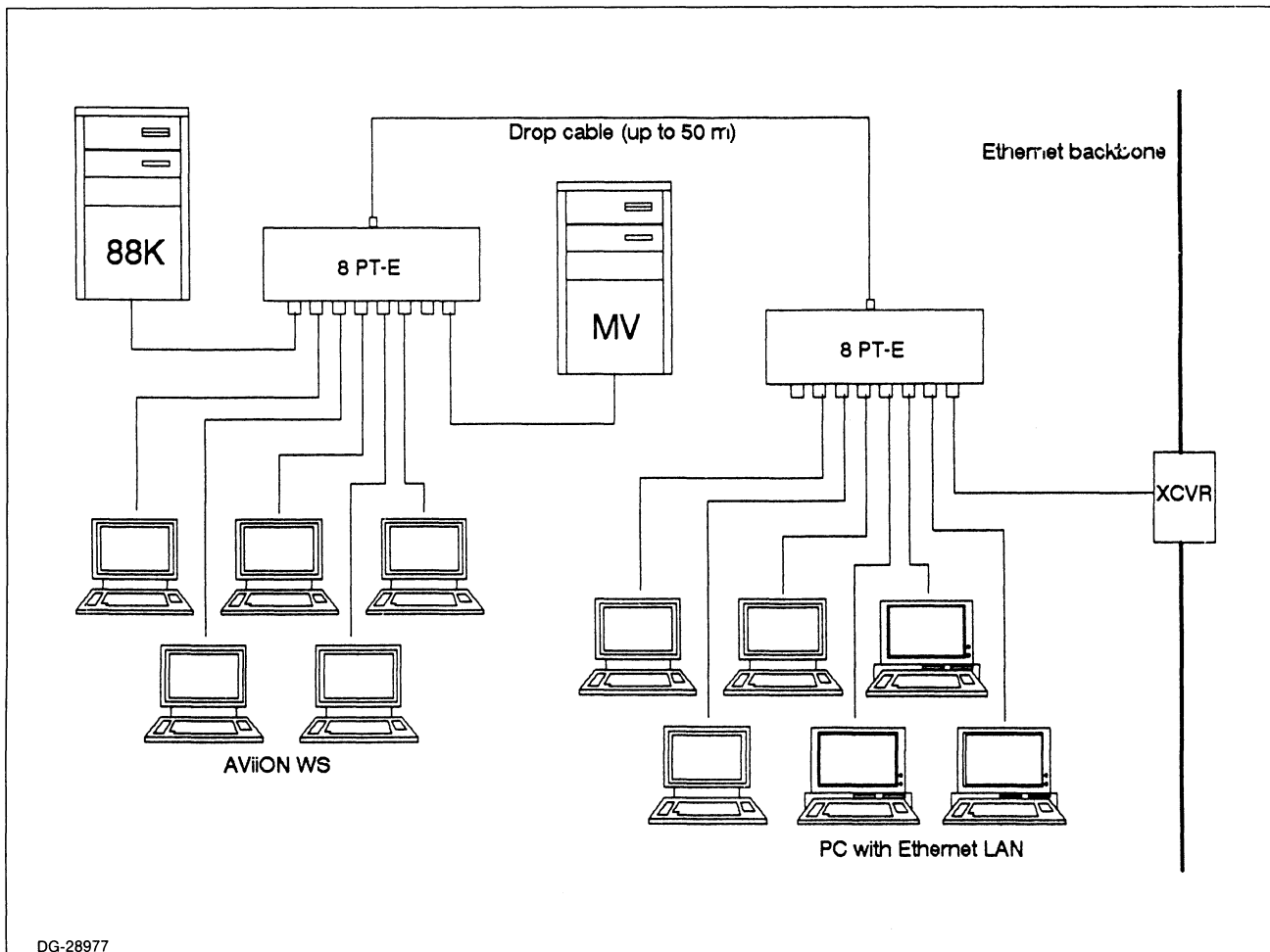


Figure 12. Client-server network with multiport transceivers.

Cabling

Cabling must be ordered separately to connect:

- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing Unit (PHU), Combined Storage Subsystem (CSS), and 1600bpi reel-to-reel tape drive
- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- AViiON Server Systems to SMD Winchester disk drives
- VDA/128 to VDC/16 and VDC/8P cluster controller boxes (cluster extension cables)

SCSI champ connectors are used by the Peripheral Housing Unit, 1600 bpi reel-to-reel tape drive, and the AViiON Server Systems themselves. The RT Sub-D SCSI connectors are used by the Combined Storage Subsystem (applicable to AV 6000 Series Systems only). Table 5 lists cable model numbers.

<i>Model No.</i>	<i>Description</i>
15338E025	25' cluster extension cable – VDA/128
15338E050	50' cluster extension cable – VDA/128
15338E100	100' cluster extension cable – VDA/128
15339E010	10' async system console cable
15339E015	15' async system console cable
15339E025	25' async system console cable
15340E010	10' async terminal cable
15340E015	15' async terminal cable
15340E025	25' async terminal cable
15325E005	SCSI champ x champ cable, 5'
15325E010	SCSI champ x champ cable, 10'
15326E005	SCSI RT Sub-D x champ cable, 5'
15326E010	SCSI RT Sub-D x champ cable, 10'
15345E015	15' Centronics printer cable
15345E025	25' Centronics printer cable
15346E015	15' Data Products printer cable
15346E025	25' Data Products printer cable

Table 5. AViiON Server System cables.

SMD Winchester Disks

Table 6 lists model numbers for the required cabling for SMD Winchester disk storage on AV 6000 Series systems. The following cables are required:

- 1 “A I/F” cable kit per SMD controller (connects drive 1)
- 1 “A Daisy” cable kit each for disks 2 through 4 on a controller
- 1 “B I/F” cable kit for each drive (1 through 4)

Thus, a VME/SMD controller with one SMD drive would require:

- 1 “B I/F” cable kit
- 1 “A I/F” cable kit

A VME/SMD controller with three SMD drives would require:

- 3 “B I/F” cable kit
- 2 “A Daisy” cable kits
- 1 “A I/F” cable kits

<i>Model No.</i>	<i>Description</i>
15342K005	5' ext A I/F cable kit
15342K010	10' ext A I/F cable kit
15342K020	20' ext A I/F cable kit
15342K030	30' ext A I/F cable kit
15342K040	40' ext A I/F cable kit
15343K001	1.3' ext A daisy cable kit
15343K005	5' ext A daisy cable kit
15343K010	10' ext A daisy cable kit
15343K020	20' ext A daisy cable kit
15344K005	5' ext B I/F cable kit
15344K010	10' ext B I/F cable kit
15344K020	20' ext B I/F cable kit
15344K030	30' ext B I/F cable kit
15344K040	40' ext B I/F cable kit

Table 6. SMD cabling for AV 6000 systems.

The required cabling is included with AV 6000 packaged systems which include SMD Winchester disks. Only cabling for add-on disks need be ordered.

Additional SMD disk ordering information:

- Model 6541-A includes the rack tray for two 8” drives and one drive.
- Model 6542-A includes the rack tray for two 8” drives and two drives.
- Model 6541-K includes an expansion 8” disk only.

Therefore if a customer has previously purchased a Model 6541-A and wishes to add a second drive to the pair, a 6541-K should be ordered – not a second 6541-A.

Model Numbers

Table 7 lists model numbers for AViiON AV 5000 Series (office-packaged) systems, table 8, for AV 6000 Series (rackmount) base systems, and table 9 for AV 6000 Series system packages.. Table 10 lists model numbers for expansion memory; and table 11, for VME bus communications controllers. Tables 12 through 14 list mass storage options for AV 5000 systems, for the Peripheral Housing Unit, and for AV 6000 systems.

<i>Model No.</i>	<i>Description</i>
G 70034@*	AV 5100 with single 20 MHz CPU, 8 MB memory, 322 MB ESDI disk, 150 MB QIC cartridge tape
G 70035@*	AV 5100 with single 20 MHz CPU, 16 MB memory, 322 MB ESDI disk, 150 MB QIC cartridge tape
G 70036@*	AV 5120 with dual 20 MHz CPU, 16 MB memory, 322 MB ESDI disk, 150 MB QIC cartridge tape
G 70040	AV 5100 with single 20 MHz CPU, 8 MB memory, 648 MB ESDI disk, 150 MB QIC cartridge tape
G 70041	AV 5100 with single 20 MHz CPU, 16 MB memory, 648 MB ESDI disk, 150 MB QIC cartridge tape
G 70042	AV 5120 with dual 20 MHz CPU, 16 MB memory, 648 MB ESDI disk, 150 MB QIC cartridge tape

***@* = AC power. For the AV 5000 Series,
@ = A(-,1,5,6,7,8,9,0).

Table 7. AV 5000 Series (office-packaged) systems.

<i>Model No.</i>	<i>Description</i>
E 70037@*	AV 6100 with single 20 MHz CPU, 8 MB memory
E 70038@*	AV 6100 with single 20 MHz CPU, 16 MB memory
E 70039@*	AV 6120 with dual 20 MHz CPU, 16 MB memory

***@* = AC power. For the AV 6000 Series, @ = A(-,1,2,4).

Table 8. AV 6000 Series (rackmount) base systems.

<i>Model</i>	<i>Description</i>
E 70043	AV 6100 w/ single 20 MHz CPU, 16 MB memory, two 1 GB 8" SMD disks, 150 MB cartridge tape in CSS, SMD, and SCSI VMEbus controllers, VMEbus Ethernet LAN controller, required cabling, meter-high cabinet
E 70044	AV 6120 w/ dual 20 MHz CPU, 16 MB memory, two 1 GB 8" SMD disks, 150 MB cartridge tape in CSS, SMD, and SCSI VMEbus controllers, VMEbus Ethernet LAN controller, required cabling, meter-high cabinet
E 70045	AV 6100 w/ single 20 MHz CPU, 16 MB memory, three 322 MB 5.25" SCSI disks and 150 MB cartridge tape in CSS, VMEbus SCSI controller, VMEbus Ethernet LAN controller, required cabling, 1344 bay cabinet
E 70046	AV 6120 w/ dual 20 MHz CPU, 16 MB memory, three 322 MB 5.25" SCSI disks and 150 MB cartridge tape in CSS, VMEbus SCSI controller, VMEbus Ethernet LAN controller, required cabling, 1344 bay cabinet
E 70047	AV 6100 with single 20 MHz CPU, 16 MB memory, three 662 5.25" SCSI disks and 150 MB QIC cartridge tape housed in a CSS cabinet, VMEbus SCSI controller, VMEbus Ethernet LAN controller, required cabling, 60" 1344 cabinet.
E 70048	AV 6120 with dual 20 MHz CPU, 16 MB memory, three 662 5.25" SCSI disks and 150 MB QIC cartridge tape housed in a CSS cabinet, VMEbus SCSI controller, VMEbus Ethernet LAN controller, required cabling, 60" 1344 cabinet

Table 9. AV 6000 Series system packages

<i>Model</i>	<i>Description</i>
7001	16 MB expansion memory board
7002	32 MB expansion memory board
7003	48 MB expansion memory board

Table 10. AV 5000, AV 6000 expansion memory.

<i>Model</i>	<i>Description</i>
7406	VAC/16 for rackmount systems
7400	VAC/16 for integrated systems
7401	VDA/128
7402	VDC/8P
7403	VDC/16
7405	VLC
7404	VSC/4 for 5100 systems
7404-V	VSC/4 for 6100 systems
7409	6U/9U VME Adapter Board*
*Required to configure third-party 6U boards only.	

Table 11. VME bus communications controllers.

Microcode

Because AViiON systems are based on a RISC processor, they do not use microcode.

System Software

AViiON Server System model numbers do not include a bundled RTU for the operating system.

A wide variety of DG/UX system software packages are available for both server and multi-user AViiON Server System configurations. Multi-user DG/UX licenses are classed by user count categories. For ordering information on system software packages, please refer to the MAPS/PLUS articles on 88000 Unix software.

Upgrades

System board upgrades are offered through the Upgrades Marketing Group of the Continuing Products Division and are listed in table 15. These upgrades require only a simple board swap and include Field Engineering installation and deinstallation. If you have any questions regarding upgrades or would like to upgrade a system or component not listed here, please call a CPD Marketing Specialist at 508-870-1400.

<i>Model No.</i>	<i>Description</i>
USTG12	Upgrade a single CPU AV 5100 or AV 6100 with 16 MB memory to a dual CPU AV 5120 or AV 6120 with 16 MB memory

Table 15. AViiON Server System upgrade.

Related Information

Table 16 lists customer manuals for FCS; table 17, MAPS/PLUS articles and sales collateral.

<i>Model No.</i>	<i>Description</i>	<i>Size, I/F</i>
6577-I	150 MB QIC cartridge tape (integral add-on)	5.25" HH SCSI
6442-I	322 MB ESDI disk (integral add-on)	5.25" FH ESDI
6555-I	648 MB ESDI disk (integral add-on)	5.25" FH ESDI
7407	VMEbus SCSI controller (add-on) for AViiON 5000 systems	
6587-A	1600bpi reel-to-reel tape (external tabletop)	SCSI

Table 12. Mass storage options for AV 5000 systems.

<i>Model No.</i>	<i>Description</i>	<i>Size, I/F</i>
G10565-@*	Peripheral Housing Unit (PHU)	
G6577-E	150 MB QIC cartridge tape	5.25" HH SCSI
G6591-E	2 GB cartridge tape	5.25" FH SCSI
G6491-E	322 MB SCSI 5.25" Winchester disk	5.25" FH SCSI
G6554-P	662 MB SCSI 5.25" Winchester disk	5.25" FH SCSI
G6601-@	PHU w/ 322 MB disk	
G6605-@	PHU w/ 662 MB disk	
G6602-@	PHU w/ 150 MB tape	
G6591-A@	PHU w/ 288 cartridge tape	
G6604-@	PHU w/ 322 MB disk and 150 MB tape	

*"@ = AC power. For Peripheral Housing Unit, @ = -,1,5,6,7,8,9.

Table 13. Mass storage options for Peripheral Housing Unit.

<i>Model No.</i>	<i>Description</i>	<i>Size, I/F</i>
6577-A	150 MB QIC cartridge tape with CSS chassis	
6590-A	2 GB cartridge tape with CSS chassis	
6443-A	322 MB SCSI 5.25" disk with CSS chassis	
6593-A	662 MB SCSI 5.25" disk with CSS chassis	
6577-M	150 MB QIC cartridge tape for CSS (add-on)	5.25" HH SCSI
6590-M	2 GB cartridge tape for CSS (add-on)	5.25" FH SCSI
6491-M	322 MB SCSI 5.25" disk for CSS (add-on)	5.25" FH SCSI
6554-M	662 MB SCSI 5.25" disk for CSS (add-on)	5.25" FH SCSI
6541-A	1 GB 8" SMD Winchester disk with mounting hardware	8" SMD
6542-A	Two x 1 GB 8" SMD Winchester disk with mounting hardware	8" SMD
6541-K	1 GB 8" SMD disk (no mounting hardware)	8" SMD
7407-V	VMEbus SCSI controller for AViiON 6000 systems	
7408	VMEbus SMD controller	
6585	Modified meter-high cabinet (8 receptacles)	
6586-A	1600 bpi reel-to-reel tape drive (rackmount)	SCSI

Table 14. Mass storage options for AV 6000 systems.

<i>Part No.</i>	<i>Title</i>
<i>AViiON 5000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001806	Setting Up and Starting AViiON 5000 Series Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 5000 VAR/OEM DOC. PACKAGE</i>	
015-000355	Expanding AViiON 5000 Series Systems
<i>AViiON 6000 SYSTEM OWNER'S DOC. PACKAGE</i>	
014-001807	Starting AViiON 6000 Series Systems
014-001802	Using the AViiON System Control Monitor
<i>AViiON 6000 VAR/OEM DOC. PACKAGE</i>	
015-000345	Expanding AViiON 6000 Series Systems
<i>AViiON 5000 AND 6000 SERIES SYSTEMS PROGRAMMER'S DOC. PACKAGE</i>	
014-001805	AViiON 5000 and 6000 Series Systems: Using the System Board Architecture and Programming Its Registers
014-001808	MC88200 User's Manual, Cache Memory/Management Unit (CMMU)
014-001809	MC88100 User's Manual, Reduced Instruction Set Computer (RISC)
<i>MODEL 10565 MASS-STORAGE SUBSYSTEM OWNER'S PACKAGE</i>	
014-001810	Installing and Operating the Model 10565 Mass-Storage Subsystem
<i>MASS STORAGE DRIVE MANUALS</i>	
014-001699	Model 6536 Tape Drive Operations and Maintenance (-00 vendor manual on the shelf; -01 manual on the shelf 6/24) -150MB Cartridge Tape
014-001692	6586/6587 Magnetic Tape Drive Installation Guide
014-001460	Disk Drive Model 6491 Series General Specifications (-01 now on the shelf; rackmount drive, not office systems) -322MB Winchester Disk Drive
<i>MASS STORAGE OEM/VAR MANUALS</i>	
014-001756	Rimfire 3500 VMEbus SCSI Host Adapter with Floppy Port Product Specification
014-001757	Rimfire 3400 VMEbus ESDI Drive Controller Product Specification
014-001758	Rimfire 3200 VMEbus SMD-E Disk Controller Product Specification
<i>COMMUNICATIONS OEM/VAR MANUALS</i>	
014-001813	HPS Cluster Controller Technical Manual (VDC/8P, VDC/16)
014-001814	HPS Cluster Controller Installation Guide (VDC/8P, VDC/16)
014-001815	HPS VMEbus Host Adapters Technical Manual (VDA/128)
014-001816	DCP 8820 Technical Manual (VSC/4)
014-001817	Model 6236 Technical Manual (VAC/16)
014-001818	High-Performance VMEbus Ethernet Communications Controller User's Guide (VLC)
069-000347	HPS Terminal Control Software User Manual
069-000348	HPS Application Installation Manual
069-000349	HPS Diagnostic Application User Manual

Table 16. List of customer manuals for FCS of AViiON System Servers.

<i>Part No.</i>	<i>Description</i>
046-001195	AViiON 300 Workstations MAPS/PLUS article, page 202-3
046-001196	VME Communications Controllers MAPS/PLUS article, page 271-113
046-000924	AViiON Mass Storage MAPS/PLUS article, page 239-29
046-001013	DG/UX 4.10 MAPS/PLUS article, page 301-12.3
046-000848-03	DG/UX TCP/IP MAPS/PLUS article, page 330-15
046-001139	Green Hillscompilers MAPS/PLUS article, page 320-73
012-3583	AViiON Server Systems brochure
012-3582	AViiON 300 Workstation brochure
012-3584	DG/UX brochure
012-3568	DG/UX 4.10 for AViiON Systems product brief
012-3518	88K Concept flyer

Table 17. MAPS/PLUS articles and sales collateral.

Specifications

Processor

CPU:

20 MHz Motorola 88100 HCMOS technology
 32-bit RISC processor: IEEE P754 floating point support on-chip
 Separate data and instruction memory ports
 Hardware register scoreboard

Motorola 88200 CMMU: HCMOS technology
 16 KB, 4-way set-associative physical cache
 MMU with user/supervisor logical address space of 4 GB each

Memory

Minimum 8 MB to maximum 208 MB
 ERCC with single-bit correction and double-bit detection
 100ns 1 MBit DRAMs in ZIP packaging

VME Bus

Slots:

10 9U slots; 6 slots also support the memory bus: Electrically compliant with Motorola VME specification, Revision C.1

Performance:

Sustained block mode VME bus transfer rate: 25 MByte/sec

Lines:

Data transfer master:
 - D32, D16, D08(E0)
 - A32, A24, A16
 - AD0 (Address Only Cycles)
 - RMW (Read Modify Write)

Data transfer slave:
 - D32, D16, D09(E0)
 - UAT (Unaligned Address Transfer)
 - A32, A24, A16
 - ADO
 - RMW
 - BLT (Block Transfer)
 - Location monitor A16

Requestor:

- Any one of BR(0-3)
 - Any one of ROR, RWD, RONR

Interrupter:

- Any one of I(1-7)
 - D08(O)
 - ROAK (Release On Acknowledge)

Interrupt handler:

- IH(1-7), D08(O)

Slot 1 functions (selectable):

- SYSClk driver
 - Power Monitor (power supply)
 - IACK daisy chain driver
 - Bus timer (BTO(32, 64, 128))
 - Arbiter (PRI, RRS, SGL)

Mass Storage

Winchester storage (integral to office system):

322 MB 5.25" ESDI Winchester disk:
 - Maximum of 3
 - 1.25 MB/sec data transfer rate
 - 18ms average seek

Winchester storage (CSS and PHU): 322 MB 5.25" SCSI Winchester disk:
 - 1.5 MB/sec data transfer rate
 - 18ms average seek

Winchester storage (rack-mount): 1 GB 8" SMD Winchester disk:
 - 3.0 MB/sec data transfer rate
 - 16ms average seek

Cartridge tape: 150 MB QIC cartridge tape:
 - Can read/write QIC 120 MB; can read QIC 40 MB and 60 MB
 112 KB/sec sustained data transfer rate
 - Single-ended SCSI interface

Reel-to-reel tape (desktop): 1600 bpi PE format reel-to-reel tape drive:
 - Auto-thread, auto-load, horizontal mount
 - 25/100 ips selectable
 - 160 KB/sec PE transfer rate (instantaneous)
 - 6 to 10.5" diameter reels
 - Single-ended SCSI interface

ESDI controller: 2.5 MB/sec data transfer rate
 512 KB on-board cache

SCSI controller: Single-ended SCSI interface with support for both asynchronous (2 MB/sec) and synchronous (5 MB/sec) operation modes

SMD controller: 3.0 MB/sec data transfer rate
 30 MB/sec burst rates on VME bus
 512 KB on-board segmented read-ahead cache

Communications

VME bus asynchronous controller (VAC/16): 16 full-duplex RS232 lines
 16 x 9600bps aggregate maximum transfer rate
 Motorola 68020 with 192 KB static RAM buffer, 128 KB EPROM, 2 custom VLSI octarts

VME bus distributed asynchronous host adapter (VDA/128): Hosts up to 128 asynchronous devices connected on cluster controllers via RG62 coaxial cable

VME bus distributed cluster controllers (VDC/16, VDC/8, VDC/8P): Support for 16 RS232 lines, 8 RS232 lines, or 8 RS232 lines plus Centronics printer port
 Aggregate throughput (VDC/16): 16 x 9600 baud, half-duplex
 (VDC/8): 8 x 19.2 KBps, half duplex
 Signals supported: CTS, DCD, DSR, DTR, RTS, RXD, TXD, Ground

VME bus synchronous controller (VSC/4): 4 multi-protocol communications channels (RS232/RS422)
 Full duplex operation
 8 MHz Intel 80186 processor with 512 KB on-board RAM with parity
 2 Zilog 8530 SCC chips
 Dual-ported memory buffer
 1.6 MBit/sec aggregate transfer rate

VME bus Ethernet LAN controller (VLC): 7990 LANCE Ethernet controller chip and 256 KB dual-ported data buffer

AC Power

Office package: 120V: 12 amps, single-phase
 220V: 10 amps, single-phase
 100V: 12 amps, single-phase

Rackmount package: 120V: 10 amps, single-phase
 220V: 5.5 amps, single-phase
 100V: 12 amps, single-phase
 240V: 5 amps, single-phase

Environmental

Temperature:

Office package: Operating: 50° to 100° F; 10° to 38° C

Rackmount Packages: Operating: 50° to 100° F; 10° to 38° C

Rackmount CPU chassis: Operating: 32° to 131° F; 0° to 55° C

Rackmount and office package: Storage: -40° to +149° F; -40° to 65° C

Humidity: Operating: 20% to 80%, noncondensing
 Storage: 10% to 90%, noncondensing

Altitude: 2,438 meters (8,000') maximum

BTU/NR (Worst Case)

Office package: 2650

Rackmount CPU chassis 1775

KVA Rating

Office package 1.5 KVA

Rackmount chassis

Physical

Dimensions:

Office package: 17.25" wide x 24.75" high x 25.5" deep

Rackmount: 17.52" wide x 13.84" high x 24.203" deep

Weight:

Office package: Approx. 160 lbs. (fully configured with mass storage)

Rackmount: Approx. 135 lbs. (fully configured)



AViiON 7000+, 8000 Server Packages

Fact Sheet

This revision reflects 16 MB memory boards, more SCSI/LAN connectivity and disk array capacity (AV 7000+), more UPS capacity (both AV 7000+ and AV 8000) and new model numbers. AV 7000+ and 8000 bring the availability and performance of Data General's high-end Open Systems into easily configured and ordered package systems. They combine a quad-CPU server running at 117 MIPS, disk array mass storage and uninterruptible power (North America only) into the user's choice of compact deskside or highly configurable rackmount cabinetry. For a snapshot, see table below.

- Single board, tightly-coupled quad processor
 - 117 Dhrystone MIPS
 - four 25 MHz 88100 RISC CPU's
 - hardware floating point
 - eight 88204 cache memory management units
 - 512 KB cache memory
- Memory boards in 16 MB, 32 MB, 64 MB, 128 MB, 192 MB (latter AV 8000 only) increments
- Disk Array (AV 7000+) or Highly Available Disk Array (AV 8000) mass storage

- Uninterruptible power supply (North Amer. only)
- Machine initiated service call to Country Support Centers
- VME bus support
 - enhanced async connectivity and performance
 - access to wide range of industry-standard devices
- Add-on packages upgrade AV 5200+, 6200 servers to AV 7000+, 8000
- Attractive, compact office packaging (AV 7000+) requires no special facilities or computer room
- Flexible, 20 slot processor and rack mount packaging (AV 8000) supports large I/O configurations for enterprise-wide server needs
- DG/UX operating system rev. 5.4
 - symmetric multiprocessing
 - commercial-grade implementation of UNIX standard
 - highly reliable environment
 - wide range of applications software, systems tools

Description

The *quad-CPU servers* at the core of AV 7000+ and 8000 (AV 5240+ and 6240 respectively) are fully described in MAPS/PLUS; see page 202-13. The payoff of

Feature	AV 7000 +	AV 8000
Server	AV 5240+	AV 6240
Server packaging	10 slot, office	20 slot, 72 " rackmount cabinet
Disk storage	Disk Array	Highly-Available Disk Array
Disk packaging	CSS2/DC	59 inch cabinet
Disk power redundancy	no	yes
Hot repair disks	no	yes
Maximum RAID disk	15 GB	60 GB
Standard memory	64 MB	128 MB
Maximum memory	512 MB	768 MB
Standard tape drive	525 MB QIC	525 MB QIC
Uninterruptible power*	3.6 KVA	12 KVA
Async connects	1020	1275
Maximum SCSI channels	5	8
LAN** ports	4	8
Synch ports	16	48
North America model #	G 70455	G 70457
Worldwide model # *	G 70454	G 70337

*Worldwide models do not include a UPS. **2 VLC or 4 VTC. Not all maximums can be achieved simultaneously.

DG/UX's symmetric multiprocessing is that a single four-processor UNIX server based on mature 88K CMOS RISC now runs at well over 100 Dhrystone (2.1) MIPS. No other vendor offers 117 MIPS and 192 MB of memory on two, 225 square inch boards. This density means compact, cost effective configurations; it also ensures increased reliability and maintainability. The existence of these servers — and inexpensive board upgrades to them — not only means opportunities in environments that need this performance today, but will also leverage single- and dual-CPU server sales to customers concerned about performance headroom. A balanced hardware & software design maximizes application throughput, for more computing capability per amount spent. AV 7000+ and 8000 servers are highly appropriate for multi-user timesharing applications or network servers, or a combination of these computing models.

Highly Available Disk Array (H.A.D.A.) in the AV 8000 package is a Redundant Array of Inexpensive Disks (RAID) in a 60" high cabinet that supports many high reliability and high availability features. It is applicable for large or critical data bases, disk farms, and other environments requiring a cost-effective way of ensuring maximum up-time. Redundancy options include power sources and supplies, cooling and multiple interface buses. Repair-under-power and customer-replaceable drive modules let application processing continue during FRU repair. A maximum of 30 1 GB disks are configurable per single cabinet and IOP. Up to two IOP's per VME chassis enable a maximum of 60 GB. Arrays can be configured in redundant disk groups (RAID 5), mirrored pairs and/or single disks. Note that in a RAID 5 configuration, 4 GB out of the 5 GB array are available for mass storage. Two host processors can interface to the same subsystem and process data from different disk groups simultaneously. HADA has excellent performance with maximum scalability and configurability: a peak activity rate of 400 I/O's per second (read only). For further information on HADA please see MAPS/PLUS, page 239-53 .

Disk Array in the AV 7000+ package is an entry point RAID level 1 or 5 mass storage subsystem comprising the 9U VME bus IOP, five 1.0 GB disks and CSS2/DC chassis. AV 7000+ supports up to three CSS2 array groups. For further information please see MAPS/PLUS, page 232-41 .

Uninterruptible Power Supply (North America only) matched to the requirements of each system ensures power integrity. It delivers backup power at full load for 10 minutes (AV 7000+) or 6 minutes (AV 8000) when

AC output is lost during brownout or blackout — and automatic normal system shutdown in extended power outages. An application program actually senses battery low states and initiates a controlled shutdown of the operating system. **NOTE: an async line must be added to 7000+ and 8000 systems for connection to the UPS to enable the shutdown software.** AV 7000+ may use either a VAC/16 or a VDA. AV 8000 systems must use a VDA. For further info please see MAPS/PLUS, page 289-17 .

The **TermServer** product family from DGC provides asynchronous terminal connectivity over Ethernet/802.3 networks to AViiON systems with LAN interfaces. TermServers use Telnet/TCP/IP for terminal sessions.

VTC (VME terminal controller) attaches AViiON systems to an IEEE 802.3 LAN and offloads TCP/IP Telnet terminal traffic from the CPU. The VTC is primarily for use with TermServer. However, other LAN-attached desktop devices, workstations and PCs, for example, may be routed through the VTC. Like other VME devices, the VTC is initialized from DG/UX. Therefore it does not require special boot software or TermManager initialization. For further details please see MAPS/PLUS, page 279-65 and 279-66.1 .

AV 7000+ and 8000 support **VME Distributed Adaptor/255 (VDA/255)**, **VME Distributed Cluster/16 (VCD/16)** and **VME Distributed Cluster/8P (VCD/8P)**. These are upgraded versions of, and replace the existing VDA/128, VDC/16 and VDC/8P for AViiON systems. Key improvements include: maximum number of async ports increased to 255 per VDA; twice the throughput of previous implementations; and POSIX compliance. For further info please see MAPS/PLUS, page 271-121.1

High Availability Features

The way Data General offers high availability across the AViiON line — in a granular, scalable, rational (and therefore cost-effective) fashion — is a key differentiator. AV 8000 high availability makes it possible to configure servers so that no single hardware failure will cause extensive system downtime. In addition to features inherent in disk array technology and packaging mentioned above, a combination of hardware and software lets customers recover quickly from system failures:

DG/UX operating system.. When a specific application or non-critical hardware subsystem fails, DG/UX takes corrective action and resists shutting down the entire system. Other high availability features in DG/UX 5.4 :

- Disk mirroring lets multiple copies of data exist on physically separate media to eliminate a single point of failure for disk subsystems.
- Fast system boot lets the operating system recover following system failure in minutes.
- Fast recovery file system eliminates the traditional UNIX requirement to run a recovery utility (fsck), guaranteeing the integrity of the disk filesystem following a system failure.
- Auto reboot after operating system failure leads to faster recovery because human intervention is not required to initiate recovery.
- On-line restart of communication controllers (LAN, synch, and VAC/16,VTC, VDA/255, etc.) does not require a reboot of the operating system.
- Robust, commercial file system attributes include: logical disk implementation over many physical disks, bad block remapping, critical data structure duplication on disks, large filesystems, and System Administrator's Tool.
- With resizeable unmounted filesystem, a UNIX filesystem can be enlarged, without requiring a time consuming, error prone procedure of dumping to tape and reloading a filesystem.
- Auto dump-to-tape option after system failure provides a record of memory for problem determination and means faster recovery when fighting intermittent system problems.

Highly Available Disk Subsystems in a single 100% available cabinet (with redundant power option) can

be *dual ported* to two AV 8000 servers, both operating as peers. Each server runs a separate operating system and utilizes different physical disks within the H.A.D.A. cabinet. This redundant hardware ensures quick recovery from a system failure. A hardware fault in one of the processors would result in the applications on that system failing; but the surviving system can switch to a failure scenario running the critical applications, constructed from DG/UX scripts. See figure one. Users can access either server via an Ethernet LAN. Should one server fail, users would then be able to log on to the survivor. Inherent in AV 8000 packaging is the UPS for reliable AC power. This configuration allows optimum use of the hardware by the customer as well as quicker recovery to the backup scenario when system failure occurs.

Configurations/Ordering

Four, easily ordered and configured package models plus upgrades are available. Note that packages with UPS are available in North America only. Packages without UPS are available worldwide. The table following each package model number describes the content of each. For options to these packages, please refer to AV 5200+/6200 MAPS/PLUS, pages 202-13 ff.

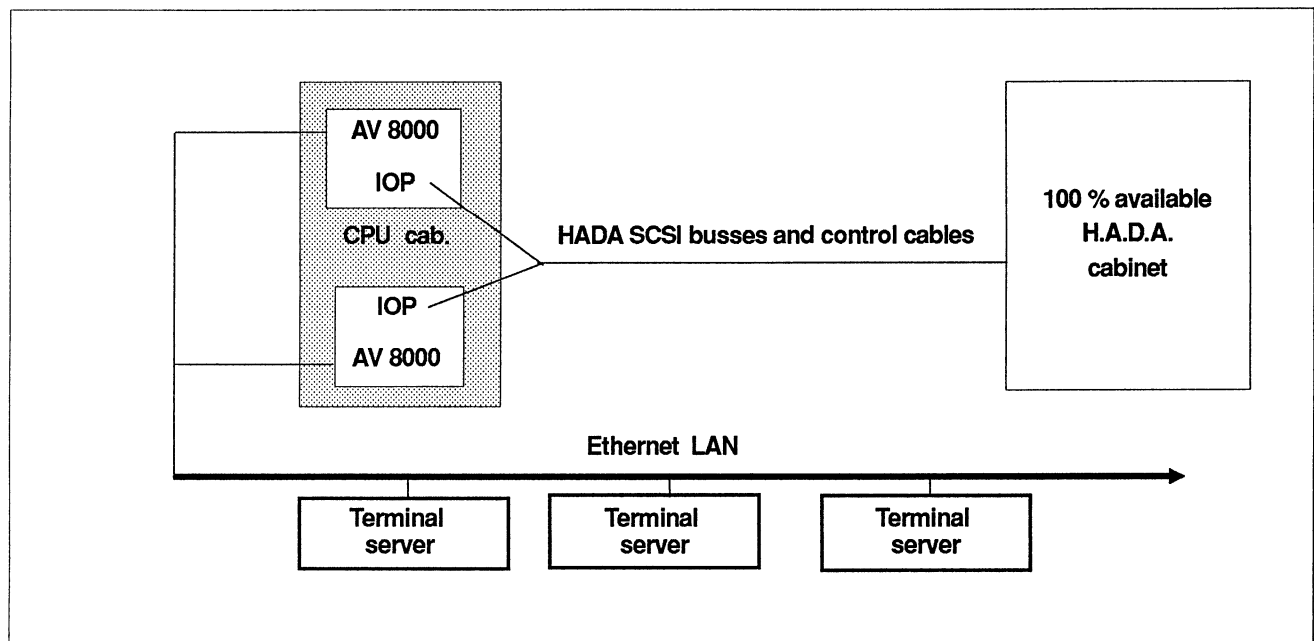


Figure one. Maximum availability, dual AV 8000, H.A.D.A. configuration

AV 7000+, Model G 70455

<i>Component</i>	<i>Description</i>
	Quad server in 10 slot office package
7015	64 MB memory board
7421	SCSI controller
6677-I	525 MB QIC tape
7417	Disk array IOP
15378E005	5' SCSI cable
	CSS2/DC chassis
6709	Second power supply for CSS2
6685-G	1.0 GB drives for CSS2 chassis (five)
18972	3.6 KVA UPS

AC power suffix: A(-) NORTH AMERICA ONLY

AV 7000+, Model G 70454*

<i>Component</i>	<i>Description</i>
	Quad server in 10 slot office package
7015	64 MB memory board*
7421	SCSI controller*
6677-I	525 MB QIC tape
7417	Disk array IOP*
15378E005	5' SCSI cable*
6701	CSS2/DC chassis*
6709	Second power supply for CSS2*
6685-G	1.0 GB drives for CSS2 chassis (five)*

AC power suffix: A(-,1,5,6,7,8,9,0). *Model G70448 substitutes 16 MB for memory, 662 MB drive for disk array.

AV 8000, Model G 70457

<i>Component</i>	<i>Description of component</i>
70299	Quad server, 20 slot RM chassis
7016	128 MB memory board
11226	72" cabinet with two 5-20R receptacles for two AV 8000 systems
7902-W	HADA cabinet with 15-drive chassis, IOP, 5.0 GB disks, hot repair
7606	DC power and AC power chasses
6577-Z	150 MB QIC tape
6590-Z	2 GB cartridge tape
18795	12 KVA UPS subsystem

AC power suffix: A(-) NORTH AMERICA ONLY

AV 5200+ to AV 7000+ Upgrade, Model G 7936

<i>Component</i>	<i>Description</i>
7922	Disk Array subsystem: IOP, 5.0 GB of disk in CSS2/DC cabinet

AC power suffix: A(-,5,6,7,8,9,0)

AV 8000, Model G 70337

<i>Component</i>	<i>Description of component</i>
70397	Quad server, 20 slot RM chassis, 128 MB memory board
11226	72" cabinet with two 5-20R receptacles for two AV 8000 systems
7902-W	HADA cabinet with 15-drive chassis, IOP, 5.0 GB of disk, hot repair
7606	DC power chassis, AC power chassis
6577-Z	150 MB QIC tape
6590-Z	2 GB cartridge tape

AC power suffix: E(-) or F(2,4)

AV 6200-20 to AV 8000 Upgrade, Model G 7938

<i>Component</i>	<i>Description</i>
7902-W	HADA subsystem: IOP, 5.0 GB of disk, HADA cabinet
7606	DC power and AC power chasses
6577-Z	150 MB QIC tape drive
6590-Z	2 GB cartridge tape drive

AC power suffix: F(7), G (7)

Related Information

<i>Part Number</i>	<i>Description</i>
046-001288-02	HADA MAPS/+, p. 239-53 ff.
046-001287-01	Disk Array MAPS/+, p. 232-41 ff.
046-001191-06	AV 5200+, 6200 Servers MAPS/+ p. 202-13 ff.
046-001028-01	UPS MAPS/+, p. 289-17 ff
046-001274	AViiON Async Connectivity MAPS/+, p. 271-121.1 ff.
046-001043-03	TermServer MAPS/+, p. 279-57
012-39801	AV 7000+ Product Brief
012-3986	AV 8000 Product Brief

Specifications

Operating temp (degr.):	10 to 38 C; 50 to 100 F
Storage temp (degr.):	-40 to 65 C; -40 to 149F
Operating humidity:	20 to 80% non-condensing
Storage humidity:	10 to 90% non-condensing
AV 7000+ processor:	24.75"H X 17.25"W X 25.5"D
AV 7000+ processor wt.:	160 LBS.
Disk Array package:	8.75"H x 19" W x 24" D
HADA package:	60"H x 32.9"W x 31.8" D
Disk Array weight:	34 lbs.



AViiON 7000, 8000 Server Packages

Fact Sheet

AV 7000 and 8000 bring the availability and performance of Data General's high-end Open Systems into *easily configured and ordered package systems*. They combine a quad-CPU server running at 117 MIPS, disk array mass storage and uninterruptible power (North America only) into the user's choice of compact deskside or highly configurable 60-inch cabinetry. For a snapshot of these packages, see the table at the bottom of this page.

- Single board, tightly-coupled AViiON quad processor
 - 117 Dhrystone MIPS
 - four 25 MHz 88100 RISC CPU's
 - hardware floating point
 - eight 88204 Cache Memory Management Units
 - up to 512 KB cache memory
- Memory boards in 16 MB, 32 MB, 64 MB, 128 MB, 192 MB (latter in AV 8000 only) increments
- Disk Array (in AV 7000) or Highly Available Disk Array (in AV 8000) mass storage
- Uninterruptible power supply (North America only)
- Packaged high availability features
 - machine initiated service call to Country Support Centers
- VME bus support
 - enhanced async connectivity and performance
 - access to wide range of industry-standard devices
- Add-on packages upgrade AV 5200, 6200 servers to AV 7000, 8000
- Attractive, compact office packaging (AViiON 7000) requires no special facilities or computer room
- Flexible, 20 slot processor and rack mount packaging (AV 8000) supports large I/O configurations for enterprise-wide server needs
- DG/UX operating system
 - symmetric multiprocessing
 - commercial-grade implementation of the UNIX standard
 - highly reliable environment
 - wide range of application software and systems tools

Feature	AV 7000	AV 8000
Server	AV 5240	AV 6240
Server packaging	10 slot, office	20 slot, rackmount
Disk storage	Disk Array	Highly-Available Disk Array
Disk packaging	CSS2/DC	59 inch cabinet
Disk power redundancy	no	yes
Hot repair disks	no	yes
Maximum RAID. disk	5 GB	60 GB
Standard memory	64 MB	128 MB
Maximum memory	512 MB	768 MB
Standard tape drive	525 MB QIC	525 MB QIC
Uninterruptible power*	3 KVA	10 KVA
Async connects	1020	1275
Maximum SCSI channels	2	8
LAN ports	2	8
Synch ports	24	48
North America model #	G 70334	G 70336
Worldwide model # *	G 70335	G 70337

* Worldwide models do not include a UPS. Not all maximums can be achieved simultaneously.

Description

The *quad-CPU servers* at the core of AV 7000 and 8000 (AV 5240 and 6240 respectively) are fully described in MAPS/PLUS; see page 202-13 (part number 046-001191-04). The payoff of DG/UX's symmetric multiprocessing is that a single four-processor UNIX server based on mature 88K CMOS RISC now runs at well over 100 Dhrystone (2.1) MIPS. No other vendor offers 117 MIPS and 192 MB of memory on two, 225 square inch boards. This density means compact, cost effective configurations; it also ensures increased reliability and maintainability. The existence of these servers — and inexpensive board upgrades to them — will not only mean opportunities in environments that need this performance today, but will also leverage single- and dual-CPU server sales to customers concerned about performance headroom. A balanced hardware & software design maximizes application throughput, for more computing capability per amount spent. AV 7000 and 8000 servers are highly appropriate for multi-user timesharing applications or network servers, or a combination of these computing models.

High Availability Disk Array (H.A.D.A.,) in the AV 8000 package houses a Redundant Array of Inexpensive Disks (RAID) in a 60" high cabinet that supports many high reliability and high availability features. It is applicable for large or critical data bases, disk farms, and other environments requiring a cost-effective way of ensuring maximum up-time. Redundancy options include power sources and supplies, cooling and multiple interface busses. Repair-under-power, customer replaceable drive modules let application processing continue during FRU repair. A maximum of 30 1 GB disks are configurable per single cabinet and IOP. Up to two IOP's per VME chassis enable a maximum of 60 GB. Arrays can be configured in redundant disk groups (RAID 5), mirrored pairs and/or single disks (RAID 1). Note that in a RAID 5 configuration, 4 GB out of the 5 GB array are available for mass storage. Two host processors can interface to the same subsystem and process data from different disk groups simultaneously. H.A.D.A. has excellent performance with maximum scalability and configurability: a peak activity rate of 400 I/O's per second (read only). For further information on H.A.D.A. please see MAPS/PLUS, page 239-53 (part # 046-001288).

Disk Array in the AV 7000 package is an entry point RAID level 1 or 5 mass storage subsystem comprising the 9U VME bus IOP, five 1.0 GB disks and a CSS2/DC chassis. The AV 7000 supports one CSS2 array group. For further information on Disk Array please see MAPS/PLUS, page 232-41 (part # 046-001287).

Uninterruptible Power Supply (North America only) matched to the requirements of each system ensures power integrity. It delivers backup power at full load for 6 minutes (AV 7000) or 10 minutes (AV 8000) when AC output is lost during brownout or blackout — and automatic normal system shutdown in extended power outages. An application program actually senses battery low states and initiates a controlled shutdown of the operating system. For further information on UPS please see MAPS/PLUS, page 289-17 (part # 046-001028-01).

AV 7000 and 8000 support *VME Distributed Adaptor/255 (VDA/255)*, *VME Distributed Cluster/16 (VCD/16)* and *VME Distributed Cluster/8P (VCD/8P)*. These are upgraded versions of, and replace the existing VDA/128, VDC/16 and VDC/8P for AViiON systems. Key improvements include: maximum number of synch ports increased to 255 per VDA; twice the throughput of previous implementations; and POSIX compliance. In particular the AV 8000 supports up to 12 VSC/4 synchronous communications boards for a total of up to 48 synch lines. For further information please see MAPS/PLUS, page 271-121.1 (part # 046-001274).

High Availability Features

The way Data General has chosen to offer high availability across the AViiON line — in a granular, scalable, rational (and therefore cost-effective) fashion — is a key differentiator. AV 8000 high availability makes it possible to configure servers so that no single hardware failure will cause extensive system downtime. In addition to those already features inherent in disk array technology and packaging mentioned above, a combination of hardware and software let customers recover quickly from system failures:

*DG/UX operating system.** In cases where a specific application or non-critical hardware subsystem fails, the operating system will take corrective action and resist shutting down the entire system. Other high availability features in DG/UX include:

- Disk mirroring lets multiple copies of data exist on physically separate media to eliminate a single point of failure for disk subsystems.
- Fast system boot provides recovery of the operating system following system failure in minutes.
- Fast recovery file system eliminates the traditional UNIX requirement to run a recovery utility (*fsck*), guaranteeing the integrity of the disk filesystem following a system failure.

- Auto reboot after operating system failure leads to faster recovery because human intervention is not required to initiate recovery.
 - On-line restart of communication controllers (LAN, synch, and VAC/16, VDA/255, etc.) does not require a reboot of the operating system.
 - Robust, commercial file system attributes include: logical disk implementation over many physical disks, bad block remapping, critical data structure duplication on disks, large filesystems, and the System Administrator's Tool.
 - With resizeable unmounted filesystem, a UNIX filesystem can be enlarged, without requiring a time consuming, error prone procedure of dumping to tape and reloading a filesystem.
 - Auto dump-to-tape option after system failure provides a record of memory for problem determination and means faster recovery when fighting intermittent system problems.
- * Some DG/UX features available in rev 5.4

Highly Available Disk Subsystems in a single cabinet with optional power redundancy can be *dual ported* to two servers, both operating as peers. Each server runs a separate operating system and utilizes different physical disks within the H.A.D.A. cabinet. This overall configuration has redundant hardware to ensure a quick recovery from a system failure. A hardware fault in one of the processors would result in the applications on that system failing; but the surviving system can switch to a failure scenario running the critical applications, constructed from DG/UX scripts.

See figure one. The configuration has two AV 8000 chassis dual-ported to a single, 100% available H.A.D.A. cabinet. Users can access either server via an Ethernet LAN. Should one server fail, users would then be able to log on to the survivor. Inherent in AV 8000 packaging is the UPS for reliable AC power. This configuration allows optimum use of the hardware by the customer as well as quicker recovery to the backup scenario when system failure occurs.

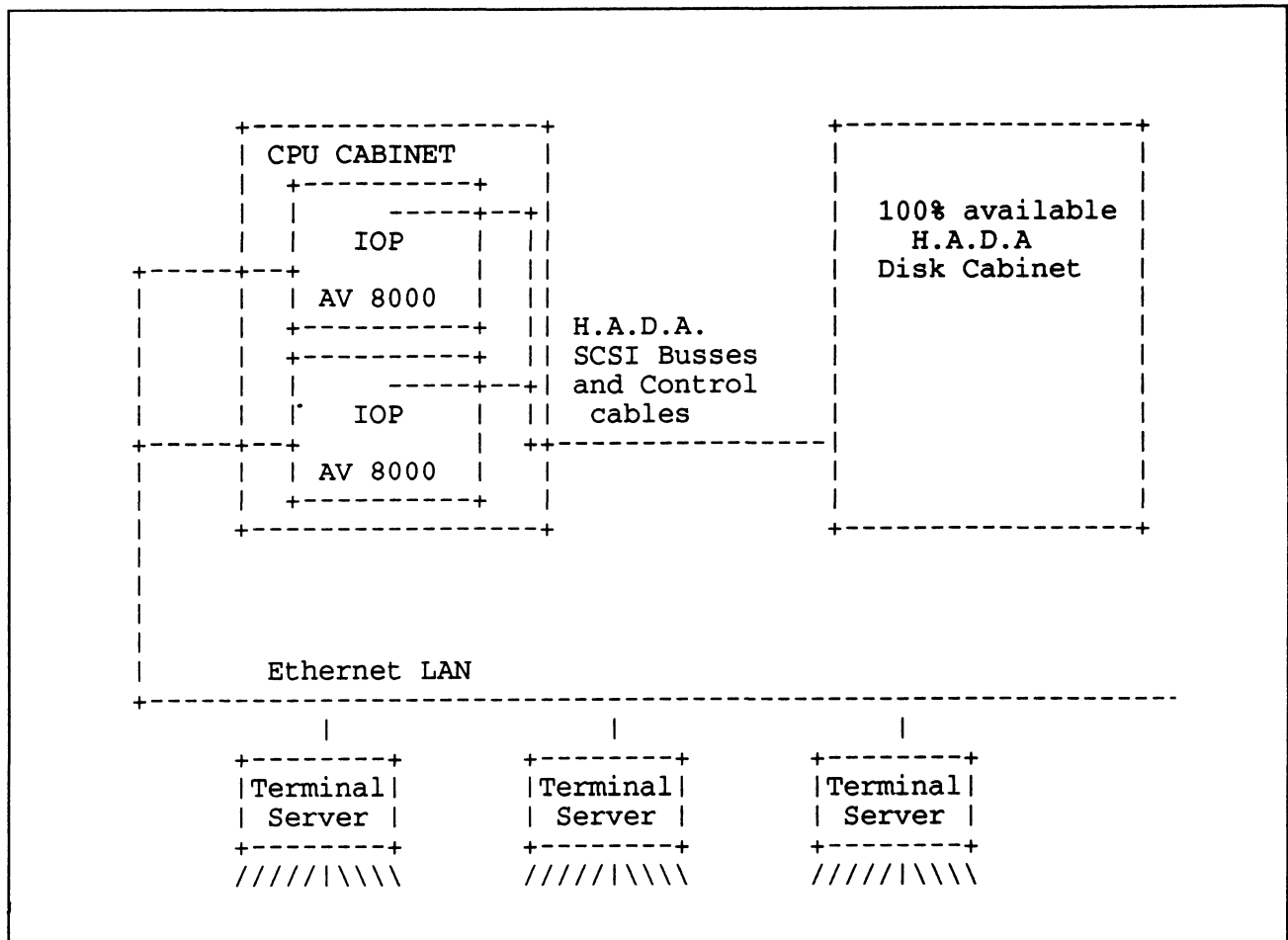


Figure one. Maximum availability, dual AV 8000, H.A.D.A. configuration

Configurations/Ordering

Four, easily ordered and configured packaged models plus four upgrade models are available. Note that packages with UPS are available in North America only. Packages without UPS are available worldwide. See following. The table below each package model number describes the content of each.

AV 7000, Model G 70334

<i>Component</i>	<i>Description</i>
70198	Quad 25 Mhz server in 10 slot office package
7152	64 MB memory board
7407	SCSI controller
6677-I	525 MB QIC tape
7417	Disk array IOP
15378E005	5' SCSI cable
6701	CSS2/DC chassis
6709	Second power supply for CSS2
6685-G	1.0 GB drives for CSS2 chassis (five)
10404-A	3 KVA UPS

AC power suffix: A(-) NORTH AMERICA ONLY

AV 7000, Model G 70335

<i>Component</i>	<i>Description</i>
70198	Quad 25 Mhz server in 10 slot office package
7152	64 MB memory board
7407	SCSI controller
6677-I	525 MB QIC tape
7417	Disk array IOP
15378E005	5' SCSI cable
6701	CSS2/DC chassis
6709	Second power supply for CSS2
6685-G	1.0 GB drives for CSS2 chassis (five)

AC power suffix: A(-,1,5,6,7,8,9,0)

AV 8000, Model G 70336

<i>Component</i>	<i>Description of component</i>
70299	Quad 25 Mhz CPU server, 20 slot RM chassis
7016	128 MB memory board
11226	72" cabinet with two 5-20R receptacles
7417-W	H.A.D.A. IOP
7608	H.A.D.A. cabinet with 15-drive chassis
6685-G	1.0 GB drives with hot repair (amount five)
15378E010	External cables for disk array (amount six)
7604	DC power chassis
7605	AC power chassis
6577-Z	150 MB QIC tape
6590-Z	2 GB cartridge tape
10432-DD	10 KVA UPS subsystem

AC power suffix: A(-) NORTH AMERICA ONLY

AV 8000, Model G 70337

<i>Component</i>	<i>Description of component</i>
70299	Quad 25 Mhz CPU server, 20 slot RM chassis
7016	128 MB memory board
11226	72" cabinet with two 5-20R receptacles
7417-W	H.A.D.A. IOP
7608	H.A.D.A. cabinet with 15-drive chassis
6685-G	1.0 GB drives with hot repair (amount five)
15378E010	External cables for disk array (amount six)
7604	DC power chassis
7605	AC power chassis
6577-Z	150 MB QIC tape
6590-Z	2 GB cartridge tape

AC power suffix: E(-) or F(2,4)

AV 5200 to AV 7000 Upgrade, Model G 7935

<i>Component</i>	<i>Description</i>
7417	Disk Array IOP
15378E005	5' SCSI cable
6701	CSS2/DC deskside chassis
6709	Second power supply for CSS2
6685-G	1.0 GB drive for CSS2 chassis (amount five)
10404-A	3 KVA UPS subsystem

AC power suffix: A(-) NORTH AMERICA ONLY

AV 5200 to AV 7000 Upgrade, Model G 7936

<i>Component</i>	<i>Description</i>
7417	Disk Array IOP
15378E005	5' SCSI cable
6701	CSS2/DC deskside chassis
6709	Second power supply for CSS2
6685-G	1.0 GB drive for CSS2 chassis (amount five)

AC power suffix: A(-,5,6,7,8,9,0)

AV 6200-20 to AV 8000 Upgrade, Model G 7937

<i>Component</i>	<i>Description</i>
7417-W	Disk array controller for 6200-20
7608	Disk array cabinet with 15 drive chassis
6685-G	1.0 GB disks with hot repair for array cabinet (amount five)
15378E010	External cables for disk array (amount six)
7604	DC power chassis
7605	AC power chassis
6577-Z	150 MB QIC tape drive
6590-Z	2 GB cartridge tape drive
10432-DD	10 KVA UPS

AC power suffix: G(7) NORTH AMERICA ONLY

AV 6200-20 to AV 8000 Upgrade,, Model G 7938

<i>Component</i>	<i>Description</i>
7417-W	Disk array controller for 6200-20
7608	Disk array cabinet with 15 drive chassis
6685-G	1.0 GB disks with hot repair for array cabinet (amount five)
15378E010	External cables for disk array (amount six)
7604	DC power chassis
7605	AC power chassis
6577-Z	150 MB QIC tape drive
6590-Z	2 GB cartridge tape drive

AC power suffix: F(7), G (7)

Related Information

<i>Part Number</i>	<i>Description</i>
046-001288	High Availability Disk Array MAPS/PLUS, p. 239-53 ff.
046-001287	Disk Array MAPS/PLUS, p. 232-41 ff.
046-001191-04	AV 5200, 6200 Servers MAPS/PLUS, p. 202-13 ff.
046-001028-01	UPS MAPS/PLUS, p. 289-17 ff
046-001274	AViiON Async Connectivity MAPS/PLUS, p. 271-121.1 ff.
012-3988	AV 7000 Product Brief
012-3986	AV 8000 Product Brief



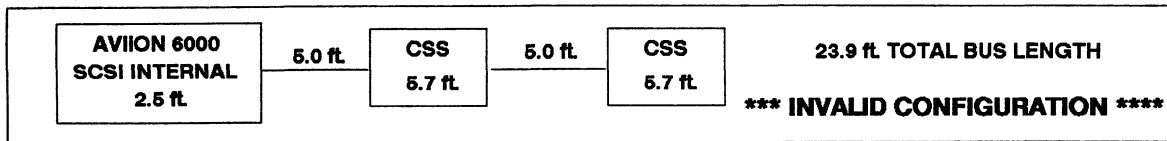
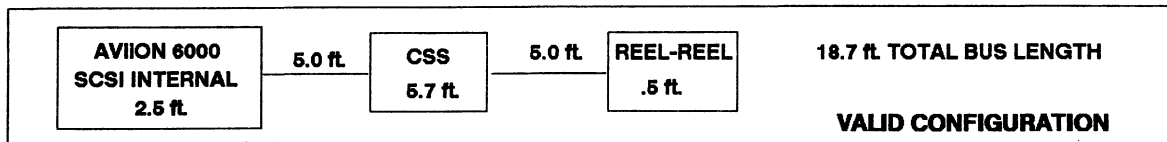
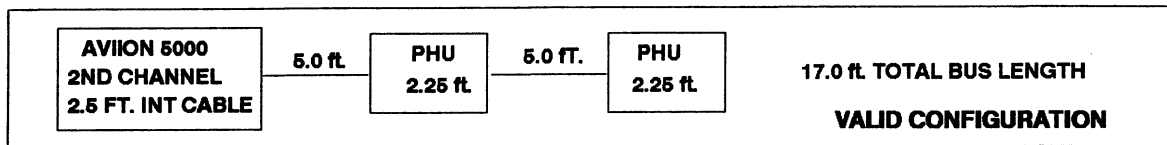
AViiON Server Configurations

The following illustrations are intended as a fast, handy guide to AViiON server configurations. They progress from entry-level systems to increasingly larger systems. In addition, there are configuration rules for SCSI channel devices, SMD disk subsystems, and the VDA/128 subsystem.

These illustrations are not all inclusive. Use the "AViiON 5000/6000 Servers" article (046-001191-01, page 202-13) as a reference.

Configuration Rules

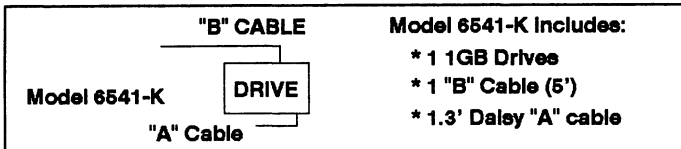
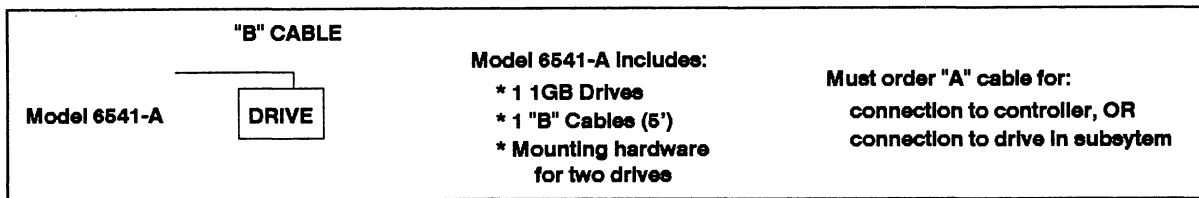
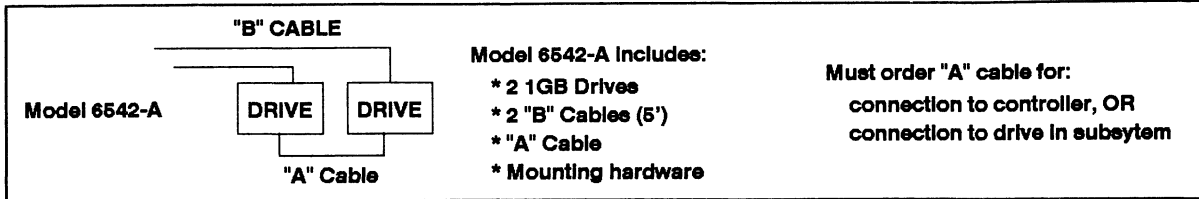
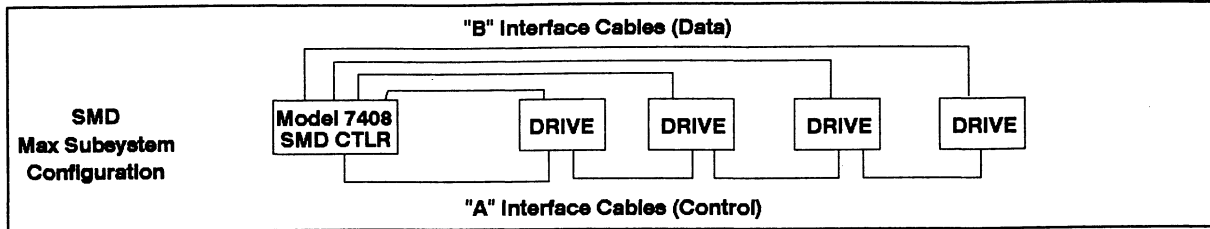
AViiON SERVER SCSI CONFIGURATIONS



MAXIMUM SCSI BUS LENGTH ON AViiON PRODUCTS= 19.6 FEET

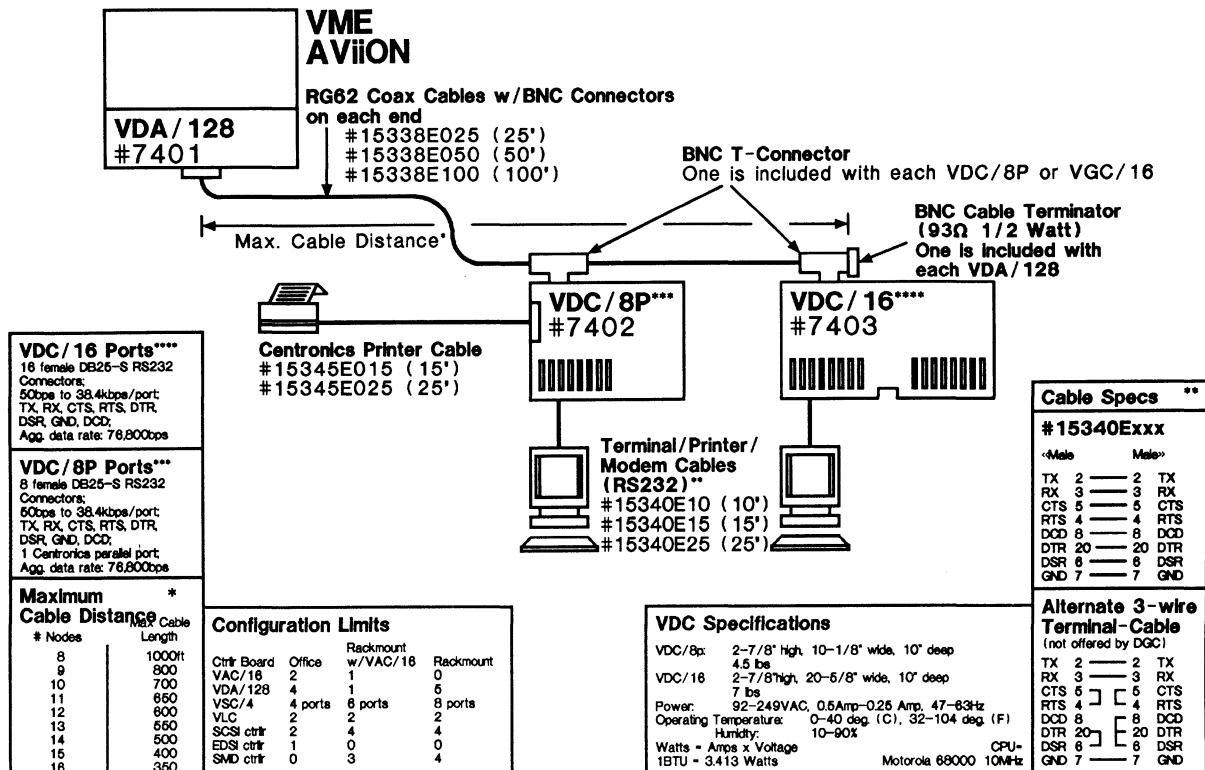
SCSI BUS LENGTH	
	FEET
AViiON 5000	
INTERNAL	10.5
2ND CHAN	2.5
AViiON 6000	
CSS CHASSIS	5.7
PHU	2.25
REEL TO REEL	.5

AViiON 6100 SMD Disk Subsystem Configuration Rules



**Total "A" Cable cannot exceed 100 feet
Individual "B" cable cannot exceed 50 feet**

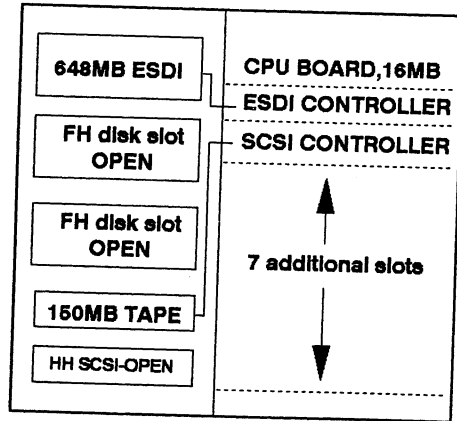
VME Distributed Async Configurations



AV/5100 Configurations

AViiON 5100 SERVER CONFIGURATION

16MB, 648MB ESDI DISK, 150MB CARTRIDGE TAPE

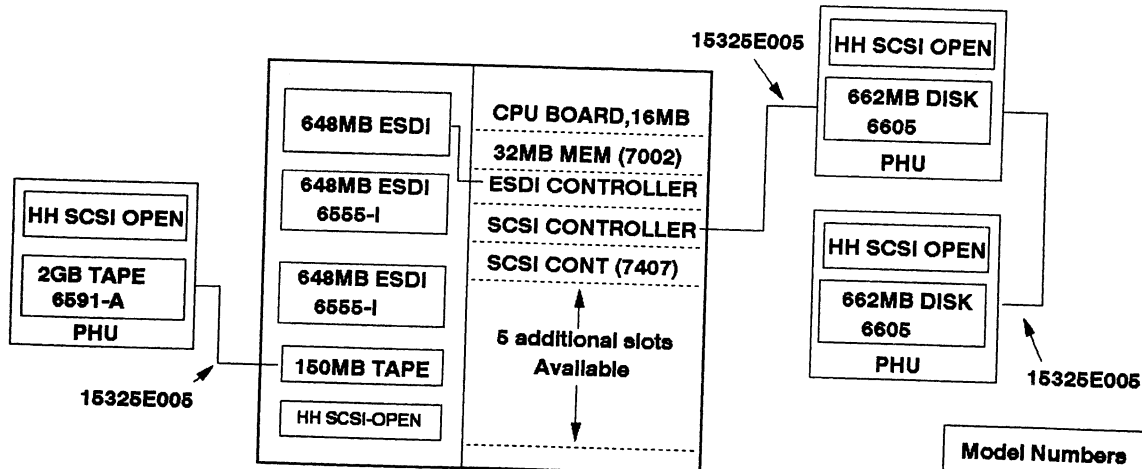


AV5100 OFFICE PACKAGING
24.75" HIGH
17.25" WIDE
25.5" DEEP

Model Numbers
G70041

AViiON 5100 SERVER CONFIGURATION

48MB, 1.9GB ESDI DISK, 150MB CARTRIDGE TAPE
EXTERNAL STORAGE IN PHU'S-- 1.3GB SCSI DISK, 2GB CARTRIDGE TAPE



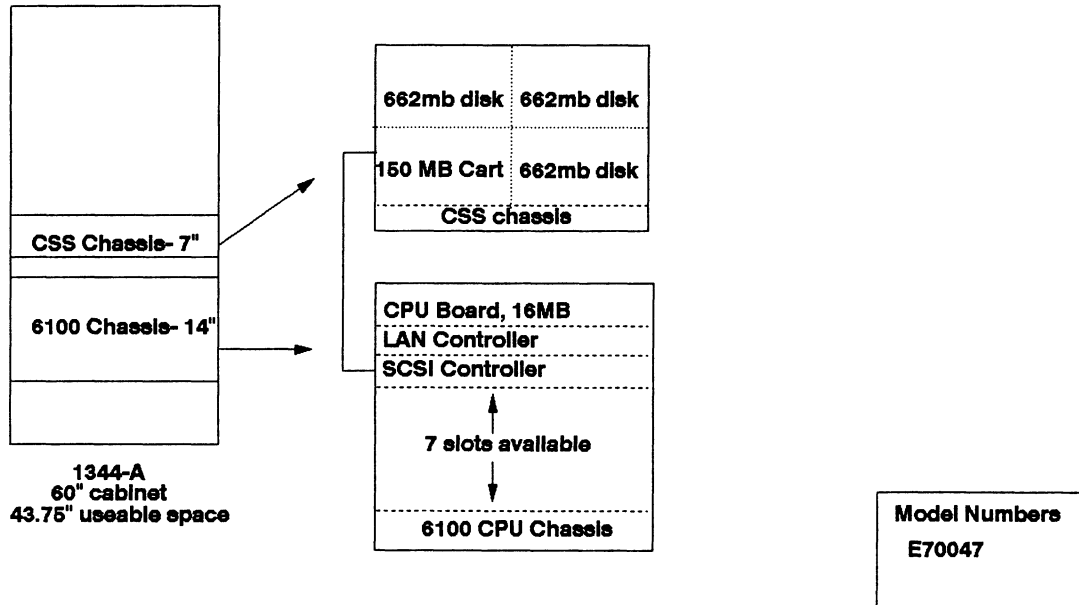
AV5100 OFFICE PACKAGING
24.75" HIGH
17.25" WIDE
25.5" DEEP

Qty	Model
1	70041
2	6555-I
1	6591-A
1	7002
1	7407
3	15325E005
2	6605

AV/6100 Configurations

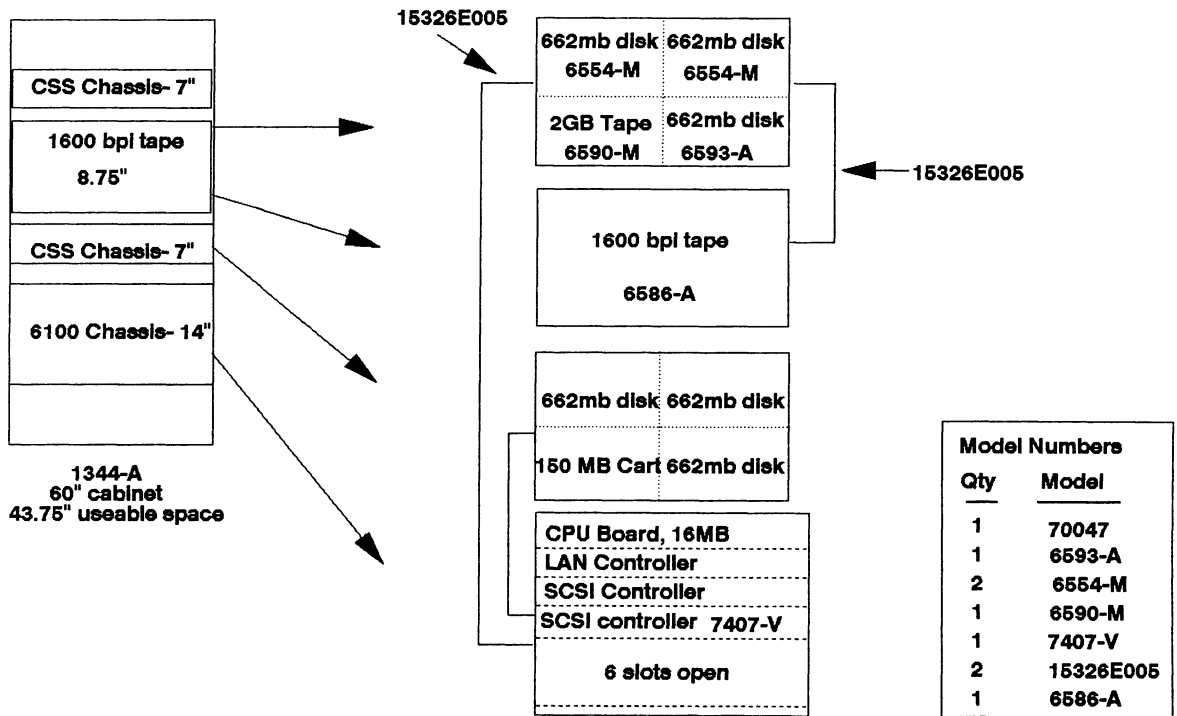
AViiON 6100 Server Configuration

16MB, 2GB SCSI disk, 150MB cartridge tape



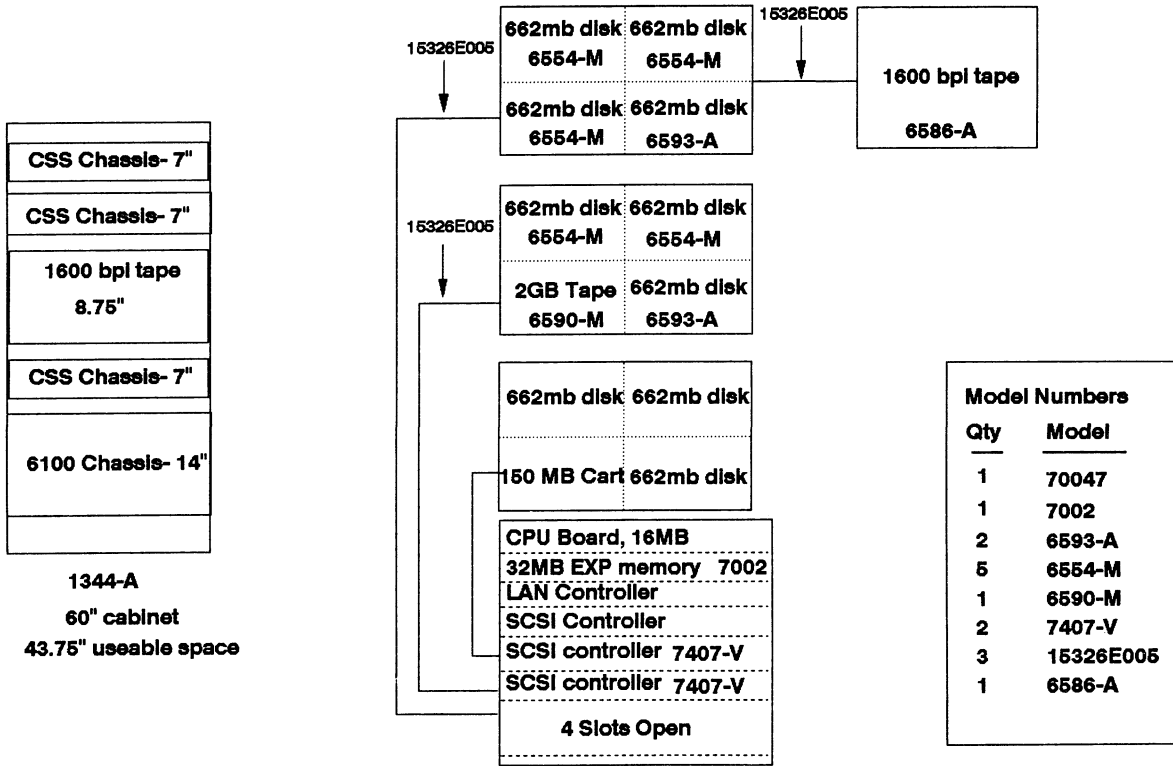
AViiON 6100 Server Configuration

16MB, 4GB scsi disk, 150MB tape, 2GB tape, 1600bpl tape



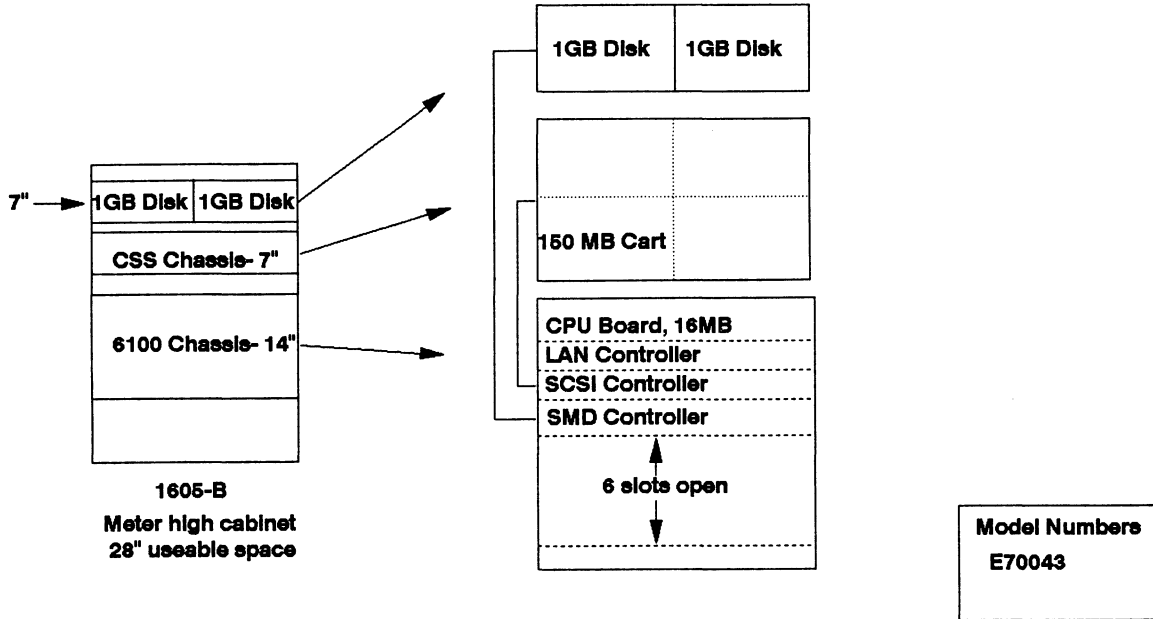
AViiON 6100 Server Configuration

49MB, 6.7GB ecdl disk, 150MB tape, 2GB tape, 1600bpl tape



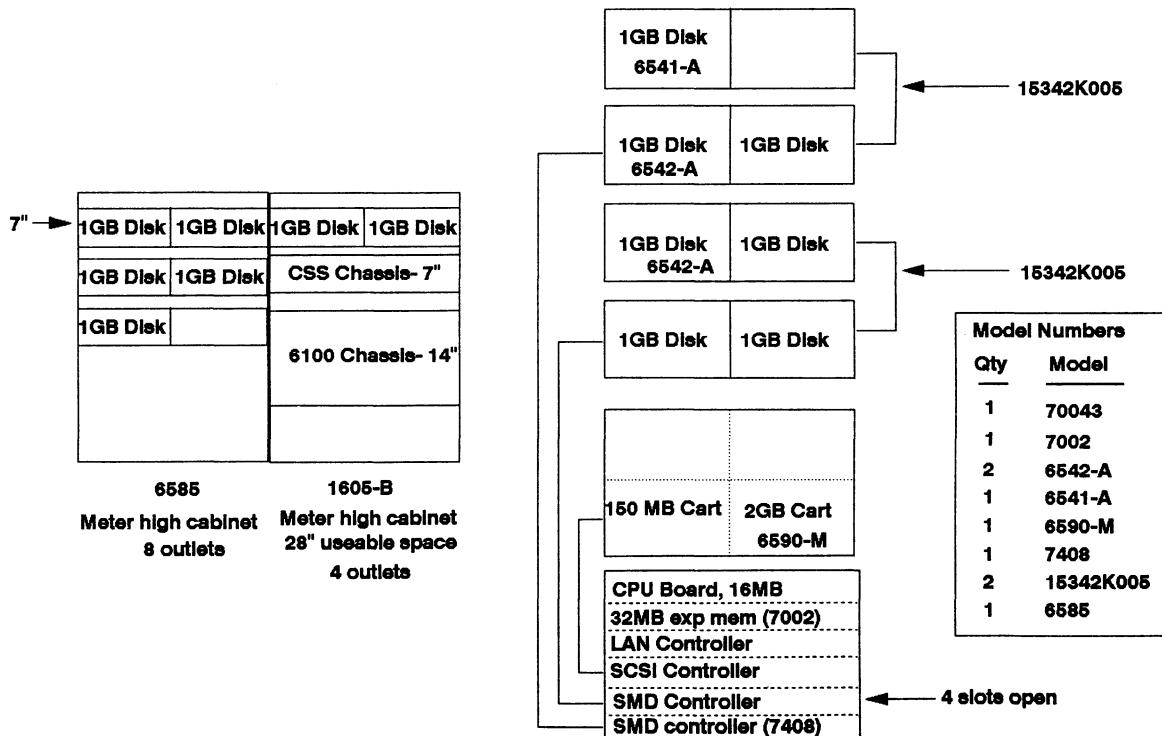
AViiON 6100 Server Configuration

16MB, 2GB SMD disk, 150MB Cartridge Tape



AViiON 6100 Server Configuration

48MB, 7GB SMD disk, 150MB Cartridge Tape, 2GB Cartridge Tape



AViiON 410 Workstations

Fact Sheet

This revision reflects deletion of 16MHz processors, and added support for 525 MB tape drives.

The AViiON 410 Series workstations extend the range of power and performance of the AViiON Workstation Family, offering advanced graphics features, industry standard I/O bus (VMEbus™), and a greater range of performance specifications. Housed in a compact desktide package with internal mass storage options, these single-user graphics workstations are designed for technical and commercial professionals who currently use traditional 32-bit high-end workstations. The AViiON 410 workstations are personal productivity tools manufactured by Data General that incorporate the Motorola 88K RISC (Reduced Instruction Set Computer) technology.

The AViiON 410 Series workstations offer advanced 32-bit stand-alone or distributed computing capabilities for single-

user graphics applications. The systems are designed around a single system board that contains the 88100 processor chip with floating point; two 88200 Cache and Memory Management Units (CMMU) for data and instruction bus (MBUS); interface logic to support Motorola's VMEbus (Revision C.1); two MBUS (MBUS is the AViiON workstation's internal high speed memory bus) connectors for the second CPU option, graphics options, and Z-Buffer option; the industry standard SCSI bus (Small Computer System Interface); integral 802.3 Ethernet; two RS232 asynchronous interfaces and a parallel printer interface. The graphics options are contained on three separate daughter boards that connect to the base system board's MBUS and provide 24-bit or 8-bit color graphics, and an optional 24-Bit Z-buffer.

Table 1 summarizes the major features of the AViiON 410 Series workstations.

Feature	Description
Complete single-board System functionality	Advanced single-user compute based on Motorola 88K RISC Processor running at 20 MHz clock speed. Tightly coupled, on-chip Floating Point Unit Two 88200 Cache and Memory Management Units (CMMU) for improved performance Dual processor option. Support for Symmetric Multiprocessing in DG/UX Advanced 32-bit RISC technology Hardware support for Motorola's VMEbus (Revision C.1). Two 6U VMEbus slots in a compact, internal card cage Attractive, compact desktide packaging (24.75 "H X 5.75 "W X 22 "D).
16 or 4 MB parity memory modules	Memory expansion capability of up to eight 16 MB memory modules, for a total of 128 MB. Integral disk and tape options—two full height 5 1/4 " devices or one full height and two half height 5 1/8 " devices Industry Standard SCSI interface for disk and tape (synchronous/asynchronous) Three-button optical mouse with pad PC/AT-101 compatible keyboards
Graphics	Choice of high performance, bit-mapped graphics with dedicated, dual ported display memory Color: 8/2 or 24/4 graphics controller High resolution, flicker-free 19" or 17" color monitors Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance Standard MIT distribution of X11 r4 or higher X Server, Xlib, X Toolkit, X Clients PHIGS and GKS support through third party ISVs Compatible with AViiON 310 Series graphics (8 bit only) OSF/Motif

Table 1. AViiON 400 Series features.

<i>Feature</i>	<i>Description</i>
Internal mass storage/ tape back-up	<p>Deskside chassis can hold two 5¼" Full Height devices; or one 5¼" Full Height device and two 5¼" Half Height devices; or four 5¼" Half Height devices. The supported devices are:</p> <ul style="list-style-type: none"> 2 GB Cartridge Tape Backup 5.25" FH SCSI 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 1.0 GB Winchester 5.25" FH SCSI 150 MB QIC150 Cartridge Tape 5.25" HH SCSI 525 MB QIC Tape 1.44 MB 3.5" Diskette Disk HH SA450/SCSI. 1.2 MB 5.25" Diskette Disk HH SA450/SCSI.
External mass storage/ tape back-up	<p>External PHU (Peripheral Housing Unit) can support up to seven SCSI devices. Each housing can hold one 5¼" Full Height device and one 5¼" Half Height device or three 5¼" Half Height devices. The supported devices are</p> <ul style="list-style-type: none"> 1.0 GB Winchester 5.25" FH SCSI 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 525 MB Cartridge Tape 5.25" FH SCSI 150 MB QIC Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI 1.2 MB 5.25" Diskette Disk HH SA450/SCSI 590 MB Eraseable 5.25" Optical Disk FH SCSI 600 MB CD-ROM 5.25" HH SCSI
Customer environment/use characteristics	<p>Customer installable Customer installable add-on memory, graphics options, second CPU option and peripherals 40db (quiet office) noise levels 90 day warranty on all system components</p>
Communications	<p>Ethernet interface standard (without transceiver or drop cable) Thick or Thin net connections available Two asynchronous, RS232C interfaces—from 150 to 19,600 baud Centronics compatible line printer port</p>

Table 1. (con't) AViiON 400 Series features.

Product Description

The AViiON 410 Series workstations are deskside systems that provide the power and performance of a mainframe in an extremely small, compact package—the main chassis housing is only 24.75"H X 5.75"W X 22"D. These workstations are available in a wide range of configurations and with options for expandable graphics, memory, mass storage, and multi-CPU configurations. The base system board is available in a 20 MHz performance range, and offers a second 20 MHz CPU option. Memory is expandable from 16 MB to 128 MB with 16 or 4 MB memory modules.

Architecture

Processor. The AViiON 410 Series Workstation is based on the 88000 series of RISC processors from Motorola. The 88000 series is comprised of the 88100 RISC CPU, and two 88200 cache/MMU (Memory Management Unit) chips.

System board. The AViiON 410 Series Workstation system board consists of a single 18" x 12" multilayer PCB that includes

- a 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- a closely coupled, integrated floating point unit
- eight connectors capable of holding up to eight 16 MB memory modules
- two MBUS connectors for connecting the second CPU or graphics options
- interface logic that supports Revision C.1 of the VMEbus
- industry standard SCSI interface for connecting peripherals such as disk and tape
- industry standard 802.3 Ethernet Interface (w/o transceiver)
- keyboard interface—AT-compatible and Japanese AX-compatible
- mouse interface
- two asynchronous interfaces—RS232 with one offering full modem support
- parallel line printer interface (Centronics-compatible)
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot.

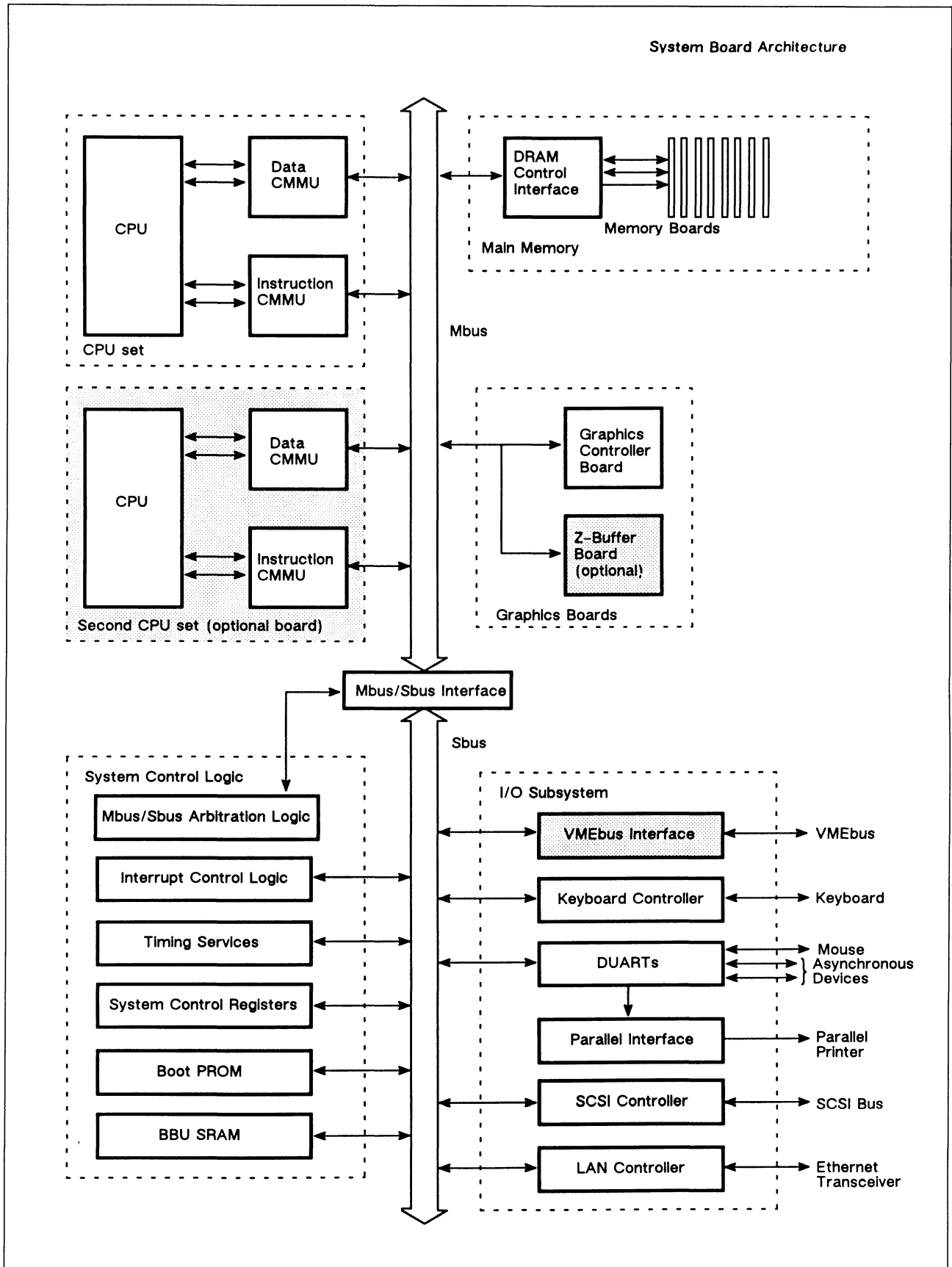


Figure 1. System Block Diagram

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, its use of the Eurocard format, its high performance, and its versatility are some of the reasons that it appeals to a wide range of users. The AViiON 410 Series systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price.

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in a closely coupled hardware configuration. The VMEbus specification on the AViiON 410 systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of both the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.

The VMEbus specification provides for a mechanical as well as an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane: the connectors are 96-pin female type, and in the AViiON 410, a separate 6U backplane provides two slots, each slot consisting of two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master. VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 410, the design allows for more than one Master.

On the AViiON 410, the internal high speed system bus is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Table 2 details the C.1 interface specifications and options and the level of implementation on the AViiON 410.

<i>Specification</i>	<i>Options</i>
Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT. A32, A24 Address only cycle RMW Block transfer supported Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock The IACK and VMEbus grant daisy chain driver The VMEbus/MBUS and MBUS/VMEbus time out logic are programmable The VMEbus arbitration time out logic 1 sec VMEbus watchdog timer (64 micro-sec.)
Type of VMEbus Arbiter:	All types selectable
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C1 Interface specifications and options

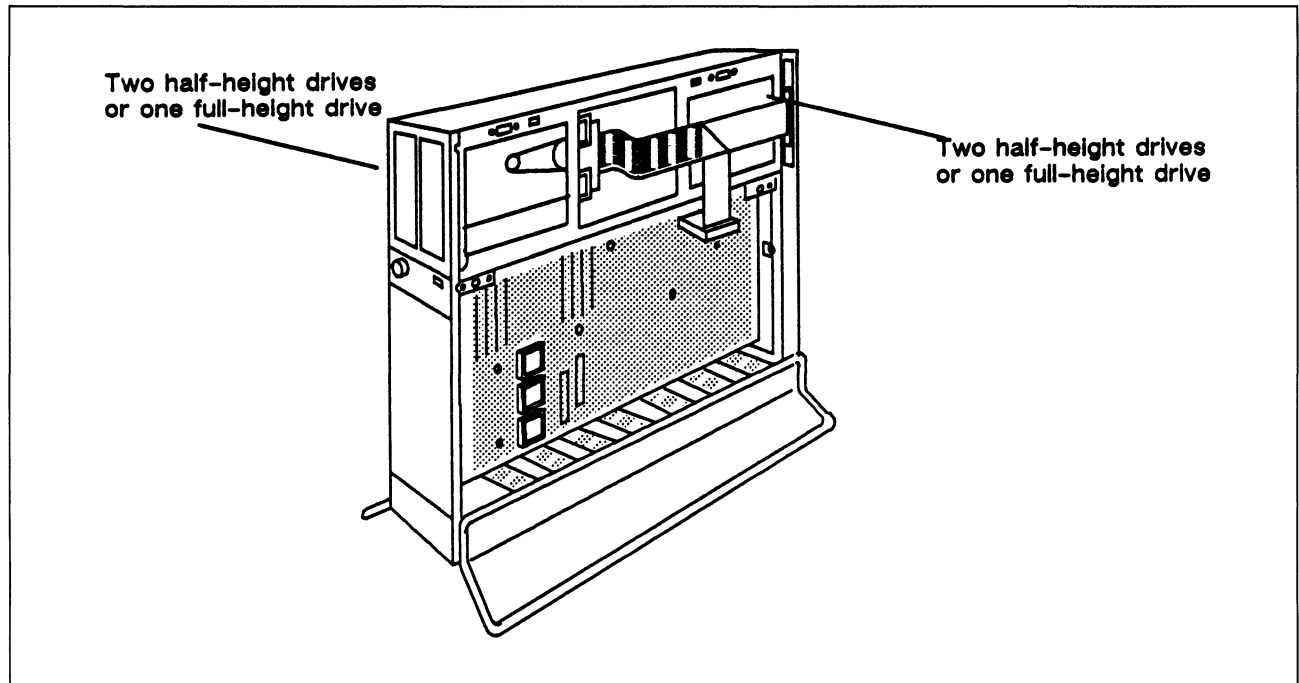


Figure 2. AV410 Internal Peripheral Configuration

Peripherals

The AViiON 410 Series Workstation has a SCSI bus for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices, then exits via the rear of the unit and terminates in a Champ connector for external Peripheral Housing Units.

In the main deskside chassis, space is available for two 5¼" Full Height devices or one 5¼" Full Height device and two 5¼" Half Height devices. Up to seven SCSI devices can be supported through the external PHU.

All external Data General peripherals for the AViiON 410 Series Workstation are mounted in the desktop PHU, which can accommodate a variety of storage and backup options. These options include

- a 1.0 GB 5½" Full Height Winchester disk
- a 662 MB 5¼" Full Height Winchester disk with 16 ms access time,
- 332 MB 5¼" Half Height Winchester disk with 14 ms seek time,
- 5¼" Half Height 150 MB QIC tape drive
- 525 MB cartridge tape drive
- a 179 MB 5¼" Half Height Winchester Disk with 18 ms access time.
- 600 MB CD ROM Half Height
- 590 MB Erasable Optical Disk Full Height

Each PHU can accommodate one full height and one half height units or three half height units.

In addition to the standard storage devices, Data General offers two diskettes; 1.44 MB 3.5" half-height and 1.2 MB 5.25" half-height. These diskettes offer industry standard format and compatibility with existing MS-DOS environments. The 1.44 MB diskette can read, write and format data in the 720KB diskette format. The 1.2 MB diskette is also read, write and format compatible with the 360KB diskette format. These diskettes have an interface called the SA450 which must be converted to the SCSI interface (a small converter board is packaged with the diskette). Mounted within the AViiON 410 chassis, the converter board can support up to two diskettes. When configured with the external PHU, the converter board can support up to two diskettes. The diskettes are available either with or without the converter board, but for use with the AViiON 310 or 410 systems, the first diskette must contain the converter board.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 410 Series chassis consumes 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, which will support configurations of up to two additional PHUs per workstation. The PHU contains a 125 watt power supply, internal fan, internal cabling (2.3 ft), and SCSI Bus terminator. The first SCSI cable from the chassis to the first PHU is different than the one used on the AV310 workstations.

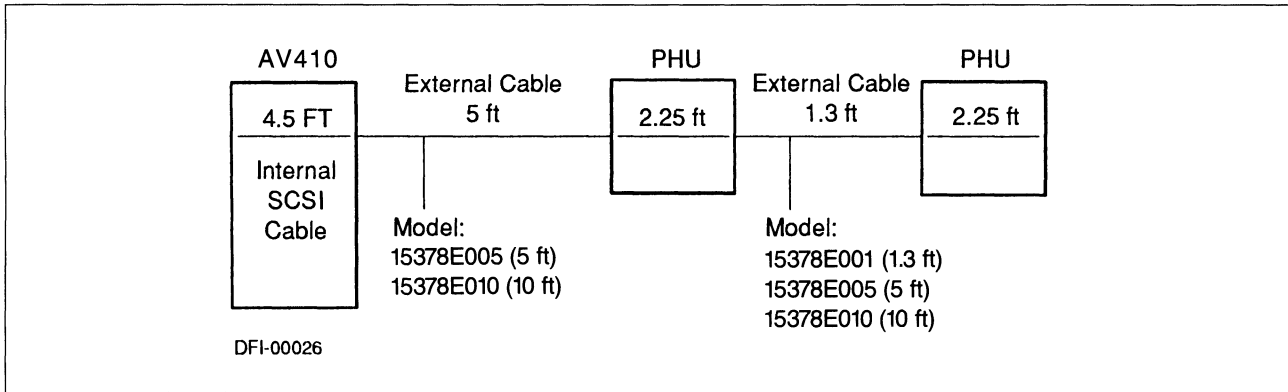


Figure 3. SCSI Cable length configurations

Graphics Hardware

Graphics hardware for the AViiON 410 Series Workstation consists of either an 8-bit or 24-bit color controller contained on separate daughter cards that mount on the main system board through a 96 pin MBUS connector for maximum performance. The Z-buffer option is a separate daughter card that plugs into the graphics board.

8-Bit Color. The 8-bit color unit consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The design of the 8-bit color controller is compatible with the AViiON 310 Series 8-bit color controller (see Figure 4). The 8-bit color controller includes

- sixty 256K dual ported video RAMS
- video timing logic
- color Look Up Table (LUT) for 256 displayable colors from a palette of 16.7 million combinations for the 8-bit color
- one 256-location LUT
- addressable resolution of 1536 X 1024
- double buffering: 2 x 4 Planes (16 colors displayable)
- 2-bits for overlay
- flat or Gouraud shading.

24-Bit Color. The 24-bit color unit consists of three special high density gate arrays for the display and control of the video display and video memory for the frame buffer (see Figure 5). The 24-bit color controller includes

- fifty-six 1 MB dual ported video RAMS
- Video timing logic
- color Look Up Table (LUT) for 16.7 million displayable colors from a palette of 16.7 million combinations for true color representation
- three 256-location LUTs
- addressable resolution of 2048 X 1024
- 4-bits for overlay
- double buffering: 2 x 12 plane (4096 colors displayable)
- flat or Gouraud shading

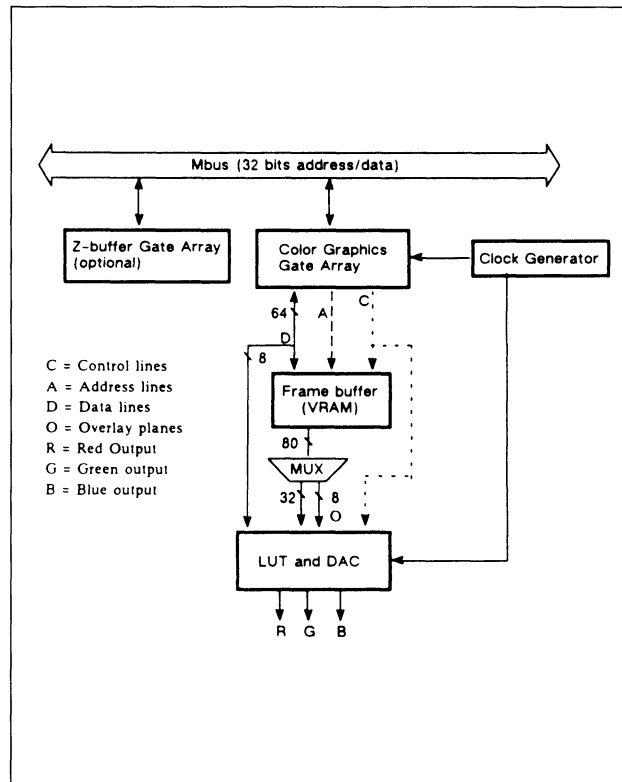


Figure 4. 8-Bit Color Graphics Subsystem

24-Bit Z-Buffer. The Z-Buffer option consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The 24-Bit Z-Buffer option provides greater accuracy and picture quality (than commonly used 16-Bit Z-Buffers) in performing hidden line and hidden surface removal. The Z-Buffer includes

- 256KB X 4 DRAMS
- programmable Hither and yon clipping planes

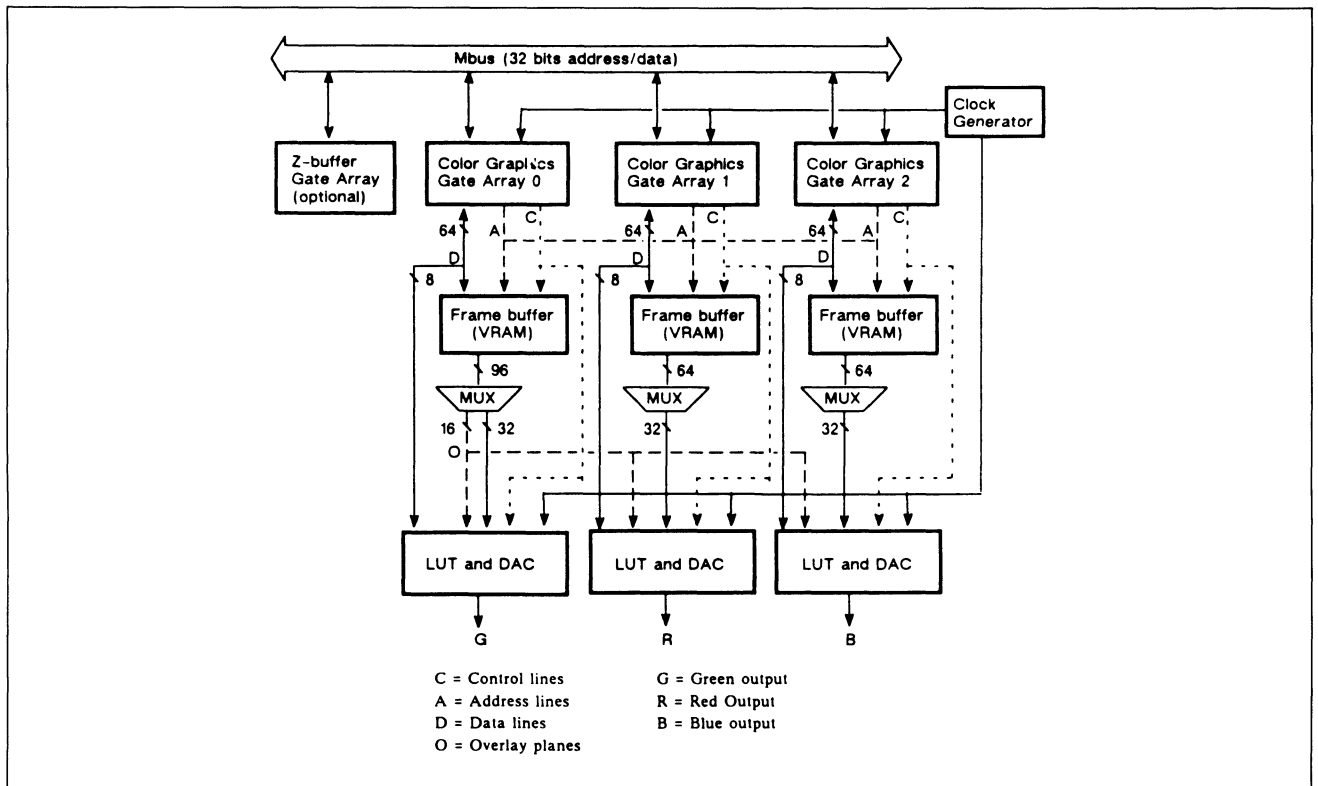


Figure 5. 24-bit Color Graphics Subsystem

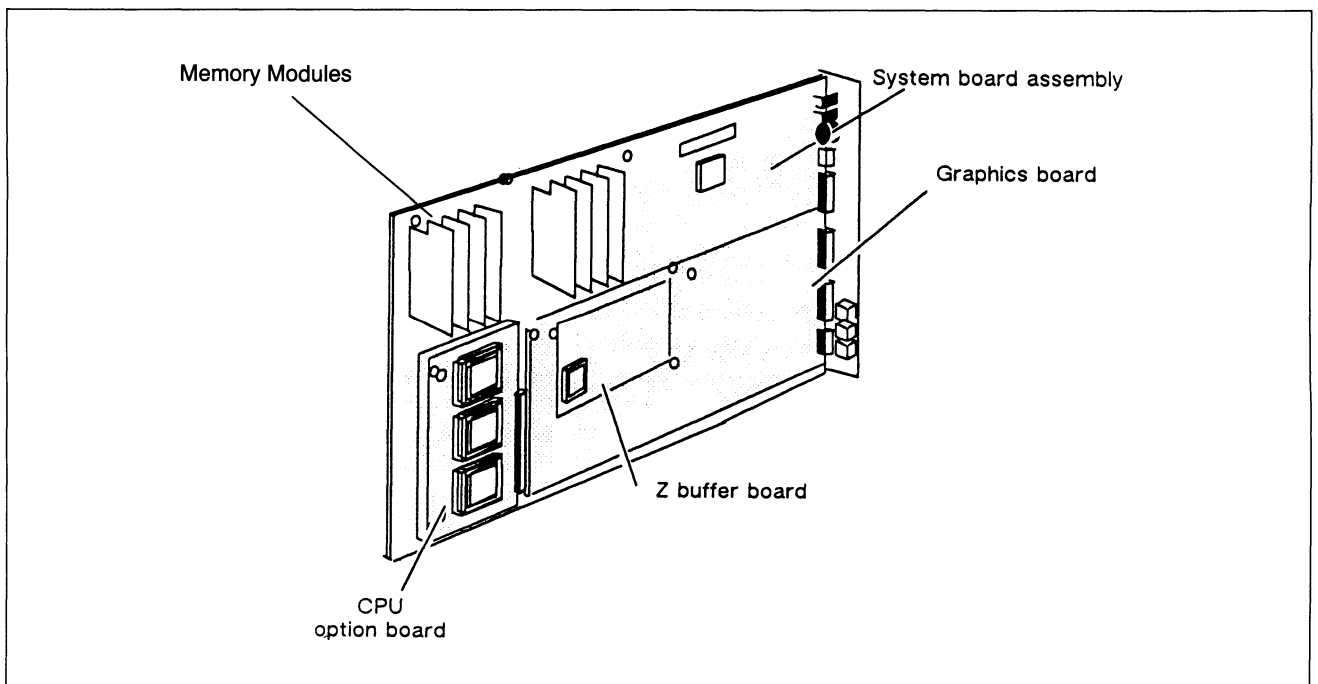


Figure 6. Graphics Options Diagram

Japanese Language Support. The color units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard, the AViiON 410 Series Workstation allows customers to use the workstation for Japanese applications and environments.

Ordering

The AViiON 410 Series Workstations are offered as individual Base Packages with or without peripherals, an arrangement that allows for greater flexibility in configurations and ordering (see Tables 3 - 9). Two graphics packages add keyboard, mouse, graphic controller and monitor. In addition, the open architecture design of the workstations allows customers to use keyboards and external peripherals that are compatible with the different industry standards supported. For example, the keyboard controller supports either AT-compatible or Japanese AX-compatible keyboards, and the SCSI interface supports SCSI-compatible peripherals.

Each system board includes:

- a 20 MHz CPU,
- hardware support for industry standard VMEbus (through the use of connectors on the system board),
- integral Ethernet LAN interface (IEEE 802.3),
- Small Computer Standard Interface (SCSI) for high performance I/O,
- two RS-232C async ports, and
- one parallel printer port (Centronix compatible)

The Graphics Packages includes:

- 3-button optical mouse,
- keyboard,
- a 19" color monitor, and
- either an 8-plane or a 24-plane graphics controller.

Systems ordered with DG/UX and a disk have the operating system installed on the disk. Media and documentation must be ordered separately.

In configurations that include a disk but no tape drive, media (the tape with the operating system) will not be shipped with the system, as the operating system is pre-loaded on the disk. This could pose a problem with a system installed in a network on non-Data General systems. The operating system will be pre-loaded at the factory but in the event of a disk malfunction, it would be difficult to reload the operating system without the media.

NOTE: A transceiver (model 4540, 4540-A OR 4619) and drop cable (model 1329) are necessary for the workstation to be connected to an Ethernet LAN.

<i>Model Number</i>	<i>Description</i>
G70344	16MB, 20 MHz Base System
G70348	16MB, 20 MHz Base System, 332 MB Disk
G70350	16MB, 20 MHz Base System, 662 MB Disk

Table 3. Packaged Base System—without graphics, monitor, keyboard or mouse

<i>Model Number</i>	<i>Description</i>
7206	19" monitor, 8-Bit color Controller
7208A	19" monitor, 24-Bit color Controller

Table 4. Graphics Package—includes keyboard, mouse, graphics controller and monitor

<i>Model Number</i>	<i>Description</i>
7202	8-Bit Color Controller
7203A	24-Bit Color Controller
7204	Optional 24-bit Z-buffer

Table 5. Board Level Components

<i>Model Number</i>	<i>Description</i>
7014	16 MB Memory Package
7000	4 MB Memory Module
G6487	19" Color Monitor
7008	Second CPU upgrade 20 MHz
4512	3 Button Optical Mouse
G6488	101/102 key AT-Style keyboard— REQUIRES LANGUAGE SUFFIX

Table 6. Options

<i>Model Number</i>	<i>Description</i>
-A	US
-B	UK
-C	French
-D	German
-S	Japanese AX-compatible (AX is the international standard for the Japanese Language)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish/Norwegian

Table 7. Language Suffix for Keyboard

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver (Teflon)
15274E002	5 foot Ethernet drop cable for connecting workstation to transceiver (PVC)

Table 8. Ethernet options.

Mass Storage Notes

Processor Chassis Mass Storage Configuration:

- The processor chassis contains four Half-Height (HH) apertures which support 4 HH devices, OR 2 HH and 1 Full-Height (FH) device.
- 2 HH apertures in the front of the chassis support media load and fixed disk devices.
- 2 HH apertures in the rear of the chassis support 2 HH OR 1 FH fixed disk only.

<i>Model Number</i>	<i>Description</i>
Fixed Disk	
6539-F	179MB (HH) Internal disk add-in
G6662-F	332MB (HH) internal disk add-in
6554-F	662MB (FH) internal disk add-in
G6685-F	1.0GB (FH) internal disk add-in
Cartridge Tape	
G6577-F	150MB (HH) QIC tape add-in
G6677-F	320/525MB (HH) QIC tape add-in
G6591-F	2GB 8MM (FH) cartridge tape add-in
Floppy Diskette	
G6563-F	1.2MB 5.25" (HH) diskette w/SCSI converter board
G6563-FX	1.2MB 5.25" (HH) diskette add-on drive
G6562-F	1.44MB 3.5" (HH) diskette w/SCSI converter board
G6562-FX	1.44MB 3.5" (HH) diskette add-on drive
CD ROM	
G6629-F	600MB (FH) CD ROM add-in drive

Table 9. Mass storage devices installed in the processor chassis.

Interface Converter Board Support:

- Each floppy disk interace converter board supports two floppy drives and is counted as one SCSI device.
- To support a -FX drive, the associated -F drive (drive with interface converter) must be configured. 1.44MB and 1.2MB floppy disks may be intermixed on DG/UX Revision 4.3 or greater.

AV 410 packages will have the *bundled fixed disk* configured in the rear section.

DG/UX is only available in -A media. 2GB 8MM cartridge tape, floppy diskettes, and 600MB CD ROM are not supported as cold boot devices. This media type is supported on 150MB and 320/525MB QIC tape drives. If not configuring QIC tape drives in the processor chassis, cold boot support should be configured in an external peripheral chassis such as the Peripheral Housing Unit or Combined Storage Subsystem 2/DC.

Subtract apertures utilized by peripherals bundled under the packaged models, to determine remaining chassis space for support of add-in internal peripherals.

In addition, the AV410 power supply provides the following power for the system boards and peripherals mounted within the chassis. The desktop Peripheral Housing Unit supplies its own power. When configuring systems, subtract the power

for each component from the total power supplied. This is important for systems which have the maximum number of graphics options, memory, disk and tapes installed if third party VME boards are to be installed.

BOARD/POWER	+5V 37 amps		-12V 1.0 amp		+12V 10 amps		+9V 1.0 amp	
	typ	max	typ	max	typ	max	typ	max
SYSTEM BD 20	14.5	14.5		0.1		0.2		
2ND CPU 20	0.6	1.0						
4 MB MEMORY	0.1	0.2						
8-BIT COLOR	1.1	2.5						
24-BIT COLOR	2.5	4.7						
Z-BUFFER	0.4	1.1						
1.0 GB DISK	2.0	2.0			2.5	4.0		
662 MB DISK	0.6	0.7			1.5	2.0		
332 MB DISK	2.0	2.0			2.25	3.3		
179 MB DISK	1.0	1.3			.9	4.5		
150 MB TAPE	.5	.7			1.5	2.5		
2 GB TAPE	2.02	2.7			.41	.5		
1.44 MB FPY	0.65	1.2						
1.2 MB FPY	0.3	0.5			0.22	0.1		
SCSI/SA450 Con	0.1	0.1			0.22	0.1		

Table 10. AV410 Power Supply.

The AViiON 410 Series Workstation will also operate with any DG/UX supported general purpose printer.

To Order Workstations:

1. Select the package that best meets your needs. This will consist of a Base Package with a Graphics Package. Add the appropriate suffix for font and power.
2. Fill out the Program License Schedule 501 and purchase order. Remember to itemize each operating system license.
3. Order the appropriate software distribution and services' packages.

Related Information

See Table 11.

<i>Document Description</i>	<i>Model Number</i>
Using System Diagnostics (RBOS)	014-001863
Setting Up, Starting, Expanding and Maintaining AViiON 400 Series	014-001859
Setting Up and Installing VMEbus options in AViiON	014-001867
Installation Road Map	069-701084
Guide to AViiON and DG/UX System Documentation	069-701085

Table 11. Related Information

Specifications

Processor:
 Motorola 88100
 20 MHz 88100 processor with integral FPU Single-
 or dual-processor options

Memory Management:
 Virtual memory
 Two 88200 CMMUs/CPU; 4 GB per process

Caches:
 Data cache and instruction cache
 Size: 16 KB per side
 Organization: 4-way set associative

Main Memory:
 16 MB—128 MB with parity
 Expansion: 4-MB or 16 MB modules
 Busses: 32-bit memory-to-cache; 32-bit
 cache-to-processor

Integrated I/O:
 LAN—ETHERNET
 IEEE 802.3
 Bandwidth: 10 Mbits/sec
 Parallel Port
 Centronics-compatible
 Two Serial Ports
 RS-232 (one with modem control); baud rates up to
 19.2 kilobaud
 SCSI
 Asynchronous/Synchronous

VMEbus Backplane:
 Motorola's VMEbus Revision C.1
 IEEE P1014 Draft 1.2
 Two 6U slots

Graphics Processor:
 8-plane gray-scale or color
 24-plane color
 24-bit Z-buffer

Monitors:
 Pixel aspect ratio
 1:1.
 Refresh Rate
 70 Hz, flicker-free 19" non-interlaced
 Pixel Rate
 125 MHz
 Controls
 Brightness, contrast

8-plane Color Monitor:

Monitor Format	19" landsc.
Displayable Res.	1280x1024
Addressable Res.	1536x1024
Colors Display	
Single Buffered	256
Double Buffered	16
Color LUT	1 x 256
Color Palette	16.7 million
Overlay Planes	2
Z-buffer	24-bit

24-plane color

Monitor Format	19" landsc.
Displayable Res.	1280x1024
Addressable Res.	1536x1024
Colors Display	
Single Buffered	True color
Double Buffered	4096
Color LUT	3 x 256
Color Palette	16.7 million
Overlay Planes	4
Z-buffer	24-bit

User Interface

Keyboard
 Style: 101/102-key PC-AT compatible
 Available versions: French, German, Italian,
 Japanese, Spanish, Swedish, UK, US

Mouse
 3-button optical

Environmental:

Temperature
 Operating/Nonoperating: 0 - 38°C / -40 - 70°C

Relative Humidity
 Operating/Nonoperating: 0 - 80% / 10 - 90%

Electrical

AC Voltage:	120V nominal (85-138 VAC) 220V nominal (187-276 VAC)
AC Frequency:	47 - 63 Hz
Current draw:	8 amps at 120Vrms 5 amps at 220Vrms
Power Supply:	325 Watts

Physical:

Dimensions:
 24.75" high x 5.75" wide by 22" deep

Weight:

System Chassis:	59 lbs. fully loaded (with disks and tape)
Monitor:	approx. 60 lbs.



AViiON 400 Workstations

Fact Sheet

This revision reflects the addition of the 24/4 graphics controller, 16 MB memory modules and additional mass storage.

The AViiON 400 Series workstations extend the range of power and performance of the AViiON Workstation Family, offering advanced graphics features, industry standard I/O bus (VMEbus™), and a greater range of performance specifications. Housed in a compact deskside package with internal mass storage options, these single-user graphics workstations are designed for technical professionals who currently use traditional 32-bit high-end workstations. The AViiON 400 workstations are the second in a series of personal productivity tools manufactured by Data General that incorporate the Motorola 88K RISC (Reduced Instruction Set Computer) technology.

The AViiON 400 Series workstations offer advanced 32-bit stand-alone or distributed computing capabilities for single-

user graphics applications. The systems are designed around a single system board that contains the 88100 processor chip with floating point; two 88200 Cache and Memory Management Units (CMMU) for data and instruction bus (MBUS); interface logic to support Motorola's VMEbus (Revision C.1); two MBUS (MBUS is the AViiON workstation's internal high speed memory bus) connectors for the second CPU option, graphics options, and Z-Buffer option; the industry standard SCSI bus (Small Computer System Interface); integral 802.3 Ethernet; two RS232 asynchronous interfaces and a parallel printer interface. The graphics options are contained on three separate daughter boards that connect to the base system board's MBUS and provide 24-bit or 8-bit color graphics, and an optional 24-Bit Z-buffer.

Table 1 summarizes the major features of the AViiON 400 Series workstations.

<i>Feature</i>	<i>Description</i>
Complete single-board System functionality	Advanced single-user compute based on Motorola 88K RISC Processor running at either 16.67 or 20 MHz clock speed. Tightly coupled, on-chip Floating Point Unit Two 88200 Cache and Memory Management Units (CMMU) for improved performance Dual processor option. Support for Symmetric Multiprocessing in DG/UX Advanced 32-bit RISC technology Hardware support for Motorola's VMEbus (Revision C.1). Two 6U VMEbus slots in a compact, internal card cage Attractive, compact deskside packaging (24.75"H X 5.75"W X 22"D).
16 or 4 MB parity memory modules	Memory expansion capability of up to eight 16 MB memory modules, for a total of 128 MB. Integral disk and tape options—two full height 5¼" devices or one full height and two half height 5½" devices Industry Standard SCSI interface for disk and tape (synchronous/asynchronous) Three-button optical mouse with pad PC/AT-101 compatible keyboards
Graphics	Choice of high performance, bit-mapped graphics with dedicated, dual ported display memory Color: 8/2 or 24/4 graphics controller High resolution, flicker-free 19" or 17" color monitors Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance Standard MIT distribution of X11 r4 or higher X Server, Xlib, X Toolkit, X Clients PHIGS and GKS support through third party ISVs Compatible with AViiON 300 Series graphics (8 bit only) OSF/Motif

Table 1. AViiON 400 Series features.

<i>Feature</i>	<i>Description</i>
Internal mass storage/ tape back-up	<p>Deskside chassis can hold two 5¼" Full Height devices; or one 5¼" Full Height device and two 5¼" Half Height devices; or four 5¼" Half Height devices. The supported devices are:</p> <ul style="list-style-type: none"> 2 GB Cartridge Tape Backup 5.25" FH SCSI 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 1.0 GB Winchester 5.25" FH SCSI 150 MB QIC150 Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI. 1.2 MB 5.25" Diskette Disk HH SA4 50/SCSI.
External mass storage/ tape back-up	<p>External PHU (Peripheral Housing Unit) can support up to seven SCSI devices. Each housing can hold one 5¼" Full Height device and one 5¼" Half Height device or three 5¼" Half Height devices. The supported devices are</p> <ul style="list-style-type: none"> 1.0 GB Winchester 5.25" FH SCSI 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 150 MB QIC Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI 1.2 MB 5.25" Diskette Disk HH SA450/SCSI 590 MB Eraseable 5.25" Optical Disk FH SCSI 600 MB CD-ROM 5.25" HH SCSI
Customer environment/use characteristics	<p>Customer installable and maintainable Customer installable add-on memory, graphics options, second CPU option and peripherals 40db (quiet office) noise levels 90 day warranty on all system components</p>
Communications	<p>Ethernet interface standard (without transceiver or drop cable) Thick or Thin net connections available Two asynchronous, RS232C interfaces—from 150 to 19,600 baud Centronics/Data Products compatible line printer port</p>

Table 1. (con't) AViiON 400 Series features.

Product Description

The AViiON 400 Series workstations are deskside systems that provide the power and performance of a mainframe in an extremely small, compact package—the main chassis housing is only 24.75"H X 5.75"W X 22"D. These workstations are available in a wide range of configurations and with options for expandable graphics, memory, mass storage, and multi-CPU configurations. The base system board is available in 16.67 or 25 MHz performance range, and offers two second CPU options of 16.67 or 20 MHz. Memory is expandable from 8 MB to 128 MB with 16 or 4 MB memory modules.

Architecture

Processor. The AViiON 400 Series Workstation is based on the 88000 series of RISC processors from Motorola. The 88000 series is comprised of the 88100 RISC CPU, and two 88200 cache/MMU (Memory Management Unit) chips. For more information, see the AViiON 300 Series MAPS/PLUS article on page 202-3.

System board. The AViiON 400 Series Workstation system board consists of a single 18" x 12" multilayer PCB that includes

- a 16.67 or a 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- a closely coupled, integrated floating point unit
- eight connectors capable of holding up to eight 16 MB memory modules
- two MBUS connectors for connecting the second CPU or graphics options
- interface logic that supports Revision C.1 of the VMEbus
- industry standard SCSI interface for connecting peripherals such as disk and tape
- industry standard 802.3 Ethernet Interface (w/o transceiver)
- keyboard interface—AT-compatible and Japanese AX-compatible
- mouse interface
- two asynchronous interfaces—RS232 with one offering full modem support
- parallel line printer interface (Centronics-compatible)
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot.

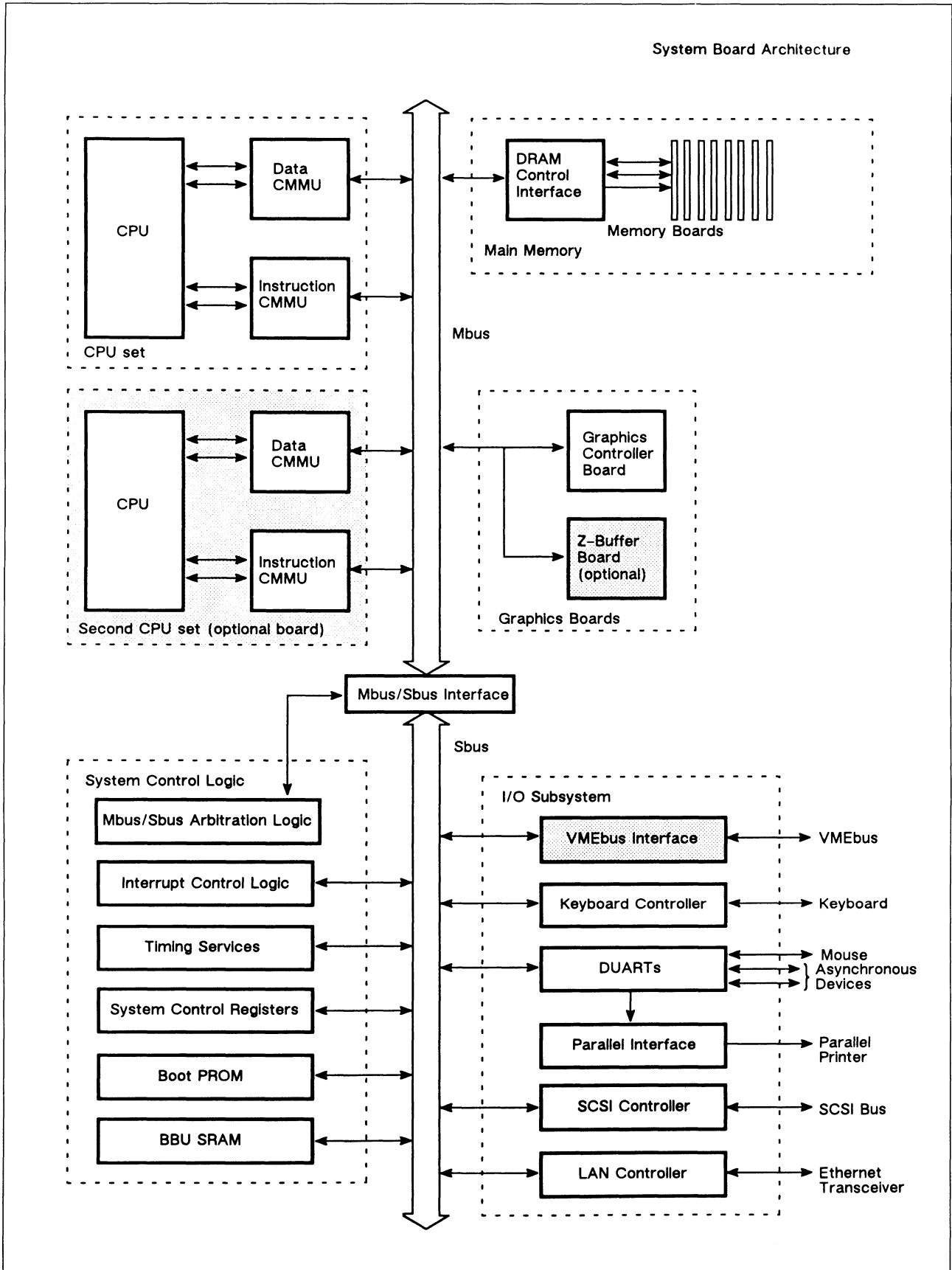


Figure 1. System Block Diagram

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, its use of the Eurocard format, its high performance, and its versatility are some of the reasons that it appeals to a wide range of users. The AViiON 400 Series systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price (the VMEbus implementation on the AViiON 5000/6000 Series Systems was designed to accommodate block mode transfers—the AViiON 400 does not support this option to the C.1 specification).

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in a closely coupled hardware configuration. The VMEbus specification on the AViiON 400 systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of both the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.

The VMEbus specification provides for a mechanical as well as an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane: the connectors are 96-pin female type, and in the AViiON 400, a separate 6U backplane provides two slots, each slot consisting of two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master since it controls the flow of data between itself and a Slave. Data transfers initiated by VMEbus devices other than the system board are considered slave transfers. VMEbus devices can transfer data to the AViiON 400's internal system bus, MBus, in single words, half words, or bytes.

VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 400, the design allows for more than one Master.

On the AViiON 400, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Table 2 details the C.1 interface specifications and options and the level of implementation on the AViiON 400.

<i>Specification</i>	<i>Options</i>
Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT. A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock The IACK and VMEbus grant daisy chain driver The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.) The VMEbus arbitration time out logic (64 micro-sec.) VMEbus watchdog timer (64 micro-sec.)
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C1 Interface specifications and options

Peripherals

The AViiON 400 Series Workstation has a SCSI bus for connecting mass storage devices. The SCSI bus originates

on the system board and provides connection for the internal storage devices, then exits via the rear of the unit and terminates in a Champ connector for external Peripheral Housing Units.

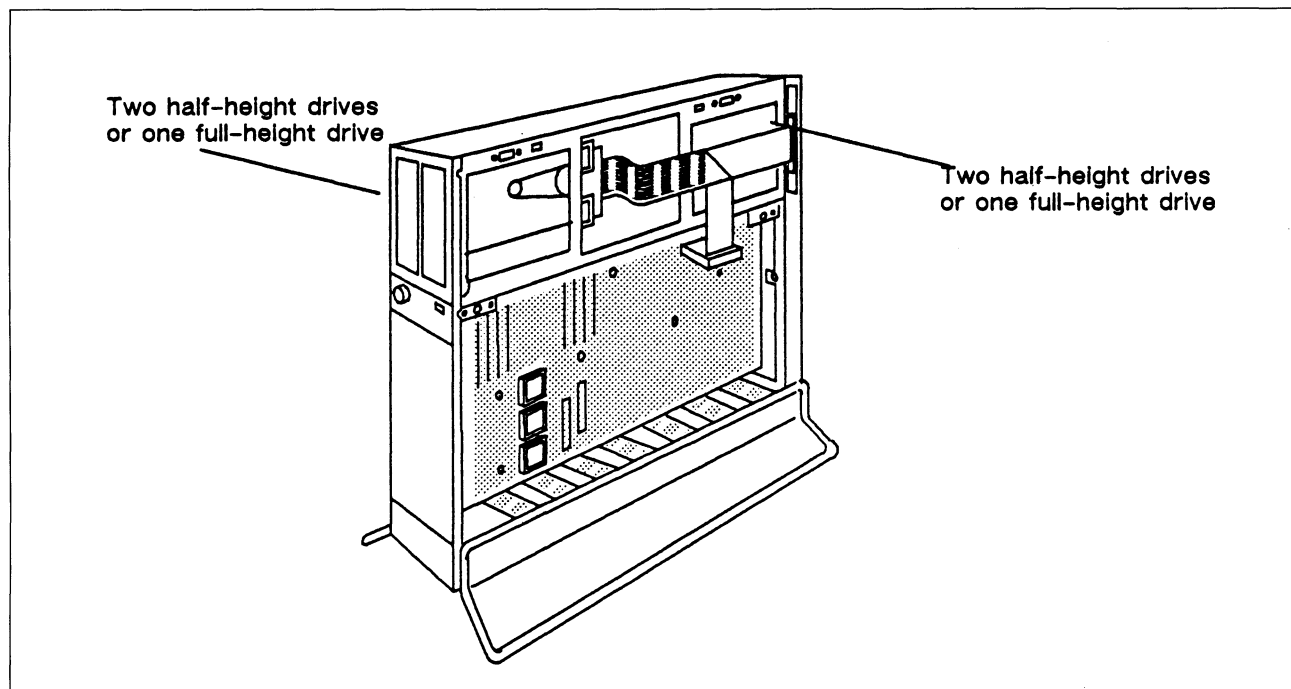


Figure 2. AV400 Internal Peripheral Configuration

In the main deskside chassis, space is available for two 5¼" Full Height devices or one 5¼" Full Height device and two 5¼" Half Height devices. Up to seven SCSI devices can be supported through the external PHU.

All external Data General peripherals for the AViiON 400 Series Workstation are mounted in the desktop PHU, which can accommodate a variety of storage and backup options. These options include

- a 1.0 GB 5½" Full Height Winchester disk
- a 662 MB 5¼" Full Height Winchester disk with 16 ms access time,
- 332 MB 5¼" Half Height Winchester disk with 14 ms seek time,
- 5¼" Half Height 150 MB cartridge tape drive conforming to the QIC 150 industry standard, and
- a 179 MB 5¼" Half Height Winchester Disk with 18 ms access time.

Each PHU can accommodate one full height and one half height units or three half height units.

In addition to the standard storage devices, Data General offers two diskettes; 1.44 MB 3.5" half-height and 1.2 MB 5.25" half-height. These diskettes offer industry standard

format and compatibility with existing MS-DOS environments. The 1.44 MB diskette can read, write and format data in the 720KB diskette format. The 1.2 MB diskette is also read, write and format compatible with the 360KB diskette format. These diskettes have an interface called the SA450 which must be converted to the SCSI interface (a small converter board is packaged with the diskette). Mounted within the AViiON 400 chassis, the converter board can support up to two diskettes. When configured with the external PHU, the converter board can support up to two diskettes. The diskettes are available either with or without the converter board, but for use with the AViiON 300 or 400 systems, the first diskette must contain the converter board.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 400 Series chassis consumes 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, which will support configurations of up to two additional PHUs per workstation. The PHU contains a 125 watt power supply, internal fan, internal cabling (2.3 ft), and SCSI Bus terminator. The first SCSI cable from the chassis to the first PHU is different than the one used on the AV300 workstations.

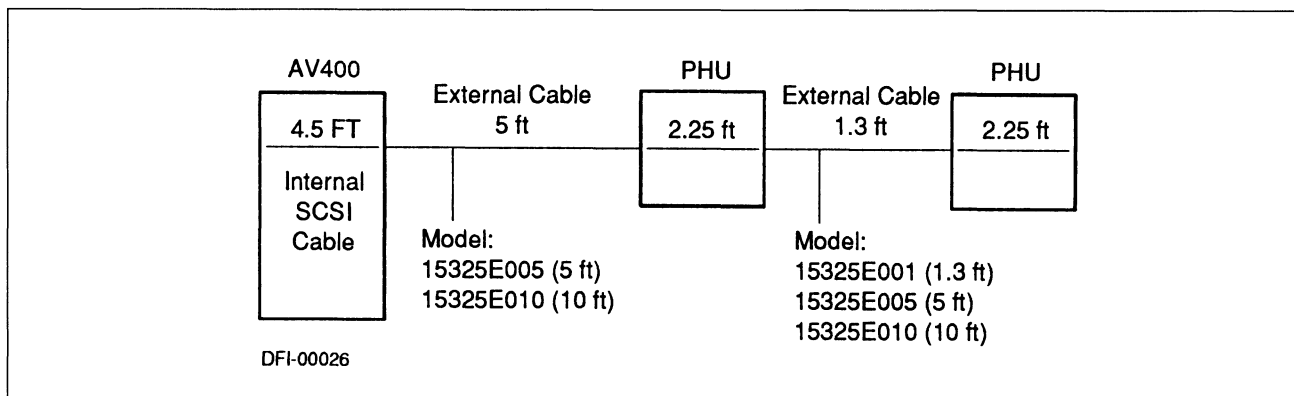


Figure 3. SCSI Cable length configurations

Graphics Hardware

Graphics hardware for the AViiON 400 Series Workstation consists of either an 8-bit or 24-bit color controller contained on separate daughter cards that mount on the main system board through a 96 pin MBUS connector for maximum performance. The Z-buffer option is a separate daughter card that plugs into the graphics board.

8-Bit Color. The 8-bit color unit consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The design of the 8-bit color controller is compatible with the AViiON 300 Series 8-bit color controller (see Figure 4). The 8-bit color controller includes

- sixty 256K dual ported video RAMS
- video timing logic
- color Look Up Table (LUT) for 256 displayable colors from a palette of 16.7 million combinations for the 8-bit color
- one 256-location LUT
- addressable resolution of 1536 X 1024
- double buffering: 2 x 4 Planes (16 colors displayable)
- 2-bits for overlay
- flat or Gouraud shading.

24-Bit Color. The 24-bit color unit consists of three special high density gate arrays for the display and control of the video display and video memory for the frame buffer (see Figure 5). The 24-bit color controller includes

- fifty-six 1 MB dual ported video RAMS
- Video timing logic
- color Look Up Table (LUT) for 16.7 million displayable colors from a palette of 16.7 million combinations for true color representation
- three 256-location LUTs
- addressable resolution of 2048 X 1024
- 4-bits for overlay
- double buffering: 2 x 12 plane (4096 colors displayable)
- flat or Gouraud shading

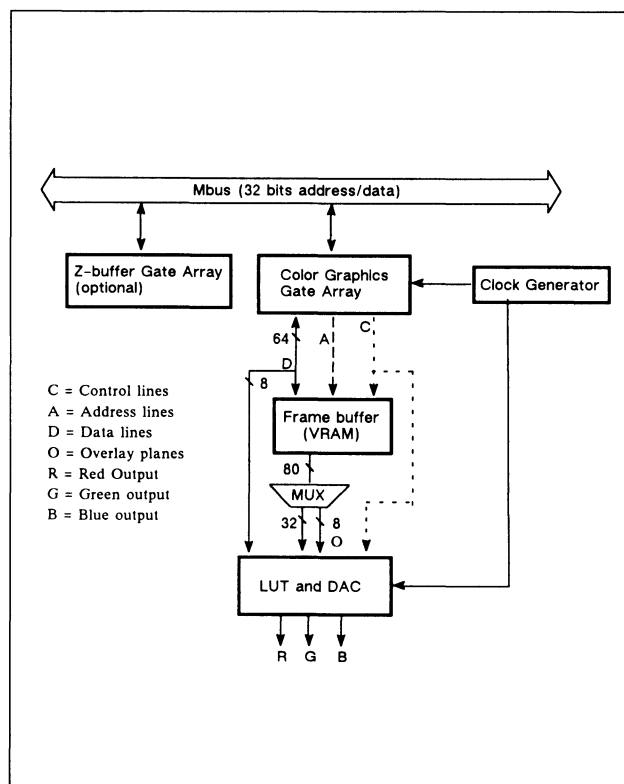


Figure 4. 8-Bit Color Graphics Subsystem

24-Bit Z-Buffer. The Z-Buffer option consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The 24-Bit Z-Buffer option provides greater accuracy and picture quality (than commonly used 16-Bit Z-Buffers) in performing hidden line and hidden surface removal. The Z-Buffer includes

- 256KB X 4 DRAMS
- programmable Hither and yon clipping planes

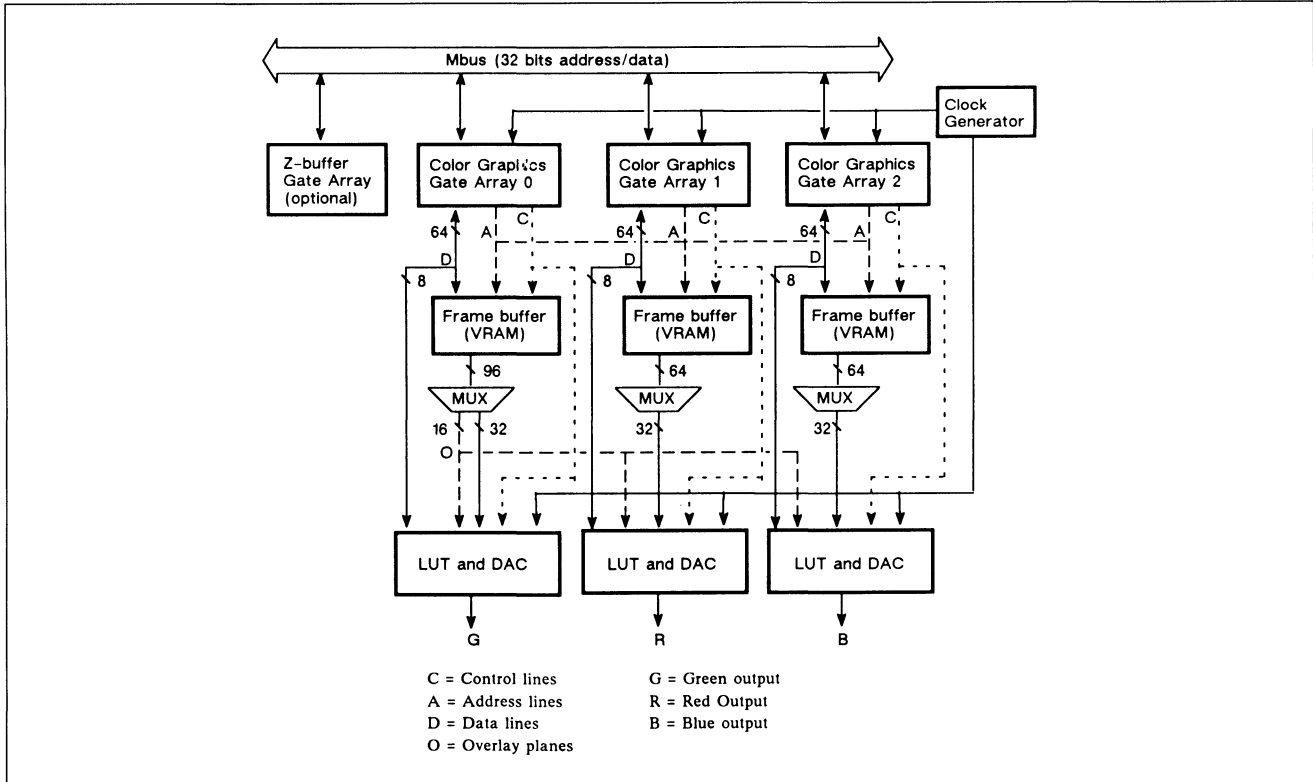


Figure 5. 24-bit Color Graphics Subsystem

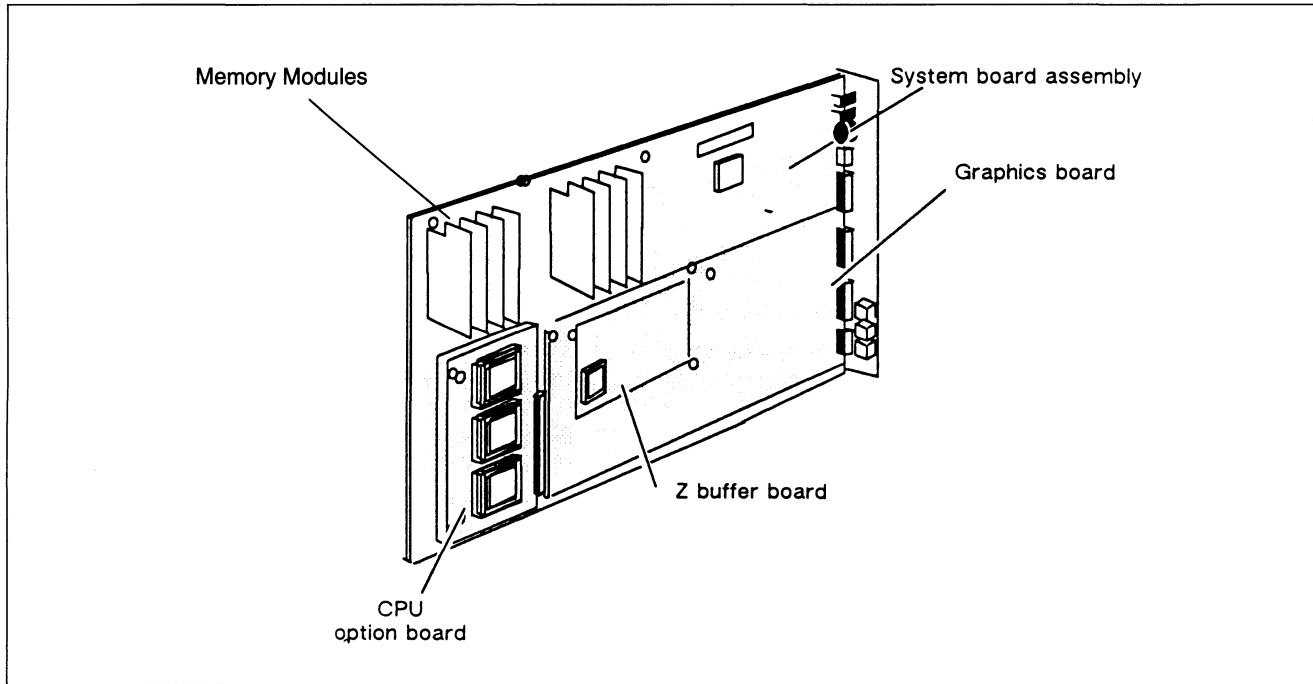


Figure 6. Graphics Options Diagram

Japanese Language Support. The color units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard, the AViiON 400 Series Workstation allows customers to use the workstation for Japanese applications and environments.

Ordering

The AViiON 400 Series Workstations will initially be offered as either Packaged Systems or as individual Base Packages without graphics (graphics controller, monitor, mouse or keyboard), and with or without peripherals, an arrangement that allows for greater flexibility in configurations and ordering (see Tables 3 - 11). In addition, the open architecture design of the workstations allows customers to use keyboards and external peripherals that are compatible with the different industry standards supported. For example, the keyboard controller supports either AT-compatible or Japanese AX-compatible keyboards, and the SCSI interface supports SCSI-compatible peripherals.

Each system board includes:

- either a 16.67 or a 20 MHz CPU,
- hardware support for industry standard VMEbus (through the use of connectors on the system board),
- integral Ethernet LAN interface (IEEE 802.3),
- Small Computer Standard Interface (SCSI) for high performance I/O,
- two RS-232C async ports, and
- one parallel printer port (Centronix/Data Products compatible)

The Graphics Packages includes:

- 3-button optical mouse,
- keyboard,
- a 19" color monitor, and
- either an 8-plane or a 24-plane graphics controller.

Systems ordered with DG/UX and a disk have the operating system installed on the disk. Media and documentation must be ordered separately. The first system ordered (either a workstation or server) must include a 150 MB tape to hold the operating system (included in the event of a disk failure).

In configurations that include a disk but no tape drive, media (the tape with the operating system) will not be shipped with the system, as the operating system is pre-loaded on the disk. This could pose a problem with a system installed in a network on non-Data General systems. The operating system will be pre-loaded at the factory but in the event of a disk malfunction, it would be difficult to reload the operating system without the media.

NOTE: A transceiver (model 4540, 4540-A OR 4619) and drop cable (model 1329) are necessary for the workstation to be connected to an Ethernet LAN.

<i>Model Number</i>	<i>Description</i>
G70343	16MB, 16 MHz Base System
G70063	8MB, 16 MHz Base System
G70347	16MB, 16 MHz Base System, 332 MB Disk
G70349	16MB, 16 MHz Base System, 662 MB Disk
G70344	16MB, 20 MHz Base System
G70348	16MB, 20 MHz Base System, 332 MB Disk
G70350	16MB, 20 MHz Base System, 662 MB Disk

Table 3. Packaged Base System—without graphics, monitor, keyboard or mouse

<i>Model Number</i>	<i>Description</i>
7206	19" monitor, 8-Bit color Controller
7208A	19" monitor, 24-Bit color Controller

Table 4. Graphics Package—includes keyboard, mouse, graphics controller and monitor

<i>Model Number</i>	<i>Description</i>
7202	8-Bit Color Controller
7203A	24-Bit Color Controller
7204	Optional 24-bit Z-buffer

Table 5. Board Level Components

<i>Model Number</i>	<i>Description</i>
7014	16 MB Memory Package
7012	8 MB Memory Package
7000	4 MB Memory Module
G6487	19" Color Monitor
7006	Second CPU upgrade 16 MHz
7008	Second CPU upgrade 20 MHz
70111	Second CPU upgrade 20 MHz w/8 MB
4512	3 Button Optical Mouse
G6488	101/102 key AT-Style keyboard— REQUIRES LANGUAGE SUFFIX

Table 6. Options

<i>Model Number</i>	<i>Description</i>
-A	US
-B	UK
-C	French
-D	German
-S	Japanese AX-compatible (AX is the international standard for the Japanese Language)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish/Norwegian

Table 7. Language Suffix for Keyboard

<i>Model Number</i>	<i>Description</i>
G10565	PHU
G6605	662 MB Disk in PHU
G6603	179 MB Disk/150 MB Tape in PHU
G6600	179 MB Disk in PHU
G6602	150 MB QIC Tape in PHU
G6591-A	2 GB Cartridge Tape 5¼" full height in PHU

Table 8. External Peripherals

<i>Model Number</i>	<i>Description</i>
G6577-E	150 MB QIC Tape add-on for PHU
6539-E	179 MB Disk add-on for PHU
6662-E	332 MB Disk add-on for PHU
6554-E	662 MB Disk add-on for PHU
G6591-E	2 Gbyte Cartridge Tape 5¼" full height for PHU
G6562-E	1.44 MB 3½" half height Diskette Drive with SA450/SCSI converter
G6563-E	1.2 MB 5¼" half height Diskette Drive with SA 450/SCSI converter
G6562-EX	1.44 MB 3½" half height Diskette Drive without SA450/SCSI converter.
G6563-EX	1.2 MB 5¼" half height Diskette Drive without SA450/SCSI converter

Table 9. External Add-On Peripherals for PHU

<i>Model Number</i>	<i>Description</i>
G6577-F	150 MB QIC Tape add-on
6539-F	179 MB Disk add-on
6662-F	332 MB Disk add-on
6554-F	662 MB Disk add-on
6685-F	1.0 GB Disk add-on
G6591-F	2 Gbyte Cartridge Tape 5¼" full height
G6562-F	1.44 MB 3½" half height Diskette Drive with SA 450/SCSI converter
G6563-F	1.2 MB 5¼" half height Diskette Drive with SA450/SCSI converter
G6562-FX	1.44 MB 3½" half height Diskette Drive without SA450/SCSI converter
G6563-FX	1.2 MB 5¼" half height Diskette Drive without SA450/SCSI converter

Table 10. Internal Add-On Peripherals for the AV 400 Systems Chassis.

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver (Teflon)
15274E002	5 foot Ethernet drop cable for connecting workstation to transceiver (PVC)

Table 11. Ethernet options.

In addition, the AV400 power supply provides the following power for the system boards and peripherals mounted within the chassis. The desktop Peripheral Housing Unit supplies its own power. When configuring systems, subtract the power

for each component from the total power supplied. This is important for systems which have the maximum number of graphics options, memory, disk and tapes installed if third party VME boards are to be installed.

BOARD/POWER	+5V 37 amps		-12V 1.0 amp		+12V 10 amps		+9V 1.0 amp	
	typ	max	typ	max	typ	max	typ	max
SYSTEM BD 16	14.4	14.4		0.1		0.2		
SYSTEM BD 25	14.5	14.5		0.1		0.2		
2ND CPU 16	0.6	1.0						
2ND CPU 25	0.6	1.0						
4 MB MEMORY	0.1	0.2						
8-BIT COLOR	1.1	2.5						
24-BIT COLOR	2.5	4.7						
Z-BUFFER	0.4	1.1						
1.0 GB DISK	2.0	2.0			2.5	4.0		
662 MB DISK	0.6	0.7			1.5	2.0		
332 MB DISK	2.0	2.0			2.25	3.3		
179 MB DISK	1.0	1.3			.9	4.5		
150 MB TAPE	.5	.7			1.5	2.5		
2 GB TAPE	2.02	2.7			.41	.5		
1.44 MB FPY	0.65	1.2						
1.2 MB FPY	0.3	0.5			0.22	0.1		
SCSI/SA450 Con	0.1	0.1			0.22	0.1		

Table 12. AV400 Power Supply.

The AViiON 400 Series Workstation will also operate with any DG/UX supported general purpose printer.

Important Ordering Notes:

For a more complete description of DG/UX and ordering information, please refer to the MAPS/PLUS article on page for DG/UX.

Related Information

See Table 13.

To Order Workstations:

1. Select the package that best meets your needs. This will consist of a Base Package with a Graphics Package. Add the appropriate suffix for font and power.
2. Fill out the Program License Schedule 501 and purchase order. Remember to itemize each operating system license.
3. Order the appropriate software distribution and services' packages.

<i>AViiON 300 and 400 Series Stations Programming System Control and I/O Register</i>	<i>Model Number</i>
Setting Up and Starting AViiON 400 Series Station	014-001858-00
Using the AViiON System Control Monitor	014-001802-03
Expanding and Maintaining AViiON 400 Series Stations	014-001859-00
MC88200 User's Manual, Cache Memory/Management Unit	014-001808-01
MC88100 User's Manual, Reduced Instruction Set Computer	014-001809-01
Installing and Maintaining the Model 10565 Mass Storage Subsystems	014-001810-00
Installing and Operating Your Model 6538/6539 Half-Height Winchester Disk Drive	014-001722-00
AViiON Workstation Product Brief	012-003496-01
AViiON Technical Specifications	012-003677-00
AV 400 Workstation Product Brief	012-003622-00
Using AViiON System Diagnostics	014-001863
Setting Up and Starting AViiON 400 Series Stations	014-001858
Expanding and Maintaining AViiON 400 Series Stations	014-001859
AViiON 300 and 400 Series Stations Programming System Control and I/O Registers	014-001800
Using the AViiON System Control Monitor (SCM)	014-001802
Installing and Operating the Model 10565 Mass-Storage Subsystem	014-001810
MC88100 User's Manual, Reduced Instruction Set Computer (RISC)	014-001809
MC88100 User's Manual, Cache/Memory Management Unit (CMMU)	014-001808
Installing the Model 6562/6563-Series Diskette Drives	014-001921
Installing the Model 6491 Disk Drive	014-001460
Installing Your Model 654/6555 Series Disk Drive	014-001702
Installing and Operating Your Model 6590 Series Cartridge Tape Drive	014-001701
Installing and Operating Your Model 6538/6539 Half-Height Winchester Disk Drive	014-001722
Installing and Operating Your Model 6536/6577 Cartridge Tape Drive	014-001699
Installing the Model 6562/6563-Series Diskette Drives	014-001921

Table 13. Related Information.

Specifications

Processor:
 Motorola 88100
 16.67 or 20 MHz 88100 processor with integral FPU
 Single- or dual-processor options

Memory Management:
 Virtual memory
 Two 88200 CMMUs/CPU; 4 GB per process

Caches:
 Data cache and instruction cache
 Size: 16 KB per side
 Organization: 4-way set associative

Main Memory:
 8 MB—128 MB with parity
 Expansion: 4-MB or 16 MB modules
 Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O:
 LAN—ETHERNET
 IEEE 802.3
 Bandwidth: 10 Mbits/sec
 Parallel Port
 Centronics-compatible
 Two Serial Ports
 RS-232 (one with modem control); baud rates up to 19.2 kilobaud
 SCSI
 Asynchronous/Synchronous

VMEbus Backplane:
 Motorola's VMEbus Revision C.1
 IEEE P1014 Draft 1.2
 Two 6U slots

Graphics Processor:
 8-plane gray-scale or color
 24-plane color
 24-bit Z-buffer

Monitors:
 Pixel aspect ratio
 1:1.
 Refresh Rate
 70 Hz, flicker-free 19" non-interlaced
 Pixel Rate
 125 MHz
 Controls
 Brightness, contrast

Gray-scale
 Monitor Format 20" landsc.
 Displayable Res. 1280x1024
 Addressable Res. 1536x1024
 Colors Display
 Single Buffered 256 shades
 Double Buffered N/A
 Color LUT
 Color Palette N/A
 Overlay Planes 2
 Z-buffer N/A

8-plane Color Monitor:
 Monitor Format 19" landsc.
 Displayable Res. 1280x1024
 Addressable Res. 1536x1024
 Colors Display
 Single Buffered 256
 Double Buffered 16
 Color LUT 1 x 256
 Color Palette 16.7 million
 Overlay Planes 2
 Z-buffer 24-bit

24-plane color
 Monitor Format 19" landsc.
 Displayable Res. 1280x1024
 Addressable Res. 1536x1024
 Colors Display
 Single Buffered True color
 Double Buffered 4096
 Color LUT 3 x 256
 Color Palette 16.7 million
 Overlay Planes 4
 Z-buffer 24-bit

User Interface
 Keyboard
 Style: 101/102-key PC-AT compatible
 Available versions: French, German, Italian, Japanese, Spanish, Swedish, UK, US
 Mouse
 3-button optical

Environmental:
 Temperature
 Operating/Nonoperating: 0 - 38 °C / -40 - 70 °C
 Relative Humidity
 Operating/Nonoperating: 0 - 80%/10 - 90%
 Electrical
 AC Voltage: 120V nominal (85-138 VAC)
 220V nominal (187-276 VAC)
 AC Frequency: 47 - 63 Hz
 Current draw: 8 amps at 120Vrms
 5 amps at 220Vrms
 Power Supply: 325 Watts

Physical:
 Dimensions:
 24.75" high x 5.75" wide by 22" deep
 Weight:
 System Chassis: 59 lbs. fully loaded (with disks and tape)
 Monitor: approx. 60 lbs.

Peripherals:
 5.25" Winchester disk drives
 179 MB half-height Sync SCSI
 332 MB half-height Sync SCSI
 662 MB full-height Sync SCSI
 TPI flexible disk drives
 1.44 MB 3.5" half-height
 1.2 MB 5.25" half-height
 Tape Drive
 150 MB 5.25" half-height QIC tape
 2 GB 5.25" full-height



AViiON 400 Workstations

Fact Sheet

This revision provides updated information for the 332 MB Half-Height Disk and added model numbers for the 20 MHz AV 400.

The AViiON 400 Series workstations extend the range of power and performance of the AViiON Workstation Family, offering advanced graphics features, industry standard I/O bus (VMEbus™), and a greater range of performance specifications. Housed in a compact desk-side package with internal mass storage options, these single-user graphics workstations are designed for technical professionals who currently use traditional 32-bit high-end workstations. The AViiON 400 workstations are the second in a series of personal productivity tools manufactured by Data General that incorporate the Motorola 88K RISC (Reduced Instruction Set Computer) technology.

The AViiON 400 Series workstations offer advanced 32-bit stand-alone or distributed computing capabilities for single-

user graphics applications. The systems are designed around a single system board that contains the 88100 processor chip with floating point; two 88200 Cache and Memory Management Units (CMMU) for data and instruction bus (MBUS); interface logic to support Motorola's VMEbus (Revision C.1); two MBUS (MBUS is the AViiON workstation's internal high speed memory bus) connectors for the second CPU option, graphics options, and Z-Buffer option; the industry standard SCSI bus (Small Computer System Interface); integral 802.3 Ethernet; two RS232 asynchronous interfaces and a parallel printer interface. The graphics options are contained on three separate daughter boards that connect to the base system board's MBUS and provide 24-bit or 8-bit color graphics, and an optional 24-Bit Z-buffer.

Table 1 summarizes the major features of the AViiON 400 Series workstations.

<i>Feature</i>	<i>Description</i>
Complete single-board System functionality	Advanced single-user compute based on Motorola 88K RISC Processor running at either 16.67 or 20 MHz clock speed. Tightly coupled, on-chip Floating Point Unit Two 88200 Cache and Memory Management Units (CMMU) for improved performance Dual processor option. Support for Symmetric Multiprocessing in DG/UX Advanced 32-bit RISC technology Hardware support for Motorola's VMEbus (Revision C.1). Two 6U VMEbus slots in a compact, internal card cage Attractive, compact desk-side packaging (24.75"H X 5.75"W X 22"D).
4 MB parity memory modules	Memory expansion capability of up to eight 4MB memory modules, for a total of 32MB. Integral disk and tape options—two full height 5¼" devices or one full height and two half height 5½" devices Industry Standard SCSI interface for disk and tape (synchronous/asynchronous) Three-button optical mouse with pad PC/AT-101 compatible keyboards
Graphics	Choice of high performance, bit-mapped graphics with dedicated, dual ported display memory Color: 1280x1024x8 or 1280x1024x24 with 2 bits of overlay memory High resolution, flicker-free 19" or 16" color monitors Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance Standard MIT distribution of X11 r3 or higher X Server, Xlib, X Toolkit, X Clients PHIGS and GKS support through third party ISVs Compatible with AViiON 300 Series graphics OSF/Motif

Table 1. AViiON 400 Series features.

<i>Feature</i>	<i>Description</i>
Internal Mass storage/Tape back-up	<p>Deskside chassis can hold two 5¼" Full Height devices or one 5¼" Full Height device and two 5¼" Half Height devices or 5¼" Half Height devices. The supported devices are:</p> <ul style="list-style-type: none"> 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 150 MB QIC150 Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI. 1.2 MB 5.25" Diskette Disk HH SA4 50/SCSI.
External Mass storage/Tape back-up	<p>External PHU (Peripheral Housing Unit) can support up to seven SCSI devices. Each housing can hold one 5¼" Full Height device and one 5¼" Half Height device or three 5¼" Half Height devices. The supported devices are</p> <ul style="list-style-type: none"> 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 150 MB QIC Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI 1.2 MB 5.25" Diskette Disk HH SA450/SCSI
Customer environment/use characteristics	<p>Customer installable and maintainable Customer installable add-on memory, graphics options, second CPU option and peripherals 40db (quiet office) noise levels 90 day warranty on all system components</p>
Communications	<p>Ethernet interface standard (without transceiver or drop cable) Thick or Thin net connections available Two asynchronous, RS232C interfaces—from 150 to 19,600 baud Centronics/Data Products compatible line printer port</p>

Table 1. (con't) AViiON 400 Series features.

Product Description

The AViiON 400 Series workstations are deskside systems that provide the power and performance of a mainframe in an extremely small, compact package—the main chassis housing is only 24.75"H X 5.75"W X 22"D. These workstations are available in a wide range of configurations and with options for expandable graphics, memory, mass storage, and multi-CPU configurations. The base system board is available in 16.67 or 25 MHz performance range, and offers two second CPU options of 16.67 or 20 MHz. Memory is expandable from 8 MB to 32 MB with 4 MB memory modules.

Architecture

Processor. The AViiON 400 Series Workstation is based on the 88000 series of RISC processors from Motorola. The 88000 series is comprised of the 88100 RISC CPU, and two 88200 cache/MMU (Memory Management Unit) chips. For more information, see the AViiON 300 Series MAPS/PLUS article on page 202-3.

System board. The AViiON 400 Series Workstation system board consists of a single 18" x 12" multilayer PCB that includes

- a 16.67 or a 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- a closely coupled, integrated floating point unit
- eight connectors capable of holding up to eight 4 MB memory modules
- two MBUS connectors for connecting the second CPU or graphics options
- interface logic that supports Revision C.1 of the VMEbus
- industry standard SCSI interface for connecting peripherals such as disk and tape
- industry standard 802.3 Ethernet Interface (w/o transceiver)
- keyboard interface—AT-compatible and Japanese AX-compatible
- mouse interface
- two asynchronous interfaces—RS232 with one offering full modem support
- parallel line printer interface (Centronics-compatible)
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot.

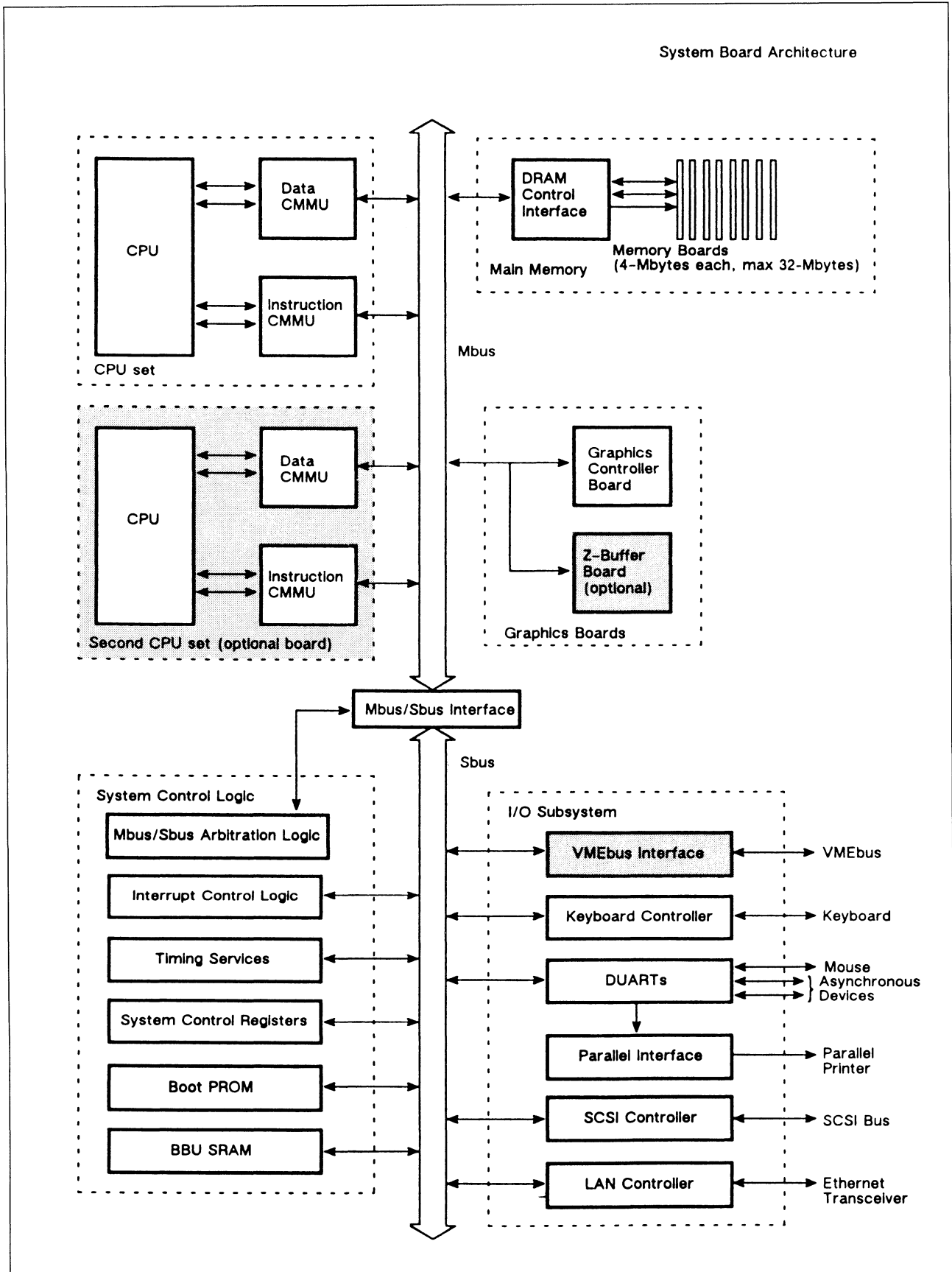


Figure 1. System Block Diagram

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, its use of the Eurocard format, its high performance, and its versatility are some of the reasons that it appeals to a wide range of users. The AViiON 400 Series systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price (the VMEbus implementation on the AViiON 5000/6000 Series Systems was designed to accommodate block mode transfers—the AViiON 400 does not support this option to the C.1 specification).

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in a closely coupled hardware configuration. The VMEbus specification on the AViiON 400 systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of both the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.

The VMEbus specification provides for a mechanical as well as an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane: the connectors are 96-pin female type, and in the AViiON 400, a separate 6U backplane provides two slots, each slot consisting of two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master since it controls the flow of data between itself and a Slave. Data transfers initiated by VMEbus devices other than the system board are considered slave transfers. VMEbus devices can transfer data to the AViiON 400's internal system bus, MBUS, in single words, half words, or bytes.

VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 400, the design allows for more than one Master.

On the AViiON 400, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Table 2 details the C.1 interface specifications and options and the level of implementation on the AViiON 400.

<i>Specification</i>	<i>Options</i>
Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT. A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock The IACK and VMEbus grant daisy chain driver The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.) The VMEbus arbitration time out logic (64 micro-sec.) VMEbus watchdog timer (64 micro-sec.)
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C1 Interface specifications and options

Peripherals

The AViiON 400 Series Workstation has a SCSI bus for connecting mass storage devices. The SCSI bus originates

on the system board and provides connection for the internal storage devices, then exits via the rear of the unit and terminates in a Champ connector for external Peripheral Housing Units.

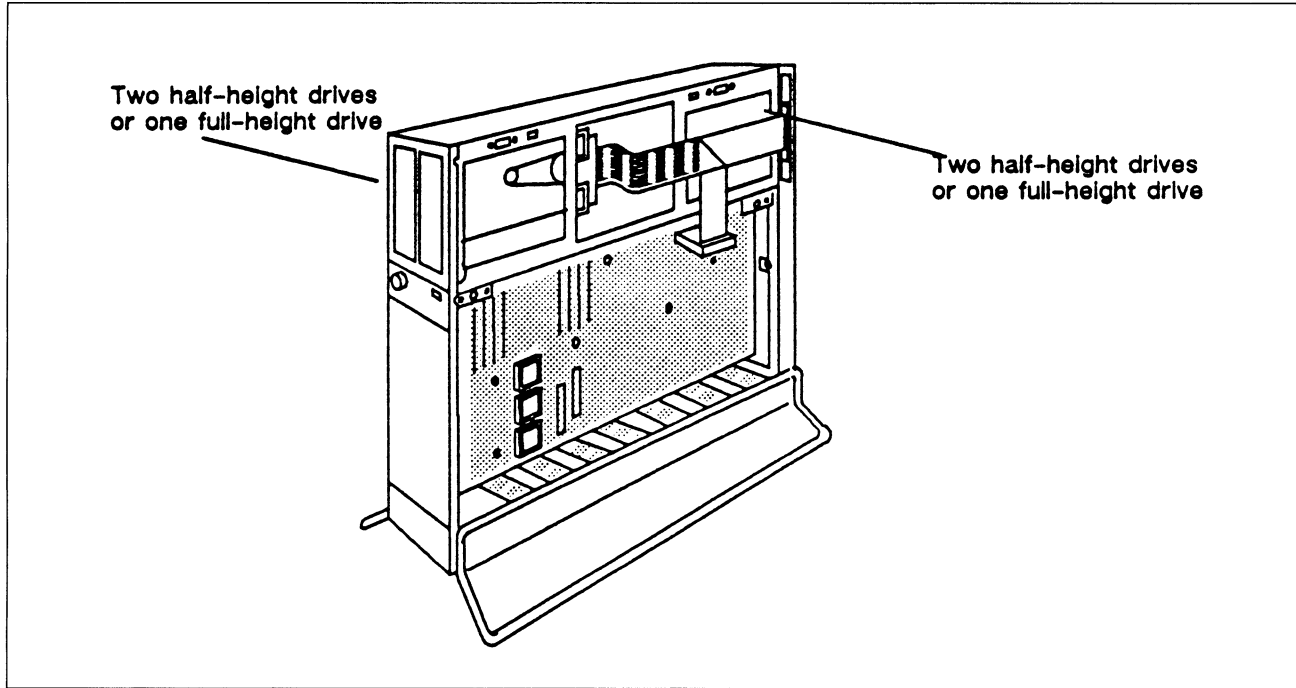


Figure 2. AV400 Internal Peripheral Configuration

In the main deskside chassis, space is available for two 5¼" Full Height devices or one 5¼" Full Height device and two 5¼" Half Height devices. Up to seven SCSI devices can be supported through the external PHU.

All external Data General peripherals for the AViiON 400 Series Workstation are mounted in the desktop PHU, which can accommodate a variety of storage and backup options. These options include

- a 662MB 5¼" Full Height Winchester disk with 16 ms access time,
- 332MB 5¼" Half Height Winchester disk with 14 ms access time,
- 5¼" Half Height 150MB cartridge tape drive conforming to the QIC 150 industry standard, and
- a 179 MB 5¼" Half Height Winchester Disk with 18 ms access time.

Each PHU can accommodate one full height and one half height units or three half height units.

In addition to the standard storage devices, Data General offers two diskettes; 1.44 MB 3.5" half-height and 1.2 MB 5.25" half-height. These diskettes offer industry standard

format and compatibility with existing MS-DOS environments. The 1.44 MB diskette can read, write and format data in the 720KB diskette format. The 1.2 MB diskette is also read, write and format compatible with the 360KB diskette format. These diskettes have an interface called the SA450 which must be converted to the SCSI interface (a small converter board is packaged with the diskette). Mounted within the AViiON 400 chassis, the converter board can support up to two diskettes. When configured with the external PHU, the converter board can support up to two diskettes. The diskettes are available either with or without the converter board, but for use with the AViiON 300 or 400 systems, the first diskette must contain the converter board.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 400 Series chassis consumes 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, which will support configurations of up to two additional PHUs per workstation. The PHU contains a 125 watt power supply, internal fan, internal cabling (2.3 ft), and SCSI Bus terminator. The first SCSI cable from the chassis to the first PHU is different than the one used on the AV300 workstations.

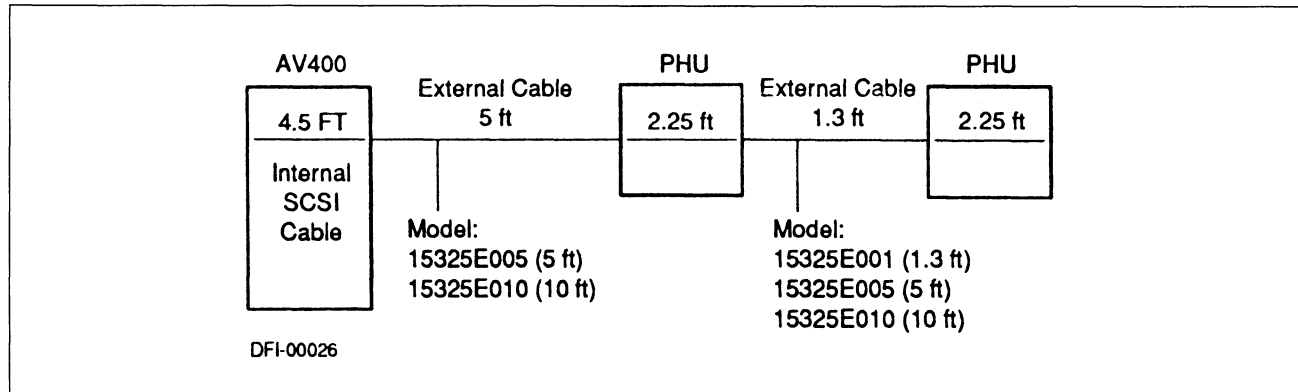


Figure 3. SCSI Cable length configurations

Graphics Hardware

Graphics hardware for the AViiON 400 Series Workstation consists of either an 8-bit or 24-bit color controller contained on separate daughter cards that mount on the main system board through a 96 pin MBUS connector for maximum performance. The Z-buffer option is a separate daughter card that plugs into the graphics board.

8-Bit Color. The 8-bit color unit consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The design of the 8-bit color controller is compatible with the AViiON 300 Series 8-bit color controller (see Figure 4). The 8-bit color controller includes

- eight 256K dual ported video RAMS
- video timing logic
- color Look Up Table (LUT) for 256 displayable colors from a palette of 16.7 million combinations for the 8-bit color
- one 256-location LUT
- addressable resolution of 1536 X 1024
- double buffering: 2 x 4 Planes (16 colors displayable)
- 2-bits for overlay
- flat or Gouraud shading.

24-Bit Color. The 24-bit color unit consists of three special high density gate arrays for the display and control of the video display and video memory for the frame buffer (see Figure 5). The 24-bit color controller includes

- twenty-four 256 KB dual ported video RAMS
- Video timing logic
- color Look Up Table (LUT) for 16.7 million displayable colors from a palette of 16.7 million combinations for true color representation
- three 256-location LUTs
- addressable resolution of 2048 X 1024
- 2-bits for overlay
- double buffering: 2 x 12 plane (4096 colors displayable)
- flat or Gouraud shading

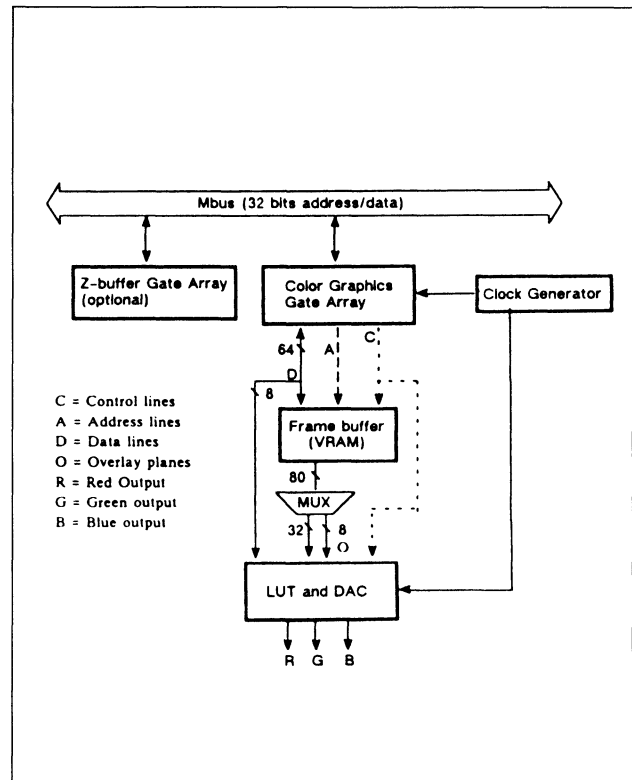


Figure 4. 8-Bit Color Graphics Subsystem

24-Bit Z-Buffer. The Z-Buffer option consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The 24-Bit Z-Buffer option provides greater accuracy and picture quality (than commonly used 16-Bit Z-Buffers) in performing hidden line and hidden surface removal. The Z-Buffer includes

- 256KB X 4 DRAMS
- programmable Hither and yon clipping planes

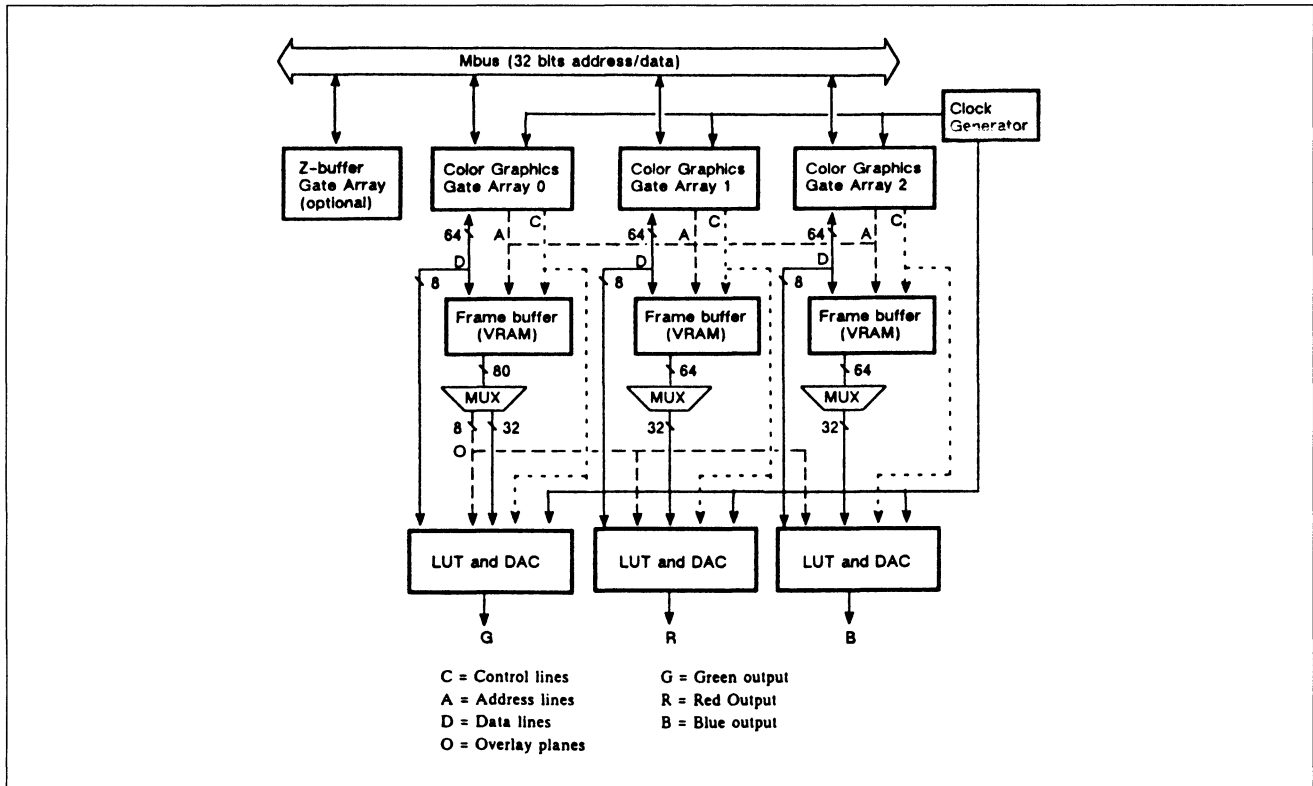


Figure 5. 24-bit Color Graphics Subsystem

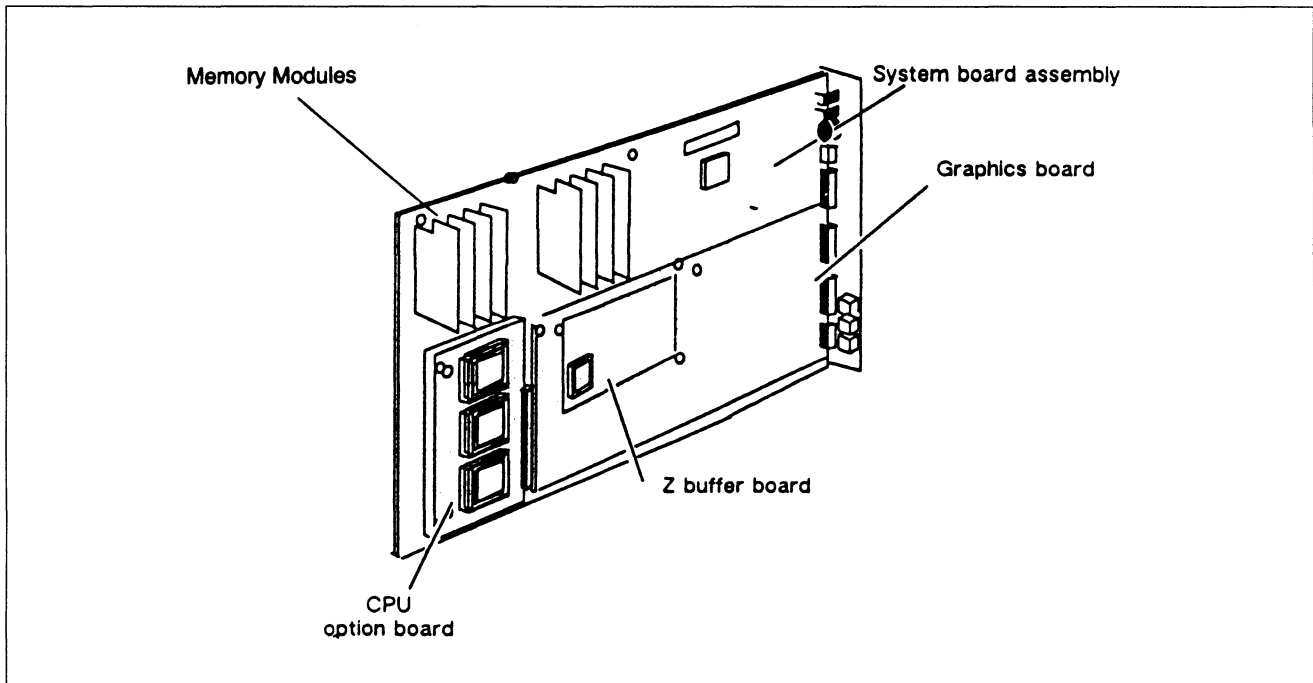


Figure 6. Graphics Options Diagram

Japanese Language Support. The color units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard, the AViiON 400 Series Workstation allows customers to use the workstation for Japanese applications and environments.

Ordering

The AViiON 400 Series Workstations will initially be offered as either Packaged Systems or as individual Base Packages without graphics (graphics controller, monitor, mouse or keyboard), and with or without peripherals, an arrangement that allows for greater flexibility in configurations and ordering (see Tables 3 - 11). In addition, the open architecture design of the workstations allows customers to use keyboards and external peripherals that are compatible with the different industry standards supported. For example, the keyboard controller supports either AT-compatible or Japanese AX-compatible keyboards, and the SCSI interface supports SCSI-compatible peripherals.

Each system board includes:

- either a 16.67 or a 20 Mhz CPU,
- hardware support for industry standard VMEbus (through the use of connectors on the system board),
- integral Ethernet LAN interface (IEEE 802.3),
- Small Computer Standard Interface (SCSI) for high performance I/O,
- two RS-232C async ports, and
- one parallel printer port (Centronix/Data Products compatible)

The Graphics Packages includes:

- 3-button optical mouse,
- keyboard,
- a 19" color monitor, and
- either an 8-plane or a 24-plane graphics controller.

Systems ordered with DG/UX and a disk have the operating system installed on the disk. Media and documentation must be ordered separately. The first system ordered (either a workstation or server) must include a 150 MB tape to hold the operating system (included in the event of a disk failure).

In configurations that include a disk but no tape drive, media (the tape with the operating system) will not be shipped with the system, as the operating system is pre-loaded on the disk. This could pose a problem with a system installed in a network on non-Data General systems. The operating system will be pre-loaded at the factory but in the event of a disk malfunction, it would be difficult to reload the operating system without the media.

NOTE: A transceiver (model 4540, 4540-A OR 4619) and drop cable (model 1329) are necessary for the workstation to be connected to an Ethernet LAN.

<i>Model Number</i>	<i>Description</i>
G70063	8MB, 16 MHz Base System
G70122	8MB, 16 MHz Base System, 332 MB Disk
G70069	8MB, 16 MHz Base System, 662 MB Disk
G70064	8MB, 20 MHz Base System
G70123	8MB, 20 MHz Base System, 332 MB Disk
G70070	8MB, 20 MHz Base System, 662 MB Disk
G70113	8MB, dual 16 MHz Base System, 662 MB Disk

Table 3. Packaged Base System—without graphics, monitor, keyboard or mouse

<i>Model Number</i>	<i>Description</i>
7206	19" monitor, 8-Bit color Controller
7208	19" monitor, 24-Bit color Controller

Table 4. Graphics Package—includes keyboard, mouse, graphics controller and monitor

<i>Model Number</i>	<i>Description</i>
7202	8-Bit Color Controller
7203	24-Bit Color Controller
7204	Optional 24-bit Z-buffer

Table 5. Board Level Components

<i>Model Number</i>	<i>Description</i>
7012	8 MB Memory Package
7000	4 MB Memory Module
G6487	19" Color Monitor
7006	Second CPU upgrade 16 MHz
7008	Second CPU upgrade 20 MHz
70111	Second CPU upgrade 20 MHz w/8 MB
4512	3 Button Optical Mouse
G6488	101/102 key AT-Style keyboard— REQUIRES LANGUAGE SUFFIX

Table 6. Options

<i>Model Number</i>	<i>Description</i>
G70109	24 MB, 20 MHz System with 8-Bit color, 662 MB Disk, 150 MB Tape
G70110	24 MB, 20 MHz System with 24-Bit color, 662 Disk, 150 Tape
G70112	24 MB, dual 20 MHz System with 8-Bit color, 662 MB Disk, 150 MB Tape

Table 7. 20 MHz Packaged Systems.

<i>Model Number</i>	<i>Description</i>
-A	US
-B	UK
-C	French
-D	German
-S	Japanese AX-compatible (AX is the international standard for the Japanese Language)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish/Norwegian

Table 8. Language Suffix for Keyboard

<i>Model Number</i>	<i>Description</i>
G10565	PHU
G6605	662 MB Disk in PHU
G6603	179 MB Disk/150 MB Tape in PHU
G6600	179 MB Disk in PHU
G6602	150 MB QIC Tape in PHU
G6591-A	2 GB Cartridge Tape 5 1/4 " full height in PHU

Table 9. External Peripherals

<i>Model Number</i>	<i>Description</i>
G6577-E	150 MB QIC Tape add-on for PHU
6539-E	179 MB Disk add-on for PHU
6662-E	332 MB Disk add-on for PHU
6554-E	662 MB Disk add-on for PHU
G6591-E	2 Gbyte Cartridge Tape 5 1/4 " full height for PHU
G6562-E	1.44 MB 3 1/2 " half height Diskette Drive with SA450/SCSI converter
G6563-E	1.2 MB 5 1/4 " half height Diskette Drive with SA 450/SCSI converter
G6562-EX	1.44 MB 3 1/2 " half height Diskette Drive without SA450/SCSI converter
G6563-EX	1.2 MB 5 1/4 " half height Diskette Drive without SA450/SCSI converter

Table 10. External Add-On Peripherals for PHU

For Internal Use Only

<i>Model Number</i>	<i>Description</i>
G6577-F	150 MB QIC Tape add-on
6539-F	179 MB Disk add-on
6662-F	332 MB Disk add-on
6554-F	662 MB Disk add-on
G6591-F	2 Gbyte Cartridge Tape 5 1/4 " full height
G6562-F	1.44 MB 3 1/2 " half height Diskette Drive with SA 450/SCSI converter
G6563-F	1.2 MB 5 1/4 " half height Diskette Drive with SA450/SCSI converter
G6562-FX	1.44 MB 3 1/2 " half height Diskette Drive without SA450/SCSI converter
G6563-FX	1.2 MB 5 1/4 " half height Diskette Drive without SA450/SCSI converter

Table 11. Internal Add-On Peripherals for the AV 400 Systems Chassis.

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver (Teflon)
15274E002	5 foot Ethernet drop cable for connecting workstation to transceiver (PVC)

Table 12. Ethernet options.

Configurations

Table 13 combines the different Base Packages with the different Graphics Packages. Use this table to order the correct system based on size of monitor, number of bit planes (for color), and disk option. The model numbers are included in this table.

<i>BASE SYSTEM/GRAPHICS</i>	<i>19" color 8-plane</i>	<i>19" color 24-plane</i>
Diskless 16 MHz, 8 MB mem	7206/70063	7208/70063
332 MB Disk, 16 MHz, 8 MB mem	7206/70065	7208/70065
662 MB Disk, 16 MHz, 8 MB mem	7206/70069	7208/70069
662 MB Disk, Dual 16 MHz, 8 MB mem	7206/70113	7208/70113
Diskless 20 MHz, 8 MB mem	7206/70064	7208/70064
332 MB Disk, 20 MHz, 8 MB mem	7206/70123	7208/70123
662 MB Disk, 20 MHz, 8 MB mem	7206/70070	7208/70070

Table 13. Base system graphics packages.

In addition, the AV400 power supply provides the following power for the system boards and peripherals mounted within the chassis. The desktop Peripheral Housing Unit supplies its own power. When configuring systems, subtract the power

for each component from the total power supplied. This is important for systems which have the maximum number of graphics options, memory, disk and tapes installed if third party VME boards are to be installed.

BOARD/POWER	+5V 37 amps		-12V 1.0 amp		+12V 10 amps		+9V 1.0 amp	
	typ	max	typ	max	typ	max	typ	max
SYSTEM BD 16	14.4	14.4		0.1		0.2		
SYSTEM BD 25	14.5	14.5		0.1		0.2		
2ND CPU 16	0.6	1.0						
2ND CPU 25	0.6	1.0						
4 MB MEMORY	0.1	0.2						
8-BIT COLOR	1.1	2.5						
24-BIT COLOR	2.5	4.7						
Z-BUFFER	0.4	1.1						
662 MB DISK	0.6	0.7			1.5	2.0		
332 MB DISK	2.0	2.0			2.25	3.3		
179 MB DISK	1.0	1.3			.9	4.5		
150 MB TAPE	.5	.7			1.5	2.5		
2 GB TAPE	2.02	2.7			.41	.5		
1.44 MB FPY	0.65	1.2						
1.2 MB FPY	0.3	0.5			0.22	0.1		
SCSI/SA450 Con	0.1	0.1			0.22	0.1		

Table 14. AV400 Power Supply.

The AViiON 400 Series Workstation will also operate with any DG/UX supported general purpose printer.

Important Ordering Notes:

For a more complete description of DG/UX and ordering information, please refer to the MAPS/PLUS article on page for DG/UX.

Related Information

See Table 15.

To Order Workstations:

1. Select the package that best meets your needs. This will consist of a Base Package with a Graphics Package. Add the appropriate suffix for font and power.
2. Fill out the Program License Schedule 501 and purchase order. Remember to itemize each operating system license.
3. Order the appropriate software distribution and services' packages.

<i>AViiON 300 and 400 Series Stations Programming System Control and I/O Register</i>	<i>Model Number</i>
Setting Up and Starting AViiON 400 Series Station	014-001858-00
Using the AViiON System Control Monitor	014-001802-03
Expanding and Maintaining AViiON 400 Series Stations	014-001859-00
MC88200 User's Manual, Cache Memory/Management Unit	014-001808-01
MC88100 User's Manual, Reduced Instruction Set Computer	014-001809-01
Installing and Maintaining the Model 10565 Mass Storage Subsystems	014-001810-00
Installing and Operating Your Model 6538/6539 Half-Height Winchester Disk Drive	014-001722-00
AViiON Workstation Product Brief	012-003496-01
AViiON Technical Specifications	012-003677-00
AV 400 Workstation Product Brief	012-003622-00
Using AViiON System Diagnostics	014-001863
Setting Up and Starting AViiON 400 Series Stations	014-001858
Expanding and Maintaining AViiON 400 Series Stations	014-001859
AViiON 300 and 400 Series Stations Programming System Control and I/O Registers	014-001800
Using the AViiON System Control Monitor (SCM)	014-001802
Installing and Operating the Model 10565 Mass-Storage Subsystem	014-001810
MC88100 User's Manual, Reduced Instruction Set Computer (RISC)	014-001809
MC88100 User's Manual, Cache/Memory Management Unit (CMMU)	014-001808
Installing the Model 6562/6563-Series Diskette Drives	014-001921
Installing the Model 6491 Disk Drive	014-001460
Installing Your Model 654/6555 Series Disk Drive	014-001702
Installing and Operating Your Model 6590 Series Cartridge Tape Drive	014-001701
Installing and Operating Your Model 6538/6539 Half-Height Winchester Disk Drive	014-001722
Installing and Operating Your Model 6536/6577 Cartridge Tape Drive	014-001699
Installing the Model 6562/6563-Series Diskette Drives	014-001921

Table 15. Related Information.

Specifications

Processor:
 Motorola 88100
 16.67 or 20 MHz 88100 processor with integral FPU
 Single- or dual-processor options

Memory Management:
 Virtual memory
 Two 88200 CMMUs/CPU; 4 GB per process

Caches:
 Data cache and instruction cache
 Size: 16 KB per side
 Organization: 4-way set associative

Main Memory:
 8 MB—32 MB with parity
 Expansion: 4-MB modules
 Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O:
 LAN—ETHERNET
 IEEE 802.3
 Bandwidth: 10 Mbits/sec
 Parallel Port
 Centronics-compatible
 Two Serial Ports
 RS-232 (one with modem control); baud rates up to 19.2 kilobaud
 SCSI
 Asynchronous/Synchronous

VMEbus Backplane:
 Motorola's VMEbus Revision C.1
 IEEE P1014 Draft 1.2
 Two 6U slots

Graphics Processor:
 8-plane gray-scale or color
 24-plane color
 24-bit Z-buffer

Monitors:
 Pixel aspect ratio
 1:1.
 Refresh Rate
 70 Hz, flicker-free 19" non-interlaced
 Pixel Rate
 125 MHz
 Controls
 Brightness, contrast

Gray-scale

Monitor Format	20" landsc.
Displayable Res.	1280x1024
Addressable Res.	1536x1024
Colors Display	
Single Buffered	256 shades
Double Buffered	N/A
Color LUT	
Color Palette	N/A
Overlay Planes	2
Z-buffer	N/A

8-plane Color Monitor:

Monitor Format	19" landsc.
Displayable Res.	1280x1024
Addressable Res.	1536x1024
Colors Display	
Single Buffered	256
Double Buffered	16
Color LUT	1 x 256
Color Palette	16.7 million
Overlay Planes	2
Z-buffer	24-bit

24-plane color

Monitor Format	19" landsc.
Displayable Res.	1280x1024
Addressable Res.	1536x1024
Colors Display	
Single Buffered	True color
Double Buffered	4096
Color LUT	3 x 256
Color Palette	16.7 million
Overlay Planes	2
Z-buffer	24-bit

User Interface

Keyboard
 Style: 101/102-key PC-AT compatible
 Available versions: French, German, Italian, Japanese, Spanish, Swedish, UK, US

Mouse
 3-button optical

Environmental:

Temperature
 Operating/Nonoperating: 0 - 38°C / -40 - 70°C

Relative Humidity
 Operating/Nonoperating: 0 - 80% / 10 - 90%

Electrical

AC Voltage:	120V nominal (85-138 VAC) 220V nominal (187-276 VAC)
AC Frequency:	47 - 63 Hz
Current draw:	8 amps at 120Vrms 5 amps at 220Vrms
Power Supply:	325 Watts

Physical:

Dimensions:
 24.75" high x 5.75" wide by 22" deep

Weight:

System Chassis:	59 lbs. fully loaded (with disks and tape)
Monitor:	approx. 60 lbs.

Peripherals:

- 5.25" Winchester disk drives
- 179 MB half-height Sync SCSI
- 332 MB half-height Sync SCSI
- 662 MB full-height Sync SCSI
- TPI flexible disk drives
- 1.44 MB 3.5" half-height
- 1.2 MB 5.25" half-height
- Tape Drive
- 150 MB 5.25" half-height QIC tape
- 2 GB 5.25" full-height

AViiON 400 Workstations

Fact Sheet

The AViiON 400 Series workstations extend the range of power and performance of the AViiON Workstation Family. The AV400 Series which includes the AV400, AV402, 410 and the AV412 offer advanced graphics features, industry standard I/O bus (VMEbus™), and a greater range of performance specifications. Housed in a compact deskside package with internal mass storage options, these single-user graphics workstations are designed for technical professionals who currently use traditional 32-bit high-end workstations. The AViiON 400 workstations are the second in a series of personal productivity tools manufactured by Data General that incorporate the Motorola 88K RISC (Reduced Instruction Set Computer) technology.

The AViiON 400 Series workstations offer advanced 32-bit stand-alone or distributed computing capabilities for single-

user graphics applications. The systems are designed around a single system board that contains the 88100 processor chip with floating point; two 88200 Cache and Memory Management Units (CMMU) for data and instruction bus (MBUS); interface logic to support Motorola's VMEbus (Revision C.1); two MBUS (MBUS is the AViiON workstation's internal high speed memory bus) connectors for the second CPU option, graphics options, and Z-Buffer option; the industry standard SCSI bus (Small Computer System Interface); integral 802.3 Ethernet; two RS232 asynchronous interfaces and a parallel printer interface. The graphics options are contained on three separate daughter boards that connect to the base system board's MBUS and provide 24-bit or 8-bit color graphics, and an optional 24-Bit Z-buffer.

Table 1 summarizes the major features of the AViiON 400 Series workstations.

<i>Feature</i>	<i>Description</i>
Complete single-board System functionality	Advanced single-user compute based on Motorola 88K RISC Processor running at either 16.67 or 20 MHz clock speed. Tightly coupled, on-chip Floating Point Unit Two 88200 Cache and Memory Management Units (CMMU) for improved performance Dual processor option. Support for Symmetric Multiprocessing in DG/UX Advanced 32-bit RISC technology Hardware support for Motorola's VMEbus (Revision C.1). Two 6U VMEbus slots in a compact, internal card cage Attractive, compact deskside packaging (24.75"H X 5.75"W X 22"D).
4 MB parity memory modules	Memory expansion capability of up to eight 4MB memory modules, for a total of 32MB. Integral disk and tape options—two full height 5 1/4" devices or one full height and two half height 5 1/8" devices Industry Standard SCSI interface for disk and tape (synchronous/asynchronous) Three-button optical mouse with pad PC/AT-101 compatible keyboards
Graphics	Choice of high performance, bit-mapped graphics with dedicated, dual ported display memory Color: 1280x1024x8 or 1280x1024x24 with 2 bits of overlay memory High resolution, flicker-free 19" color monitor Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance Standard MIT distribution of X11 r3 or higher X Server, Xlib, X Toolkit, X Clients PHIGS and GKS support through third party ISVs Compatible with AViiON 300 Series graphics Future support for OSF/Motif

Table 1. AViiON 400 Series features.

<i>Feature</i>	<i>Description</i>
Internal Mass storage/Tape back-up	<p>Deskside chassis can hold two 5¼" Full Height devices or one 5¼" Full Height device and two 5¼" Half Height devices or four 5¼" Half Height devices. The supported devices are:</p> <ul style="list-style-type: none"> 662 MB Winchester 5.25" FH SCSI 322 MB Winchester 5.25" FH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 150 MB QIC150 Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI. 1.2 MB 5.25" Diskette Disk HH SA4 50/SCSI.
External Mass storage/Tape back-up	<p>External PHU (Peripheral Housing Unit). Each housing can hold one 5¼" Full Height device and one 5¼" Half Height device or three 5¼" Half Height devices. The supported devices are</p> <ul style="list-style-type: none"> 662 MB Winchester 5.25" FH SCSI 322 MB Winchester 5.25" FH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 150 MB QIC Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI 1.2 MB 5.25" Diskette Disk HH SA450/SCSI
Customer environment/use characteristics	<p>Customer installable and maintainable Customer installable add-on memory, graphics options, second CPU option and peripherals 40db (quiet office) noise levels 90 day warranty on all system components</p>
Communications	<p>Ethernet interface standard (without transceiver or drop cable) Thick or Thin net connections available Two asynchronous, RS232C interfaces—from 150 to 19,600 baud Centronics/Data Products compatible line printer port</p>

Table 1. (con't) AViiON 400 Series features.

Product Description

The AViiON 400 Series workstations are deskside systems that provide the power and performance of a mainframe in an extremely small, compact package—the main chassis housing is only 24.75"H X 5.75"W X 22"D. These workstations are available in a wide range of configurations and with options for expandable graphics, memory, mass storage, and multi-CPU configurations. The base system board is available in 16.67 or 20MHz performance range, and offers two second CPU options of 16.67 or 20 MHz. Memory is expandable from 8 MB to 32 MB with 4 MB memory modules.

Architecture

Processor. The AViiON 400 Series Workstation is based on the 88000 series of RISC processors from Motorola. The 88000 series is comprised of the 88100 RISC CPU, and two 88200 cache/MMU (Memory Management Unit) chips. For more information, see the AViiON 300 Series MAPS/PLUS article on page 202-3.

System board. The AViiON 400 Series Workstation system board consists of a single 18" x 12" multilayer PCB that includes

- a 16.67 or a 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- a closely coupled, integrated floating point unit
- eight connectors capable of holding up to eight 4 MB memory modules
- two MBUS connectors for connecting the second CPU and graphics options
- interface logic that supports Revision C.1 of the VMEbus
- industry standard SCSI interface for connecting peripherals such as disk and tape
- industry standard 802.3 Ethernet Interface (w/o transceiver)
- keyboard interface—AT-compatible and Japanese AX-compatible
- mouse interface
- two asynchronous interfaces—RS232 with one offering full modem support
- parallel line printer interface (Centronics-compatible)
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot.

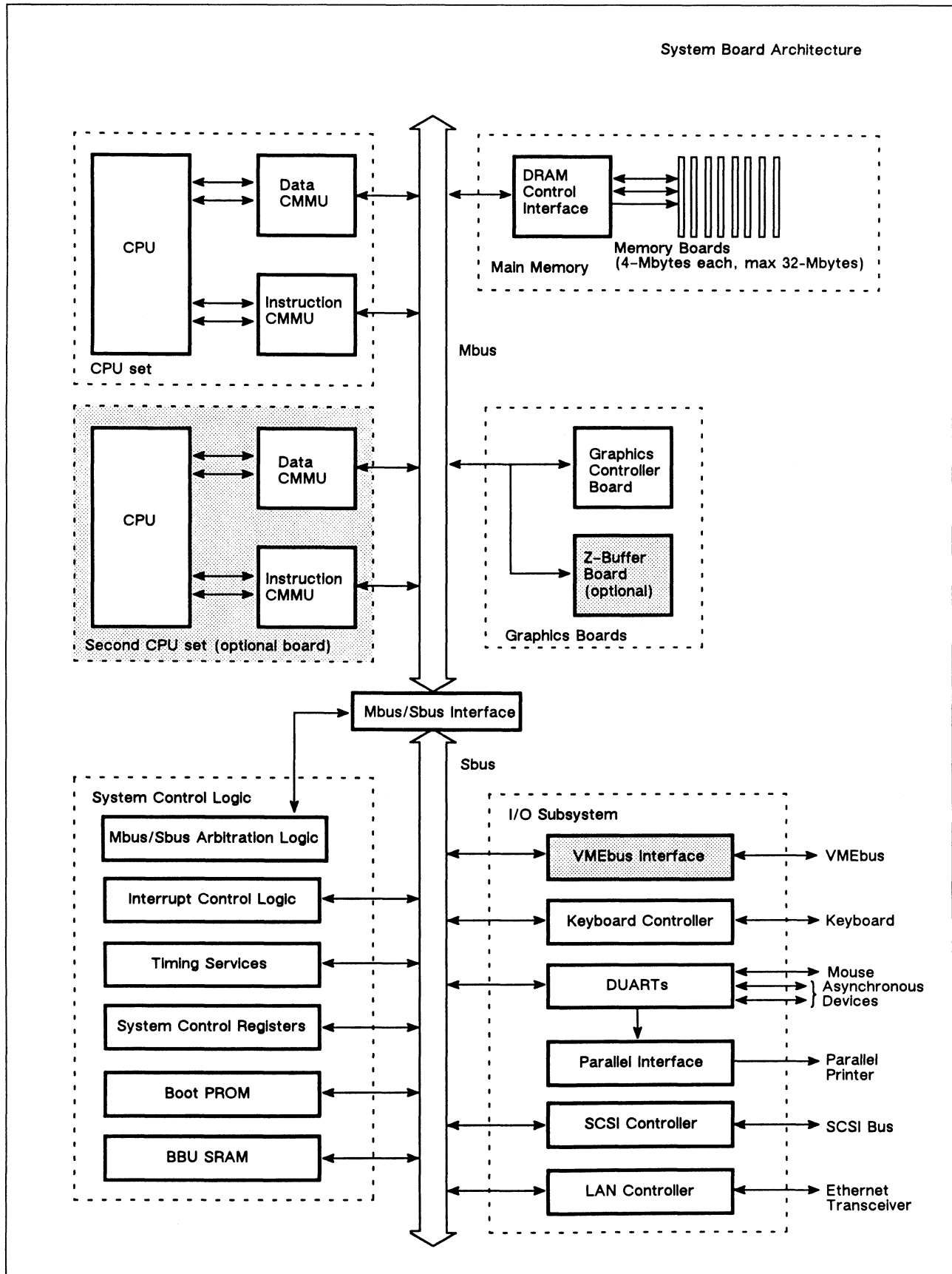


Figure 1. System Block Diagram

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, its use of the Eurocard format, its high performance, and its versatility are some of the reasons that it appeals to a wide range of users. The AViiON 400 Series systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price (the VME bus implementation on the AViiON 5000/6000 Series Systems was designed to accommodate block mode transfers—the AViiON 400 does not support this extension to the C.1 specification).

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in a closely coupled hardware configuration. The VMEbus specification on the AViiON 400 systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of both the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEE and IEC Standards Committee.

The VMEbus specification provides for a mechanical as well as an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane: the connectors are 96-pin female type, and in the AViiON 400, a separate 6U backplane provides two slots, each slot consisting of two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master since it controls the flow of data between itself and a Slave. Data transfers initiated by VMEbus devices other than the system board are considered slave transfers. VMEbus devices can transfer data to the AViiON 400's internal system bus, MBus, in single words, half words, or bytes.

VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 400, the design allows for more than one Master.

On the AViiON 400, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Table 2 details the C.1 interface specifications and options and the level of implementation on the AViiON 400.

<i>Specification</i>	<i>Options</i>
Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT. A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock The IACK and VMEbus grant daisy chain driver The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.) The VMEbus arbitration time out logic (64 micro-sec.) VMEbus watchdog timer (64 micro-sec.)
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C1 Interface specifications and options

Peripherals

The AViiON 400 Series Workstation has a SCSI bus for connecting mass storage devices. The SCSI bus originates

on the system board and provides connection for the internal storage devices, then exits via the rear of the unit and terminates in a Champ connector for external Peripheral Housing Units.

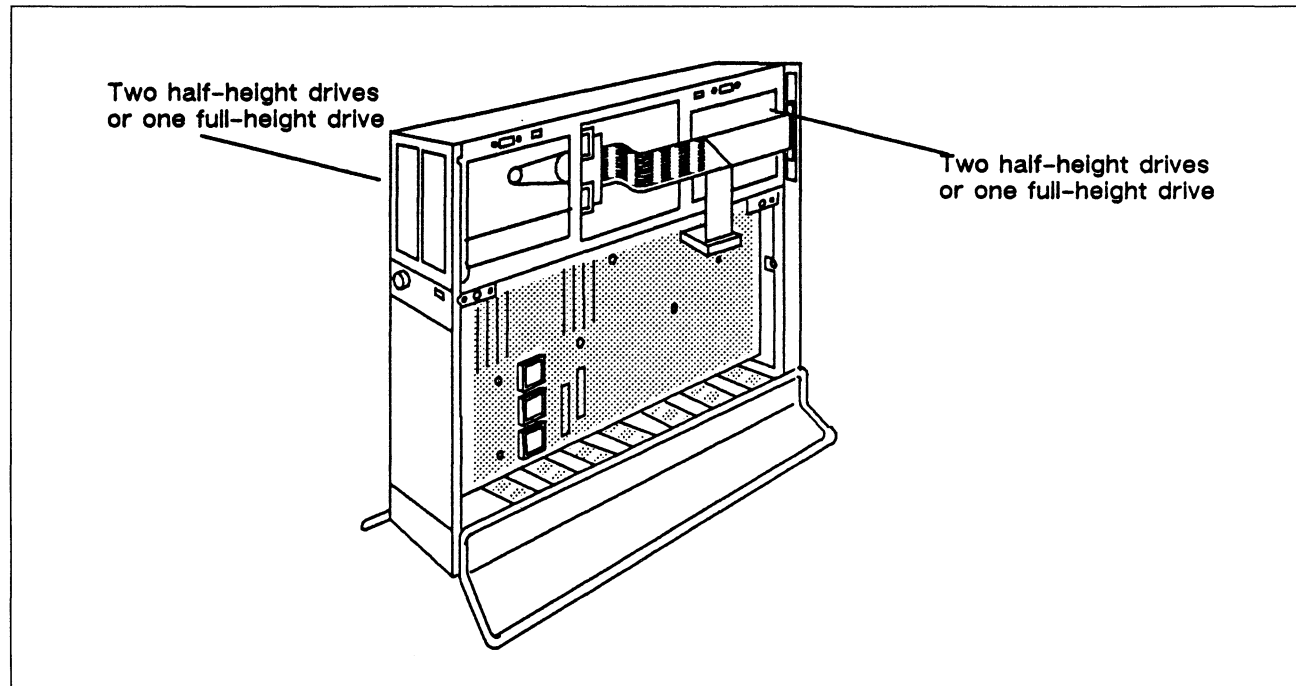


Figure 2. AV400 Internal Peripheral Configuration

In the main deskside chassis, space is available for two 5¼" Full Height devices, or four Half Height devices, one 5¼" Full Height device and two 5¼" Half Height devices. Up to seven SCSI devices can be supported through the external PHU.

All external Data General peripherals for the AViiON 400 Series Workstation are mounted in the desktop PHU, which can accommodate a variety of storage and backup options. These options include

- a 662MB 5¼" Full Height Winchester disk with 16 ms access time,
- 322MB 5¼" Full Height Winchester disk with 16 ms access time,
- 5¼" Half Height 150MB cartridge tape drive conforming to the QIC 150 industry standard, and
- a 179 MB 5¼" half height Winchester Disk with 18 ms access time.

Each PHU can accommodate one full height and one half height units or three half height units.

In addition to the standard storage devices, Data General offers two diskettes; 1.44 MB 3.5" half-height and 1.2 MB 5.25" half-height. These diskettes offer industry standard

format and compatibility with existing MS-DOS environments. The 1.44 MB diskette can read, write and format data in the 720KB diskette format. The 1.2 MB diskette is also read, write and format compatible with the 360KB diskette format. These diskettes have an interface called the SA450 which must be converted to the SCSI interface (a small converter board is packaged with the diskette). Mounted within the AViiON 400 chassis, the converter board can support up to two diskettes. When configured with the external PHU, the converter board can support up to two diskettes. The diskettes are available either with or without the converter board, but for use with the AViiON 300 or 400 systems, the first diskette must contain the converter board.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 400 Series chassis consumes 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, which will support configurations of up to two additional PHUs per workstation. The PHU contains a 125 watt power supply, internal fan, internal cabling (2.3 ft), and SCSI Bus terminator. The first SCSI cable from the chassis to the first PHU is different than the one used on the AV300 workstations.

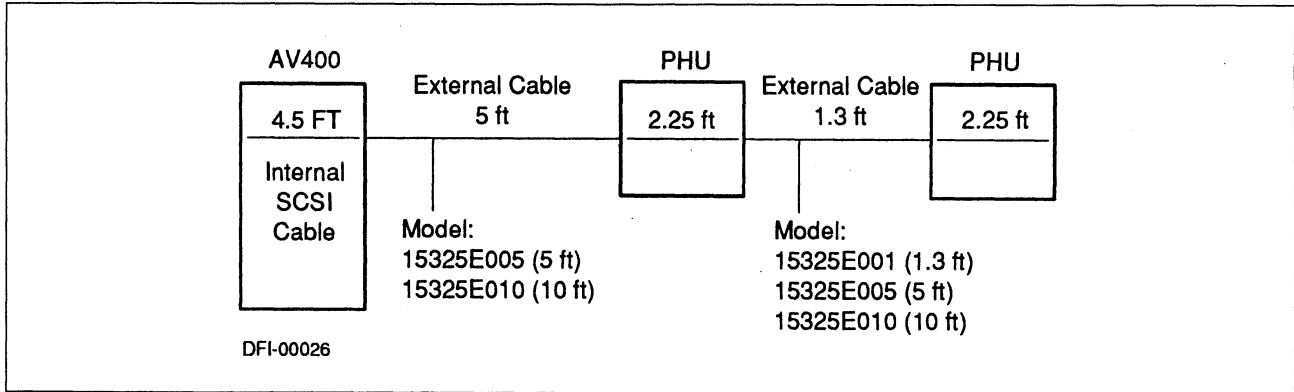


Figure 3. SCSI Cable length configurations

Graphics Hardware

Graphics hardware for the AViiON 400 Series Workstation consists of either an 8-bit or 24-bit color controller contained on separate daughter cards that mount on the main system board through a 96 pin MBUS connector for maximum performance. The Z-buffer option is a separate daughter card that plugs onto the graphics board.

8-Bit Color. The 8-bit color unit consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The design of the 8-bit color controller is compatible with the AViiON 300 Series 8-bit color controller (see Figure 4). The 8-bit color controller includes

- eight 256K dual ported video RAMS
- video timing logic
- color Look Up Table (LUT) for 256 displayable colors from a palette of 16.7 million combinations for the 8-bit color
- one 256-location LUT
- addressable resolution of 1536 X 1024
- double buffering: 2 x 4 Planes (16 colors displayable)
- 2-bits for overlay
- flat or Gouraud shading.

24-Bit Color. The 24-bit color unit consists of three special high density gate arrays for the display and control of the video display and video memory for the frame buffer (see Figure 5). The 24-bit color controller includes

- twenty-four 256 KB dual ported video RAMS
- Video timing logic
- color Look Up Table (LUT) for 16.7 million displayable colors from a palette of 16.7 million combinations for true color representation
- three 256-location LUTs
- addressable resolution of 2048 X 1024
- 2-bits for overlay
- double buffering: 2 x 12 plane (4096 colors displayable)
- flat or Gouraud shading

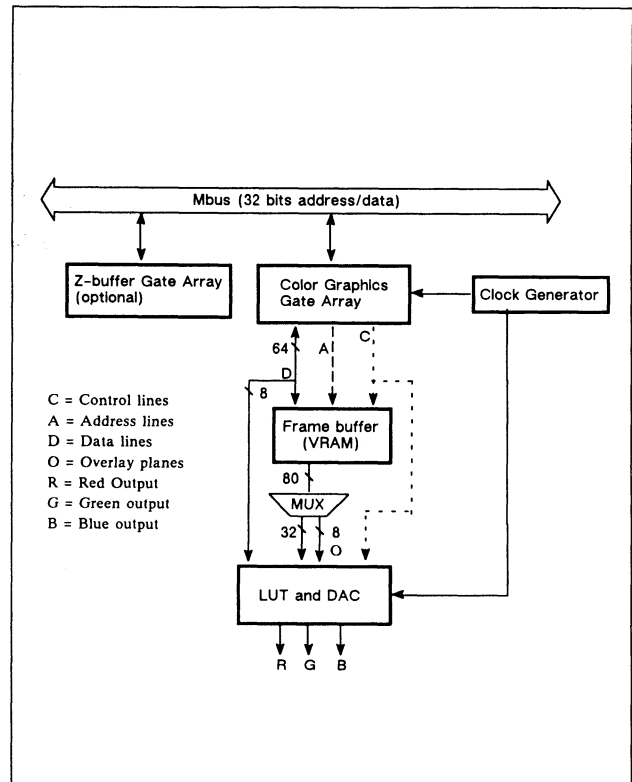


Figure 4. 8-Bit Color Graphics Subsystem

24-Bit Z-Buffer. The Z-Buffer option consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The 24-Bit Z-Buffer option provides greater accuracy and picture quality (than commonly used 16-Bit Z-Buffers) in performing hidden line and hidden surface removal. The Z-Buffer includes

- 256 KB X 4 DRAMS
- programmable Hither and yon clipping planes

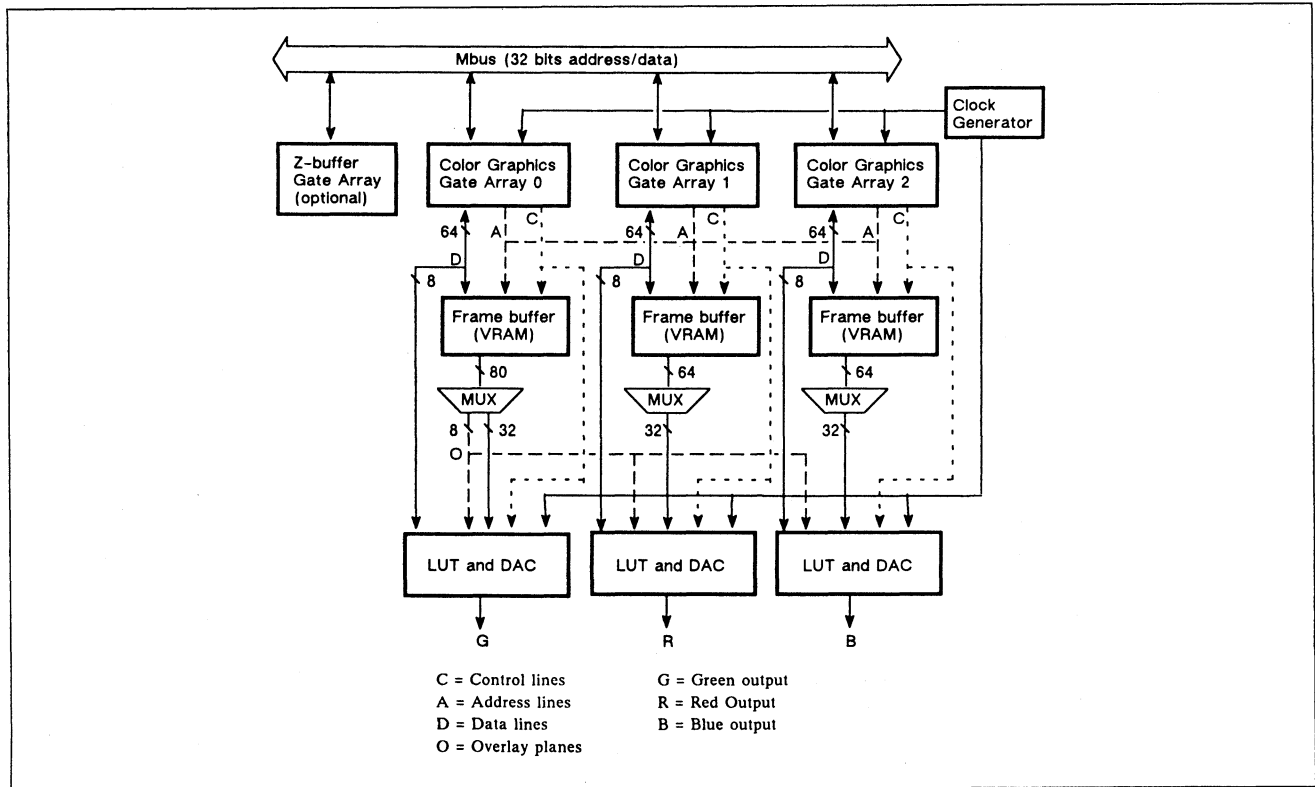


Figure 5. 24-bit Color Graphics Subsystem

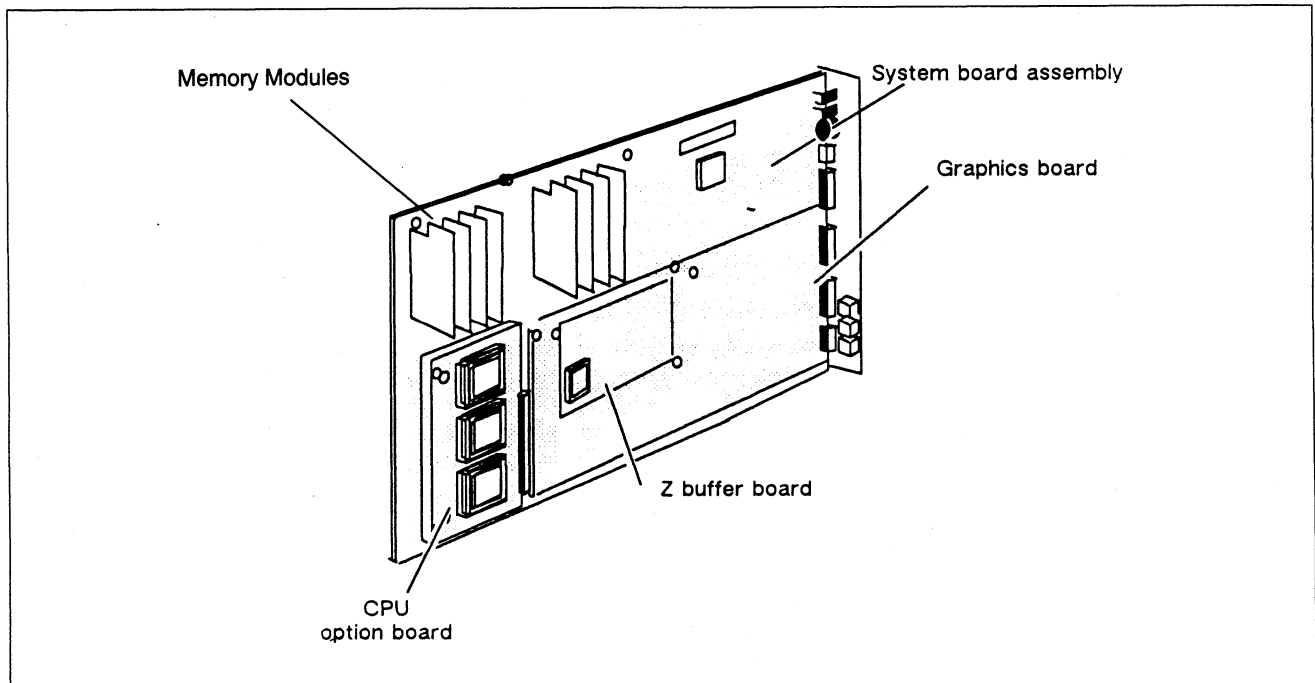


Figure 6. Graphics Options Diagram

Japanese Language Support. The color units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard, the AViiON 400 Series Workstation allows customers to use the workstation for Japanese applications and environments.

Ordering

The AViiON 400 Series Workstations will initially be offered as either Packaged Systems or as individual Base Packages without graphics (graphics controller, monitor, mouse or keyboard), and with or without peripherals, an arrangement that allows for greater flexibility in configurations and ordering (see Tables 3 - 12). In addition, the open architecture design of the workstations allows customers to use keyboards and external peripherals that are compatible with the different industry standards supported. For example, the keyboard controller supports either AT-compatible or Japanese AX-compatible keyboards, and the SCSI interface supports SCSI-compatible peripherals.

Each system board includes:

- either a 16.67 or a 20 Mhz CPU,
- hardware support for industry standard VMEbus (through the use of connectors on the system board),
- integral Ethernet LAN interface (IEEE 802.3),
- Small Computer Standard Interface (SCSI) for high performance I/O,
- two RS-232C async ports, and
- one parallel printer port (Centronix/Data Products compatible)

The Graphics Packages includes:

- 3-button optical mouse,
- keyboard,
- a 19" color monitor, and
- either an 8-plane or a 24-plane graphics controller.

Systems ordered with DG/UX and a disk have the operating system installed on the disk. Media and documentation must be ordered separately. The first system ordered (either a workstation or server) must include a 150 MB tape to hold the operating system (included in the event of a disk failure).

In configurations that include a disk but no tape drive, media (the tape with the operating system) will not be shipped with the system, as the operating system is pre-loaded on the disk. This could pose a problem with a system installed in a network on non-Data General systems. The operating system will be pre-loaded at the factory but in the event of a disk malfunction, it would be difficult to reload the operating system without the media.

NOTE: A transceiver (model 4540, 4540-A OR 4619) and drop cable (model 1329) are necessary for the workstation to be connected to an Ethernet LAN.

<i>Model Number</i>	<i>Description</i>
G70063	8MB, 16 MHz Base System
G70065	8MB, 16 MHz Base System, 322 MB Disk
G70069	8MB, 16 MHz Base System, 662 MB Disk
G70113	8MB, dual 16 MHz Base System, 662 MB Disk

Table 3. Packaged Base System—without graphics, monitor, keyboard or mouse.

<i>Model Number</i>	<i>Description</i>
G7206	19" monitor, 8-Bit color
G7208	19" monitor, 24-Bit color

Table 4. Graphics Package—includes keyboard, mouse graphics controller and monitor.

<i>Model Number</i>	<i>Description</i>
7202	8-Bit Color Board
7203	24-Bit Color Board
7204	Optional 24-Bit Z-buffer

Table 5. Board Level Components.

<i>Model Number</i>	<i>Description</i>
7012	8 MB Memory Package
7000	4 MB Memory Module
G6487	19" Color Monitor
7006	Second CPU upgrade 16 MHz
70111	Second CPU upgrade 25 MHz w/8 MB
4512	3 Button Optical Mouse
G6488	101/102 key AT-Style keyboard— REQUIRES LANGUAGE SUFFIX

Table 6. Options.

<i>Model Number</i>	<i>Description</i>
G70109	24 MB, 20 MHz System with 8-Bit color, 662 MB Disk, 150 MB Tape
G70110	24 MB, 20 MHz System with 24-Bit color, 662 MB Disk, 150 MB Tape
G70112	24 MB, dual 20 MHz System with 8-Bit color, 662 MB Disk, 150 MB Tape

Table 7. 20 MHz Packaged Systems.

<i>Model Number</i>	<i>Description</i>
-A	US
-B	UK
-C	French
-D	German
-S	Japanese AX-compatible (AX is the international standard for the Japanese Language)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish/Norwegian

Table 7. Language Suffix for Keyboard

<i>Model Number</i>	<i>Description</i>
G10565	PHU
G6605	662 MB Disk in PHU
G6604	322 MB Disk/150 MB Tape in PHU
G6603	179 MB Disk/150 MB Tape in PHU
G6601	322 MB Disk in PHU
G6600	179 MB Disk in PHU
G6602	150 MB QIC Tape in PHU
G6591-A	2 GB Cartridge Tape 5 1/4 " full height in PHU

Table 8. External Peripherals

<i>Model Number</i>	<i>Description</i>
G6577-E	150 MB QIC Tape add-on for PHU
6539-E	179 MB Disk add-on for PHU
6491-E	320 MB Disk add-on for PHU
6554-E	662 MB Disk add-on for PHU
G6591-E	2 Gbyte Cartridge Tape 5 1/4 " full height for PHU
G6562-E	1.44 MB 3 1/2 " half height Diskette Drive with SA450/SCSI converter
G6563-E	1.2 MB 5 1/4 " half height Diskette Drive with SA450/SCSI converter
G6562-EX	1.44 MB 3 1/2 " half height Diskette Drive without SA450/SCSI converter
G6563-EX	1.2 MB 5 1/4 " half height Diskette Drive without SA450/SCSI converter

Table 9. External Add-On Peripherals for PHU

<i>Model Number</i>	<i>Description</i>
G6577-F	150 MB QIC Tape add-on
6539-F	179 MB Disk add-on
6491-F	320 MB Disk add-on
6554-F	662 MB Disk add-on
G6591-F	2 Gbyte Cartridge Tape 5 1/4 " full height
G6562-F	1.44 MB 3 1/2 " half height Diskette Drive with SA450/SCSI converter
G6563-F	1.2 MB 5 1/4 " half height Diskette Drive with SA450/SCSI converter
G6562-FX	1.44 MB 3 1/2 " half height Diskette Drive without SA450/SCSI converter
G6563-FX	1.2 MB 5 1/4 " half height Diskette Drive without SA450/SCSI converter

Table 10. Internal Add-On Peripherals for the AV400 System Chassis

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver

Table 11. Ethernet Options

Configurations

Table 12 combines the different Base Packages with the different Graphics Packages. Use this table to order the correct system based on size of monitor, number of bit planes (for color), and disk option. The model numbers are included in the table.

<i>BASE SYSTEM/GRAPHICS</i>	<i>19" color 8-plane</i>	<i>19" color 24-plane</i>
Diskless 16 MHz, 8 MB mem	7206/70063	7208/70063
322 MB Disk, 16 MHz, 8 MB mem	7206/70065	7208/70065
662 MB Disk, 16 MHz, 8 MB mem	7206/70069	7208/70069
662 MB Disk, Dual 16 MHz, 8 MB mem	7206/70113	7208/70113

Table 12. Base system graphics packages.

In addition, the AV400 power supply provides the following power for the system boards and peripherals mounted within the chassis. The desktop Peripheral Housing Unit supplies its own power. When configuring systems, subtract the power

for each component from the total power supplied. This is important for systems which have the maximum number of graphics options, memory, disk and tapes installed if third party VME boards are to be installed.

BOARD/POWER	+5V 37 amps		-12V 1.0 amp		+12V 10 amps		+9V 1.0 amp	
	typ	max	typ	max	typ	max	typ	max
SYSTEM BD 16	14.4	14.4		0.1		0.2		
SYSTEM BD 20	14.5	14.5		0.1		0.2		
2ND CPU 16	0.6	1.0						
2ND CPU 20	0.6	1.0						
4 MB MEMORY	0.1	0.2						
8-BIT COLOR	1.1	2.5						
24-BIT COLOR	2.5	4.7						
Z-BUFFER	0.4	1.1						
662 MB DISK	0.6	0.7			1.5	2.0		
322 MB DISK	2.0	2.0			2.25	3.3		
179 MB DISK	1.0	1.3			.9	4.5		
150 MB TAPE	.5	.7			1.5	2.5		
2 GB TAPE	2.02	2.7			.41	.5		
1.44 MB FPY	0.65	1.2						
1.2 MB FPY	0.3	0.5			0.22	0.1		
SCSI/SA450 Con	0.1	0.1			0.22	0.1		

Table 13. AV400 Power Supply.

The AViiON 400 Series Workstation will also operate with any DG/UX supported general purpose printer.

Important Ordering Notes:

For a more complete description of DG/UX and ordering information, please refer to the MAPS/PLUS article for DG/UX

To Order Workstations:

1. Select the package that best meets your needs. This will consist of a Base Package with a Graphics Package. Add the appropriate suffix for font and power.
2. Fill out the Program License Schedule 501 and purchase order. Remember to itemize each operating system license.
3. Order the appropriate software distribution and services' packages.

Related Information

AViiON 300 and 400 Series Stations Programming System Control and I/O Registers

Setting Up and Starting AViiON 400 Series Station	014-001858-00
Using the AViiON System Control Monitor	014-001802-03
Expanding and Maintaining AViiON 400 Series Stations	014-001859-00
MC88200 User's Manual, Cache Memory/Management Unit	014-001808-01
MC88100 User's Manual, Reduced Instruction Set Computer	014-001809-01
Installing and Maintaining the Model 10565 Mass Storage Subsystems	014-001810-00
Installing and Operating Your Model 6538/6539 Half-Height Winchester Disk Drive	014-001722-00
AViiON Workstation Product Brief	012-003496-01
AViiON Technical Specifications	012-003677-00
AV400 Workstation Product Brief	012-003622-00
Using AViiON System Diagnostics	014-001863
Setting Up and Starting AViiON 400 Series Stations	014-001858
Expanding and Maintaining AViiON 400 Series Stations	014-001859
AViiON 300 and 400 Series Stations Programming System Control and I/O Registers	014-001800
Using the AViiON System Control Monitor (SCM)	014-001802
Installing and Operating the Model 10565 Mass-Storage Subsystem	014-001810
MC88100 User's Manual, Reduced Instruction Set Computer (RISC)	014-001809
MC88100 User's Manual, Cache/Memory Management Unit (CMMU)	014-001808
Installing the Model 6562/6563-Series Diskette Drives	014-001921
Installing the Model 6491 Disk Drive	014-001460
Installing Your Model 6554/6555 Series Disk Drive	014-001702
Installing and Operating Your Model 6590 Series Cartridge Tape Drive	014-001701
Installing and Operating Your Model 6538/6539 Half-Height Winchester Disk Drive	014-001722
Installing and Operating Your Model 6536/6577 Cartridge Tape Drive	014-001699
Installing the Model 6562/6563-Series Diskette Drives	014-001921

Specifications

Processor:
 Motorola 88100
 16.67 or 20 MHz 88100 processor with integral FPU
 Single- or dual-processor options

Memory Management:
 Virtual memory
 Two 88200 CMMUs/CPU; 4 GB per process

Caches:
 Data cache and instruction cache
 Size: 16 KB per side
 Organization: 4-way set associative

Main Memory:
 8 MB—32 MB with parity
 Expansion: 4-MB modules
 Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O:
 LAN—ETHERNET
 IEEE 802.3
 Bandwidth: 10 Mbits/sec
 Parallel Port
 Centronics- and Data Products-compatible
 Two Serial Ports
 RS-232 (one with modem control); baud rates up to 19.2 kilobaud
 SCSI
 Asynchronous/Synchronous

VMEbus Backplane:
 Motorola's VMEbus Revision C.1
 IEEE P1014
 Two 6U slots

Graphics Processor:
 8-plane gray-scale or color
 24-plane color
 24-bit Z-buffer

Monitors:
 Pixel aspect ratio
 1:1.
 Refresh Rate
 70 Hz, flicker-free 19" non-interlaced
 Pixel Rate
 125 MHz
 Controls
 Brightness, contrast

Gray-scale
 Monitor Format 20" landsc.
 Displayable Res. 1280x1024
 Addressable Res. 1536x1024
 Colors Display
 Single Buffered 256 shades
 Double Buffered N/A
 Color LUT
 Color Palette N/A
 Overlay Planes 2
 Z-buffer N/A

8-plane Color Monitor:
 Monitor Format 19" landsc.
 Displayable Res. 1280x1024
 Addressable Res. 2048x1024
 Colors Display
 Single Buffered 256
 Double Buffered 16
 Color LUT 1 x 256
 Color Palette 16.7 million
 Overlay Planes 2
 Z-buffer 24-bit

24-plane color
 Monitor Format 19" landsc.
 Displayable Res. 1280x1024
 Addressable Res. 1536x1024
 Colors Display
 Single Buffered True color
 Double Buffered 4096
 Color LUT 3 x 256
 Color Palette 16.7 million
 Overlay Planes 2
 Z-buffer 24-bit

User Interface
 Keyboard
 Style: 101/102-key PC-AT compatible
 Available versions: French, German, Italian, Japanese, Spanish, Swedish/Norwegian, UK, US
 Mouse
 3-button optical

Environmental:
 Temperature
 Operating/Nonoperating: 0 - 38°C / -40 - 70°C
 Relative Humidity
 Operating/Nonoperating: 0 - 80% / 10 - 90%

Electrical
 AC Voltage: 120V nominal (85-138 VAC)
 220V nominal (187-276 VAC)
 AC Frequency: 47 - 63 Hz
 Current draw: 8 amps at 120Vrms
 5 amps at 220Vrms
 Power Supply: 325 Watts

Physical:
 Dimensions:
 24.75" high x 5.75" wide by 22" deep
 Weight:
 System Chassis: 59 lbs. fully loaded (with disks and tape)
 Monitor: approx. 60 lbs.

Peripherals:
 5.25" Winchester disk drives
 179 MB half-height Sync SCSI
 322 MB full-height Async SCSI
 662 MB full-height Sync SCSI
 TPI flexible disk drives
 1.44 MB 3.5" half-height
 1.2 MB 5.25" half-height
 Tape Drive
 150 MB 5.25" half-height QIC tape
 2 GB 5.25" full-height



AViiON 4100 Series Servers

Fact Sheet

This revision reflects deletion of 16 MHz processors; deeper async support (VDA/255) and 1.4GB Winchester disk have been added.

The AV 4100 Series Servers are cost-effective, office-package systems based on the Motorola 88000 RISC architecture. The series provides a small-footprint tower package in a 20MHz, 88100 uni- (AV 4100) or dual processor (AV 4120). They are suitable for a wide spectrum of time-sharing and server environments.

An integrated motherboard (and daughtercards) offers single or dual CPUs, parity memory, SCSI bus controller, Ethernet controller, and VME interface. The second CPU is standard on the 4120 and optional on the AV 4100. Two VMEbus slots support asynchronous and synchronous communications controllers.

In a time-sharing environment, as many as 255 asynchronous devices can be supported via the VME Distributed Async Host Adapter (VDA/255). The AV 4100 systems can be connected to other intelligent systems via an industry-standard IEEE 802.3 Ethernet LAN to act as file, compute, or cleaved application servers.

Integrated System Board

- 20MHz Motorola 88100 RISC Processor
- Two 88200 Cache and Memory Management Units (CMMU)
- Dual processor standard on the AV 4120, optional on the AV 4100.
- 16 to 128MB byte parity RAM
- Industry standard SCSI interface for disk and tape
 - Supports synchronous (4 Mbits/sec) and asynchronous (1.5 Mbits/sec) operation
- IEEE 802.3 LAN interface
- Two RS-232C serial ports (one used for system console)
- Centronics-compatible parallel port
- Hardware support for Motorola's VMEbus (Revision C.1)

Attractive Tower Package

- Compact small-footprint desktide chassis
 - (24.75"H x 5.75"W x 22"D)
- Internal mass storage (see following)

- Two slot (6U) VMEbus card cage
- 325W power supply

Internal Mass Storage/Tape Back-up

- Desktide chassis can hold four 5 1/4" half-height (HH) devices (two can be removable) or one 5 1/4" full-height (FH) device and two 5 1/4" HH devices (two can be removable)
 - 150MB or 320/525 MB HH QIC tape is standard and uses one removable media bay
 - Packages include either a HH 322MB, FH 662MB, FH 1.4GB or FH 1GB Winchester disk
- Devices supported
 - 1 GB Winchester 5.25" FH SCSI
 - 1.4GB Winchester 5.25" FH SCSI
 - 662 MB Winchester 5.25" FH SCSI
 - 332 MB Winchester 5.25" HH SCSI
 - 179 MB Winchester 5.25" HH SCSI
 - 150 MB QIC150 Cartridge Tape 5.25" HH SCSI
 - 320/525 QIC Cartridge Tape 5.25" HH SCSI
 - 600 MB CD-ROM 5.25" HH SCSI

External Mass storage/Tape back-up

- Up to seven SCSI devices (total internal and external) are supported for a maximum of 8.4 GB of disk storage
- External mass storage Peripheral Housing Unit (PHU)
 - Each housing can hold one 5 1/4" FH device and one 5 1/4" HH device or three 5 1/4" HH devices.
- External Combined Storage Subsystem 2/DC (CSS 2/DC)
 - Each housing can hold up to five 5 1/4" FH devices or ten HH devices (limited by system maximum of seven devices)
- Devices supported
 - 1GB Winchester 5.25" FH SCSI
 - 1.4GB Winchester 5.25" FH SCSI
 - 662MB Winchester 5.25" FH SCSI
 - 332MB Winchester 5.25" HH SCSI
 - 179MB Winchester 5.25" HH SCSI
 - 2GB Cartridge Tape Backup 5.25" FH SCSI
 - 150MB QIC Cartridge Tape 5.25" HH SCSI
 - 320/525MB QIC Cartridge Tape 5.25" HH SCSI
 - 1600bpi 9-track tape drive (separate tabletop enclosure)
 - 600MB CD-ROM 5.25" HH SCSI
 - 590MB Erasable Optical Disk Drive 5.25" FH SCSI

Standard Communications

- Ethernet interface standard (without transceiver or drop cable). Supports either thick or thin net connections.
- Two asynchronous, RS-232C interfaces - from 150 to 19,600 baud
- Centronics compatible parallel printer port

Optional VME expansion boards

- VAC/16 16 RS-232C port asynchronous multiplexor (max.2) -OR-
- VDA/255 asynchronous subsystem host adapter (up to 255 RS-232C asynchronous connections via VDC/8 and VDC/16 cluster controllers) - max. 1
- 32-user distributed async package (low-cost bundle of VDA/255 and 2 VDC/16's)
- VSC/3 3 port synchronous communications board - max. 1
- Second Ethernet interface (without transceiver or drop cable) - max. 1. Supports either thick or thin net connections.

Customer environment/use characteristics

- Customer installable and maintainable
- Customer installable add-on memory options, second CPU option and peripherals
- 40db (quiet office) noise levels
- 90 day on-site warranty on all system components

Product Description

The AViiON 4100 Series deskside servers offer RISC multi-processor power in an extremely small, compact package. With extensive internal and external mass storage, up to 128 MB of memory, and industry-standard VMEbus controllers, these systems provide a wide range of configurations and options for memory, mass storage and multi-CPU configurations.

The base system board has a 20MHz uniprocessor, with an optional second CPU that's standard in the AV 4120. Base memory is 16MB (one 16MB SIMM). A maximum of 8 SIMMs are supported. 4MB and 16MB SIMMS can co-exist in a single system.

CPU's	1-2
VME Slots	2
Memory	16-128MB*
Asynchronous Connects std.	2 (1 for console)
Asynchronous Connects opt. (1 VDA Max.)	255
or	
Asynchronous Connects opt. (2 VAC/16 max.)	32
Ethernet LAN	1-2
Token Ring LAN	0-2
Sync Ports (1 VSC/3 max.)	0-3
External PHUs	0-2
External CSS2/DC	0-1
Disk	
Integral	332MB-1.7MB
External	0-7.0GB
Cartridge Tapes	1-2
Reel-to-Reel Tapes	0-1
<p>Note: Due to mass storage and bus slot limitations, not all maxima can be achieved simultaneously. *128MB requires PROM revision 5.05 or greater. The limit is 112MB with earlier PROMS.</p>	

Table 1. Configuration range for AV 4100 Series

Architecture

The AViiON 4100 Series servers are based on Motorola 88000 RISC processors and contain the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. The AV 4120 has two 88100 CPU chips and four 88200 CMMU chips. See the AViiON 5000/6000 Series MAPS/PLUS article on page 202-13 for more information about the 88K processor architecture.

The AV 4100 series board is a single 18" x 12" multilayer PCB that includes

- A 20MHz (AV 4100) Motorola 88100 RISC CPU (AV 4120 has two) and two 88200 CMMUs (AV 4120 has four)
- Closely coupled, integrated floating point unit

- Eight connectors capable of holding up to eight memory modules
- MBUS connector for the second CPU
- Interface logic supporting Revision C.1 of the VMEbus
- Industry-standard SCSI interface for connecting peripherals such as disk and tape
- Industry-standard 802.3 Ethernet Interface (w/o transceiver)
- Two, asynchronous interfaces - RS232 with one offering full modem support
- Parallel line printer interface (Centronics compatible)
- Time-of-Boot clock and calendar
- Power-up diagnostics

Figure 1 shows a block diagram of the AV 4100 system architecture. Note that the AV 4100 Series uses the same system board as the AV 400 series. The mouse and keyboard connectors are on the board, although they are not used for server configurations.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its Eurocard format, performance, and versatility are some of the reasons that it appeals to a wide range of users, especially in the technical marketplace. DGC chose the VMEbus for the AViiON systems because it is an industry-standard bus that offers high performance at a reasonable price. The VMEbus implementation for AViiON 5000/6000 Series Systems incorporates block-mode transfers, but the AViiON 4100 Series doesn't support this option to the C.1 specification.

The VMEbus specification defines an interface system for interconnecting data processing, data storage and peripheral control devices in a closely-coupled hardware configuration. The specification for the VMEbus that is incorporated in the AViiON 4100 conforms to Motorola's Revision C.1 VMEbus specification.1

The C.1 specification evolved from work by the IEEE P1014 Standard Committee and the IEC 47b Standards Committee. The IEEE P1014 Standards Committee approved the specification in their draft 1.2 which is undergoing IEEE and IEC final approval.

The VMEbus specification provides for a mechanical and an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female connectors. In the AViiON 4100 Series, a separate 6U backplane is designed to provide two slots, each slot consisting of two 96-pin connectors called J1 and J2, the J1 connector being the uppermost connector and J2 the lower. In addition to the VMEbus slots the backplane provides the power connection for the system board.

The VMEbus incorporates the Master/Slave concept. Within this framework, the system board is the Master, since it controls the flow of data between itself and any other device (the Slave). Data transfers initiated by VMEbus devices other than the system board are considered "slave" transfers. VMEbus devices can transfer data to the AV 4100's internal system bus—MBUS—in single words, half-words, or bytes.

VMEbus transactions are governed by a single-bus Master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 4100 Series, the design allows for more than one Master, but the system board is always a Master.

In the AViiON 4100 Series, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, and performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8-, 16-, and 32-bit MBUS masters and slaves as well as the 8-, 16-, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

The C.1 interface specifications and options implemented on the AViiON 4100 Series are listed in Table 2.

Mass Storage

The AV 4100 Series offers an integral SCSI bus controller for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices, then exits the rear of the unit and terminates in a Champ connector for connecting external Peripheral Housing Units. The SCSI controller supports either asynchronous (1.5 MB/s) or synchronous (4 MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU), or Combined Storage Subsystem 2/DC (CSS2/DC).

In the main deskside chassis, space is provided for one FH and two HH 5.25" devices. Standard in all system packages is a 5.25" HH 150MB or 320/525MB QIC cartridge tape, and either a 332MB 5.25" HH Winchester disk with 14ms seek time, a 662MB 5.25" FH Winchester disk with 16ms seek time or a 1GB 5.25" FH Winchester disk with 15ms seek time or a 1.4GB 5.25" FH Winchester with 15ms seek time. A 179MB 5.25" HH Winchester disk with 18ms seek time is available to fit the remaining bay.

All external Data General peripherals, with the exception of the tabletop 9-track tape option, for the AViiON 4100 Series are mounted in the desktop Peripheral Housing Unit or deskside Combined Storage Subsystem 2/DC which can accommodate a variety of storage and backup options. These options include

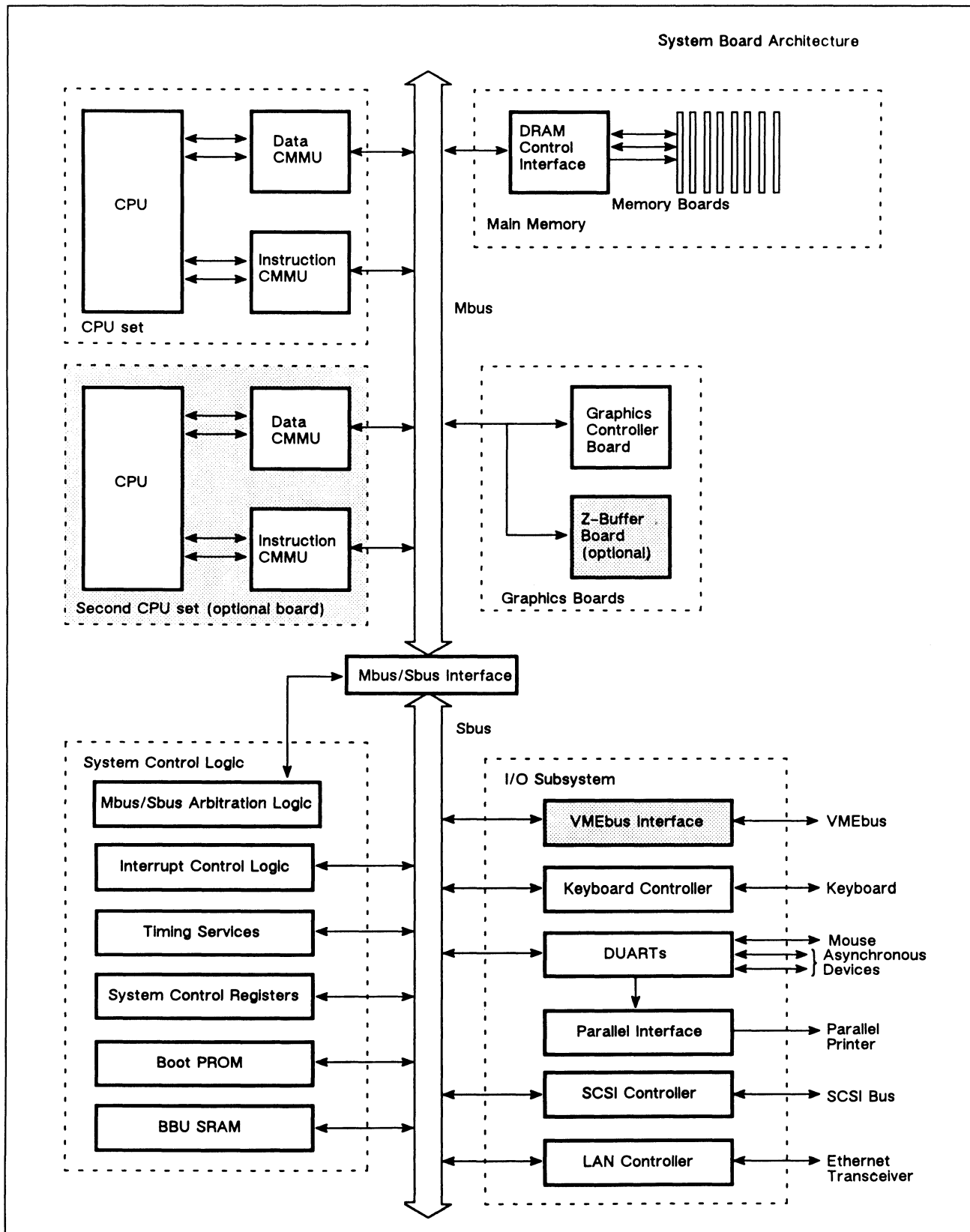


Figure 1. System Block Diagram

Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock. The IACK and VMEbus grant daisy chain driver. The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.). The VMEbus arbitration time out logic (64 micro-sec.). VMEbus watchdog timer (64 micro-sec.).
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C.1 interface specifications and options.

the 179MB, 322MB, 662MB, 1GB and 1.4GB Winchester disks, 150MB and 320/525MB QIC tapes, 2GB FH 5.25" cartridge tape drive, 600MB CD-ROM and 590MB erasable optical disk drive. Each Peripheral Housing Unit can accommodate one FH and one HH unit or three HH units. Each CSS2/DC can accommodate up to 5 FH or 10 HH 5.25" devices. (Note: AV 4100 series is limited to 7 devices).

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 4100 Series chassis requires 4.5 feet for the internal peripherals, leaving 15.1 feet for external

peripherals, enough space for configurations of up to two additional Peripheral Housing Units per workstation. Figure 2 illustrates the available cabling options. The Peripheral Housing Unit contains an 125 watt power supply, internal fan, internal cabling (2.25 ft.) and SCSI Bus terminator. The CSS2/DC contains one or two power supplies, internal cabling (4.7') and SCSI bus terminator. The first SCSI cable from the chassis to the first external housing is different than the one used on the AV 3xx workstations.

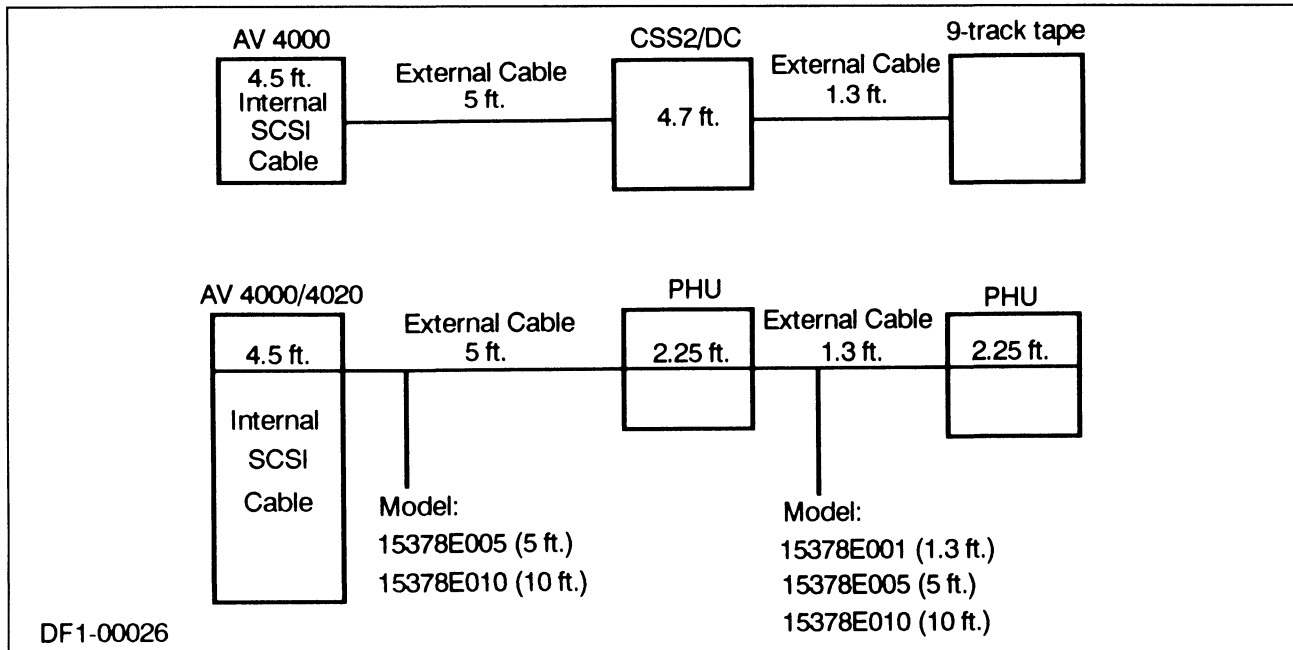


Figure 2. SCSI Cable length configurations.

The 9-track reel-to-reel tape option can replace the last PHU on the SCSI bus.

Communications

The system board supports two RS232C asynchronous ports and an IEEE 802.3 Ethernet LAN port. In addition, the two-slot VMEbus supports a variety of asynchronous, synchronous, and LAN communications options. These use the same boards that are supported on the AV 5000/ 6000, but all require changes due to chassis differences. For the AV 4100 Series, each board is sold in a 6U Eurocard form factor, with air dams and external connectors. In addition, some modifications have been made to ensure mechanical and environmental compliance with Data General and government standards.

See the MAPS/PLUS VME Communications Controllers article for a complete description of the optional VME communications controllers (page 271-113).

Asynchronous Communications

The two serial ports on the system board provide data rates of up to 19.2 Kbps full duplex. The first of these ports supports the system console. The second can be used to connect an additional asynchronous device. This line supports full modem control.

For low-connect counts, the most cost-effective connectivity scheme is the VAC/16 (VME Asynchronous Controller/16), since it provides 16 RS-232C lines with modem control. Each VAC/16 includes a Motorola 68020 processor, 192 KB static RAM buffer, 128 KB EPROM, and two custom VLSI octarts.

All 16 lines are full duplex. The board has an aggregate data rate of 16 x 19.2 Kbps full duplex.

In AV 4100 Series systems, the VAC/16 connects to two external junction boxes via a 5 ft. shielded cable. Each junction box provides eight DB-25 connectors. The junction boxes use the same board as the VAC/16 bulkhead connector panel which is used on the AV 5000 series.

Larger connect-counts can be handled with the VDA/255 (VME Distributed Adapter) which provides up to 255 asynchronous connections via VDC (VME Distributed Cluster) boxes.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines). All cluster controllers support the following RS232C signals: CTS, DCD, DSR, DTR, TRS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

The VAC/16 and VDA/255 are mutually exclusive options.

A 32-user Distributed Asynchronous Package provides a low-cost bundling of one VDA/255 and two VDC/16s.

Synchronous Communications

Synchronous communications for the AV 4100 Series are handled by the VSC/3 (VME Synchronous Controller/3). This board provides three multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips (this same board is called the

VSC/4 on AV 5000 systems—only three ports can be connected on AV 4100 systems due to cabling restrictions). The board is built around an 8 MHz INtel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. This board can handle two independent sync protocols simultaneously; however, initial software offerings will support only a single protocol. Aggregate throughput is 1.6 Mb/sec.

LAN Communications

Ethernet LAN communications are provided by the integrated Ethernet controller on the system board and the optional VLC (VME Ethernet LAN Controller). Each provides access to 10 Mbit/second IEEE 802.3 Ethernet LANs via a 15-pin sub-D connector. A drop cable and a standard Ethernet N-tap or a Thin Ethernet BNC-tap transceiver are required.

Token ring LAN communications are provided by the VME Token Ring Network (VTRN) controller.

Hardware Support Services

The DGC Customer Service Division supports AViiON systems with state-of-the-art service technology. We offer several service programs that include a full array of options to satisfy users' uptime requirements.

On-Call Service with a four-hour response goal lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include:

- **Multi-Year Plus**—discounts up to 10% and price protection in return for signing a three-, four-, or five-year agreement
- **Extended Coverage**—coverage up to seven days a week, 24 hours a day

- **Enhanced Response**—two-hour on-site response for installations within 50 miles of a Data General Service Center
- **Basic Response**—on-site response generally within 24 hours
- **Multi-Device Deferred**—standard discounts up to 40% to customers who have large numbers of PCs, workstations, terminals and desktop printers, and who can wait until a specified number are down before placing a service call

On-Site Select Service is available for customer-maintainable equipment. Toll-free telephone support is provided to help customers identify inoperable part. The replacement part is shipped overnight, and the customer may choose to either install it with telephone assistance, or to request next-day dispatch of a Field Engineer to complete the installation.

Additionally, both Services offer pre-payment discounts of up to 25% for non-cancellable pre-payment terms and up to 10% for cancellable pre-payment terms. On-Call Service pre-payment discounts start for terms as short as six months and On-Site Select discounts start at terms of 24 months.

Warranty. AViiON Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement. With this agreement, warranty service is automatically upgraded to contract service. The warranty covers all base system components and memory and controller boards.

Ordering

System Packages

The AViiON 4100 is offered as systems packages that include a single CPU, 16MB RAM, single disk and QIC cartridge tape. The AViiON 4120 is offered in packages that include dual CPU, 32MB RAM, 1GB or 1.4GB disk, and 525 MB cartridge tape. Table 3 lists the packaged systems and model numbers. Table 4 lists the available power suffixes. To provide optimum flexibility, a second CPU, additional memory, mass storage and communications controllers can be ordered as separate options.

<i>Model</i>	<i>Description</i>
G70318	16MB, 20MHz AV 4100 Base System, 332MB disk, 150MB tape
G70324	16MB, 20MHz AV 4100 Base System, 662MB disk, 525MB tape
G70238	16MB, 20MHz AV 4100 Base System, 1GB disk, 525MB tape
G70417	16MB, 20 MHz AV4100 Base System, 1.4GB disk, 525MB tape
G70240	32MB, 20MHz AV 4120 Dual CPU System, 1GB disk, 525MB tape
G70418	32MB, 20MHz AV4120 Dual CPU System, 1.4 GB disk, 525MB tape

Table 3. AV 4100 Series system packages.

System Board Options

The system board can support up to eight 4MB or 16MB SIMMs. Base systems with 16MB use a single 16MB SIMM and can support up to seven additional SIMMs. Base systems with 32MB use two 16MB SIMMs and can support up to six additional SIMMs. 4MB and 16MB SIMMs can be mixed in a system. An MBUS connector is also available to support the AV 4100 second-CPU option daughtercard that contains an 88100 CPU and two 88200 CPU. Model numbers for these options are in Table 5.

<i>Model</i>	<i>Description</i>
7000-K	4 MB Expansion Memory Module
7008-K	20 MHz Second CPU upgrade
7014-K	16MB Expansion Memory Module

Table 5. AV 4100 Series system board options

<i>Suffix</i>	<i>Countries</i>
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 4. AV 4100 Series power options.

<i>Model</i>	<i>Description</i>	<i>Max. #</i>
7411-K	VME Asynchronous Controller/16 (VAC/16) & Junction Boxes	2**
7418-K	VME Distributed Adapter/255 (VDA/255)	1**
7419	VME Distributed Cluster/8P (VDC/8P)	32
7420	VME Distributed Cluster/16 (VDC/16)	6
7424-K	32-User Distributed Async Package	1
7413-K	VME Synchronous Controller/3 (VSC/3)*	1
7405-K	VME LAN Controller (VLC) - IEEE 802.3 controller	1
7416-K	VME Token Ring Controller (VTRN)	2

*This board is called VME Synchronous Controller/4 on AV 5000/6000.
**A VDA/255 and a VAC/16 are not supported in the same system.

VMEbus Communications Options

A maximum of two VME option boards are supported on AV 4100 Series systems. Table 6 lists model numbers for the optional VMEbus communications controllers (note that not all of the maximums can be achieved simultaneously).

The integral and optional Ethernet controllers require a transceiver and drop cable. Table 7 lists the available options and model numbers.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables.
1326	5 foot Ethernet drop cable for connecting system to transceiver.

Table 7. Communications connectivity options.

Mass Storage

The AV 4100 Series chassis can support a maximum of one FH and two HH or four HH peripherals. Each package includes one disk drive and a HH QIC tape. Table 8 lists the available options.

<i>Model</i>	<i>Description</i>
6577-F	150MB QIC Tape add-on
6539-F	179MB Disk add-on
G6662-F	332MB 5.25" HH SCSI disk
G6554-F	662MB 5.25" FH SCSI disk
G6685-F	1GB 5.25" FH SCSI disk
G6716-F	1.4GB 5.25" FH SCSI disk
G6562-F	1.44MB 3.5" HH diskette drive with SA450/SCSI converter
G6563-F	1.2MB 5.25" HH diskette drive with SA450/SCSI converter
G6629-F	600MB 5.25" HH CD-ROM
G6677-F	320/525MB QIC Tape

Table 8. AV 4100 Series internal mass storage options.

Additional mass storage expansion is provided via the external extension of the SCSI channel. Subject to the maximum cable length and seven device limitations described earlier, up to two external chassis or an external chassis and reel-to-reel tape can be attached. See the AViiON Mass Storage MAPS/PLUS article (page 239-29 to 239-49) for PHU and CSS2/DC configuration information.

Systems ordered with DG/UX and a disk will receive the operating system installed on the disk.

Cabling

Cabling must be ordered separately to connect:

- System Console
- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing UNIT (PHU) and 1600bpi reel-to-reel tape drive (using champ connectors on either end)
- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- VDA/255 to VDC/16 and VDC/8P cluster controller boxes

Table 9 lists the model numbers for the AV 4100 system cables.

<i>Model</i>	<i>Descriptions</i>
15338E050	10 foot cluster extension cable - VDA/255
15338E025	25 foot cluster extension cable - VDA/255
15338E100	100 foot cluster extension cable - VDA/255
15340E010	10 foot async terminal cable VDC.xx or VAC/16 only
15340E015	15 foot async terminal cable VDC.xx or VAC/16 only
15340E025	25 foot async terminal cable VDC.xx or VAC/16 only
15378E001	SCSI single-ended cable, 1.3 feet (not for connecting 1st PHU to system)
15378E005	SCSI single-ended cable, 5 feet
15378E010	SCSI single-ended cable, 10 feet
15345E015	15 foot Centronics printer cable (for VDC/8P only)
15345E025	25 foot Centronics printer cable (for VDC/8P only)
10235	5 foot Centronics printer cable (for integrated parallel port only)
1084M	Modem control (25 foot) processor to modem
1084M-A	Modem control (10 foot) processor to modem
1340-S	RS232 (5 foot) processor to asynchronous device (including system console)
1340-T	15 foot processor to asynchronous device (including system console)
1340	25 foot processor to asynchronous device (including system console)
1340-A	50 foot processor to asynchronous device (including system console)

Table 9. AV 4100 Series cable options.

Important Ordering Notes

NOTE: For asynchronous (or parallel) devices connected to VAC or VDC junctions boxes, a bundled cable may be ordered. For devices attached to base system parts (including system console), order devices with -X suffix. Order cables separately.

To Order:

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage and VME communications options as needed.
3. Each operating system license ordered **MUST** be itemized on the Program License Schedule 501 and purchase order.
4. Order appropriate software distribution and services' packages.

Related Information

See Table 10.

<i>Part Number</i>	<i>Title</i>
012-004059	AV 4100 Series Product Brief
046-000959-03	AV 410 Series Workstations MAPS/PLUS article, p. 333-21

Table 10. Related Information

Specifications

Processor:

Motorola 88100
20 MHz 88100 processor with integral FPU Single- or dual-processor options

Memory Management

Virtual memory
Two 88200 CMMUs/CPU; 4 GB per process
Caches
Data cache and instruction cache
Size: 16 KB per side
Organization: 4-way set associative

Main Memory

16 MB - 128 MB with byte parity
Expansion: 4- or 16-MB modules
Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O

IEEE 802.3 Ethernet LAN
Bandwidth: 10 Mbits/sec
Parallel Port
Centronics-compatible

Two Serial Ports
RS-232 (one with modem control); baud rates up to 19.2 kilobaud

SCSI
Asynchronous and synchronous operation

VMEbus Backplane
Motorola's VMEbus Revision C.1
IEEE P1014 Draft 1.2
Two 6U slots

Environmental

Temperature
Operating/Nonoperating
10 - 38 C/- 40 - 70 C

Relative Humidity
Operating/Nonoperating:
20 - 80%/10 - 90%

Electrical
AC Voltage: 120V nominal (85-138 VAC);
220V nominal (187-276 VAC)
AC Frequency
47 - 63 Hz
Current draw
8 amps at 120Vrms
5 amps at 220Vrms
Power Supply: 325 Watts

Physical

Dimensions:
24.75" high x 5.75" wide by 22" deep

Weight:
System Chassis: 59 lbs. fully loaded (with disks and tape)

Peripherals

5.25" Winchester disks: 179MB HH
5.25" SCSI 20ms average seek time
1.5MB/s transfer rate
332MB HH 5.25" SCSI
14ms average seek time
4MB/s transfer rate

662MB FH 5.25" SCSI
16.5ms average seek time
4MB/s transfer rate

1GB FH 5.25" SCSI
15ms average seek time
4MB/s transfer rate

1.4GB FH 5.25" SCSI
15ms average seek time
4 MB/s transfer rate

Tape Drives:

150MB 5.25" HH QIC Cartridge tape
Can read/write QIC 120MB; can read QIC 40MB and 60MB
112KB/sec sustained data transfer rate
Single-ended SCSI interface

320/525MB 5.25" HH QIC Cartridge tape
Can read/write QIC 150MB
Single-ended SCSI interface

2GB 5.25" FH 8mm cartridge tape
Auto-load/auto-thread
1.5MBs burst data rate
246 KBs sustained data rate
Single-ended SCSI interface

1600bpi PE format reel-to-reel tape drive
Auto-thread, auto-load, horizontal mount
25/100 ips selectable
160 KB/sec PE transfer rate (instantaneous)
6 to 10.5" diameter reels
Single-ended SCSI interface

Optional Communications Controllers

VMEbus Asynchronous Controller

- 16 full-duplex RS-232C ports
- 16 x 9600bps aggregate maximum transfer rate
- Motorola 68020 with 192 KB static RAM buffer, 128KB EPROM, 2 custom VLSI octarts

VMEbus Distributed Host Adapter (VDA/255)

- Up to 255 asynchronous devices connected on cluster controllers via RG62 coaxial cable

VMEbus Distributed Cluster

- Support for 16 RS-232C lines(VDC/16) or 8 RS-232C lines plus Centronics printer port (VDC/8P)
- Signals supported CTS, DCD, DSR, DTR, RTS, RXD, TXD, Ground

VMEbus Ethernet LANController

- 7990 LANCE Ethernet controller chip and 256 KB dual-ported data buffer 10Mbits/sec Bandwidth



AViiON 4000 Series Servers

Fact Sheet

This revision describes new 16 MB SIMM modules and updates mass storage offerings.

The AV 4000 Series Servers are cost-effective, office-package systems based on the Motorola 88000 RISC architecture. The series provides a small-footprint tower package in a 16MHz, 88100 uni- (AV 4000) or dual-processor (AV 4020) and a 20MHz, 88100 uni- (AV 4100) or dual processor (AV 4120). They are suitable for a wide spectrum of time-sharing and server environments.

An integrated motherboard (and daughtercards) offers single or dual CPUs, parity memory, SCSI bus controller, Ethernet controller, and VME interface. The second CPU is standard on the AV 4020 and 4120 and optional on the AV 4000 and 4100. Two VMEbus slots support asynchronous and synchronous communications controllers.

In a time-sharing environment, as many as 128 asynchronous devices can be supported via the VME Distributed Async Host Adapter (VDA/128). The AV4000 systems can be connected to other intelligent systems via an industry-standard IEEE 802.3 Ethernet LAN to act as file, compute, or cleaved application servers.

Integrated System Board

- 16.67 or 20MHz Motorola 88100 RISC Processor
- Two 88200 Cache and Memory Management Units (CMMU)
- Dual processor standard on the AV 4020 and 4120, optional on the AV 4000 and AV 4100.
- 8 to 128MB byte parity RAM
- Industry standard SCSI interface for disk and tape
 - Supports synchronous (4 Mbits/sec) and asynchronous (1.5 Mbits/sec) operation
- IEEE 802.3 LAN interface
- Two RS-232C serial ports (one used for system console)
- Centronics-compatible parallel port
- Hardware support for Motorola's VMEbus (Revision C.1)

Attractive Tower Package

- Compact small-footprint desktide chassis
 - (24.75" H x 5.75" W x 22" D)
- Internal mass storage (see following)
- Two slot (6U) VMEbus card cage
- 325W power supply

Internal Mass Storage/Tape Back-up

- Desktide chassis can hold four 5 1/4" half-height (HH) devices (two can be removeable) or one 5 1/4" full-height (FH) device and two 5 1/4" HH devices (two can be removeable)
 - 150MB or 320/ 525 MB HH QIC tape is standard and uses one removeable media bay
 - Packages include either a HH 322MB, FH 662MB or FH 1GB Winchester disk
- Devices supported
 - 1 GB Winchester 5.25" FH SCSI
 - 662 MB Winchester 5.25" FH SCSI
 - 332 MB Winchester 5.25" HH SCSI
 - 179 MB Winchester 5.25" HH SCSI
 - 150 MB QIC150 Cartridge Tape 5.25" HH SCSI
 - 320/ 525 QIC Cartridge Tape 5.25" HH SCSI
 - 600 MB CD-ROM 5.25" HH SCSI

External Mass storage/Tape back-up

- External mass storage Peripheral Housing Unit (PHU)
 - Up to seven SCSI devices (total internal and external) are supported for a maximum of 3.9 GB of disk storage
 - Each housing can hold one 5 1/4" FH device and one 5 1/4" HH device or three 5 1/4" HH devices.
- External Combined Storage Subsystem 2/ DC (CSS 2/ DC)
 - Up to seven SCSI devices (total internal and external) are supported for a maximum of 6 GB of disk storage
 - Each housing can hold up to five 5 1/4" FH devices or ten HH devices (limited by system maximum of seven devices)
- Devices supported
 - 1GB Winchester 5.25" HH SCSI
 - 662MB Winchester 5.25" FH SCSI
 - 332MB Winchester 5.25" HH SCSI
 - 179MB Winchester 5.25" HH SCSI
 - 2GB Cartridge Tape Backup 5.25" FH SCSI

- 150MB QIC Cartridge Tape 5.25" HH SCSI
- 320/525MB QIC Cartridge Tape 5.25" HH SCSI
- 1600bpi 9-track tape drive (separate tabletop enclosure)
- 600MB CD-ROM 5.25" HH SCSI
- 590MB Eraseable Optical Disk Drive 5.25" FH SCSI

Standard Communications

- Ethernet interface standard (without transceiver or drop cable). Supports either thick or thin net connections.
- Two asynchronous, RS-232C interfaces - from 150 to 19,600 baud
- Centronics compatible parallel printer port

Optional VME expansion boards

- VAC/16 16 RS-232C port asynchronous multiplexor (max.2)
- -OR-
- VDA/128 asynchronous subsystem host adapter (up to 128 RS-232C asynchronous connections via VDC/8 and VDC/16 cluster controllers) - max. 1
- VSC/3 3 port synchronous communications board - max. 1
- Second Ethernet interface (without transceiver or drop cable) - max. 1. Supports either thick or thin net connections.

Customer environment/use characteristics

- Customer installable and maintainable
- Customer installable add-on memory options, second CPU option and peripherals
- 40db (quiet office) noise levels
- 90 day on-site warranty on all system components

Product Description

The AViiON 4000 Series desktop servers offer RISC multi-processor power in an extremely small, compact package. With extensive internal and external mass storage, up to 28 MB of memory, and industry-standard VMEbus controllers, these systems provide a wide range of configurations and options for memory, mass storage and multi-CPU configurations.

The base system board has a 16.67MHz or 20MHz uniprocessor, with an optional second CPU that's standard in AV 4020 and AV 4120. Base memory is either 8MB (two 4MB SIMMS) or 16MB (one 16MB SIMM). A maximum of 8 SIMMs are supported. 4MB and 16MB SIMMS can co-exist in a single system.

CPU's	1-2
VME Slots	2
Memory	8-128MB*
Asynchronous Connects std.	2 (1 for console)
Asynchronous Connects (1 VDA Max.)	128
or	
Asynchronous Connects (2 VAC/16 max.)	32
Ethernet LAN	1-2
Sync Ports (1 VSC/4 max.)	0-3
External PHUs	0-2
Disk	
Integral	332MB-1.3MB
External	0-5.0GB
150MB Cartridge Tapes	1-2
Reel-to-Reel Tapes	0-1

Note: Due to mass storage and bus slot limitations, not all maxima can be achieved simultaneously.
*128MB requires PROM revision 5.05 or greater. The limit is 112MB with earlier PROMS.

Table 1. Configuration range for AV4000 Series

Architecture

The AViiON 4000 Series servers are based on Motorola 88000 RISC processors and contain the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. The AV 4020 and AV 4120 have two 88100 CPU chips and four 88200 CMMU chips. See the AViiON 5000/6000 Series MAPS/PLUS article on page 202-13 for more information about the 88K processor architecture.

The AV 4000/ AV 4100 series board is a single 18" x 12" multilayer PCB that includes

- A 16.67 (AV 4000) or 20MHz (AV 4100) Motorola 88100 RISC CPU (Models AV 4020 & 4120 have two) and two 88200 CMMUs (Models AV 4020 & 4120 have four)
- Closely coupled, integrated floating point unit
- Eight connectors capable of holding up to eight memory modules
- MBUS connector for the second CPU
- Interface logic supporting Revision C.1 of the VMEbus
- Industry-standard SCSI interface for connecting peripherals such as disk and tape
- Industry-standard 802.3 Ethernet Interface (w/o transceiver)

- Two, asynchronous interfaces - RS232 with one offering full modem support
- Parallel line printer interface (Centronics compatible)
- Time-of-Boot clock and calendar
- Power-up diagnostics

Figure 1 shows a block diagram of the AV 4000 system architecture. Note that the AV 4000 Series uses the same system board as the AV 400 series. The mouse and keyboard connectors are on the board, although they are not used for server configurations.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its Eurocard format, performance, and versatility are some of the reasons that it appeals to a wide range of users, especially in the technical marketplace. DGC chose the VMEbus for the AViiON systems because it is an industry-standard bus that offers high performance at a reasonable price. The VMEbus implementation for AViiON 5000/6000 Series Systems incorporates block-mode transfers, but the AViiON 4000 Series doesn't support this option to the C.1 specification.

The VMEbus specification defines an interface system for interconnecting data processing, data storage and peripheral control devices in a closely-coupled hardware configuration. The specification for the VMEbus that is incorporated in the AViiON 4000 and 4100 conforms to Motorola's Revision C.1 VMEbus specification.¹

¹ The C.1 specification evolved from work by the IEEE P1014 Standard Committee and the IEC 47b Standards Committee. The IEEE P1014 Standards Committee approved the specification in their draft 1.2 which is undergoing IEEE and IEC final approval.

The VMEbus specification provides for a mechanical and an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female connectors. In the AViiON 4000 Series, a separate 6U backplane is designed to provide two slots, each slot consisting of two 96-pin connectors called J1 and J2, the J1 connector being the uppermost connector and J2 the lower. In addition to the VMEbus slots the backplane provides the power connection for the system board.

The VMEbus incorporates the Master/Slave concept. Within this framework, the system board is the Master, since it controls the flow of data between itself and any other device (the Slave). Data transfers initiated by

VMEbus devices other than the system board are considered "slave" transfers. VMEbus devices can transfer data to the AV 400's internal system bus—MBUS—in single words, half-words, or bytes.

VMEbus transactions are governed by a single-bus Master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 4000 Series, the design allows for more than one Master, but the system board is always a Master.

In the AViiON 4000 Series, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, and performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8-, 16-, and 32-bit MBUS masters and slaves as well as the 8-, 16-, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

The C.1 interface specifications and options implemented on the AViiON 4000 Series are listed in Table 2.

Mass Storage

The AV 4000 Series offers an integral SCSI bus controller for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices, then exits the rear of the unit and terminates in a Champ connector for connecting external Peripheral Housing Units. The SCSI controller supports either asynchronous (1.5 MB/s) or synchronous (4 MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU), or Combined Storage Subsystem 2/DC (CSS2/DC).

In the main deskside chassis, space is provided for one FH and two HH 5.25" devices. Standard in all system packages is a 5.25" HH 150MB or 320/525MB QIC cartridge tape, and either a 332MB 5.25" HH Winchester disk with 14ms seek time, a 662MB 5.25" FH Winchester disk with 16ms seek time or a 1GB 5.25" FH Winchester disk with 15ms seek time. A 179MB 5.25" HH Winchester disk with 18ms seek time is available to fit the remaining bay.

All external Data General peripherals, with the exception of the tabletop 9-track tape option, for the AViiON 4000 Series are mounted in the desktop Peripheral Housing Unit or deskside Combined Storage Subsystem 2/DC which can accommodate a variety of storage and backup options. These options include the 179MB, 322MB, 662MB and

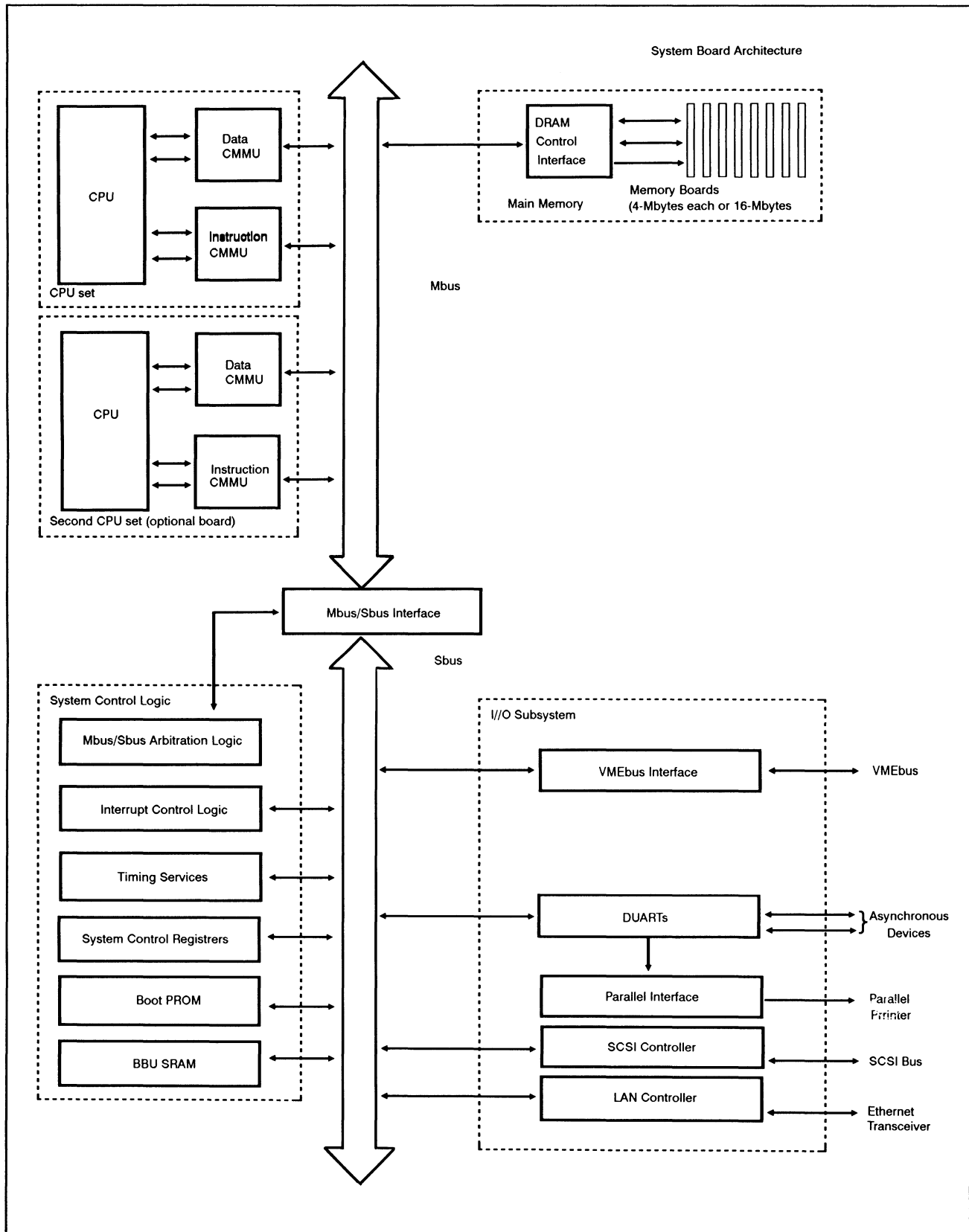


Figure 1. System Block Diagram

Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock. The IACK and VMEbus grant daisy chain driver. The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.). The VMEbus arbitration time out logic (64 micro-sec.). VMEbus watchdog timer (64 micro-sec.).
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C.1 interface specifications and options.

1GB Winchester disks, 150MB and 320/525MB QIC tapes, 2GB FH 5.25" cartridge tape drive, 600MB CD-ROM and 590MB erasable optical disk drive. Each Peripheral Housing Unit can accommodate one FH and one HH unit or three HH units. Each CSS2/DC can accommodate up to 5 FH or 10 HH 5.25" devices. (Note: AV 4000 series is limited to 7 devices).

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 4000 Series chassis requires 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, enough space for configurations of up to two additional Peripheral Housing Units per workstation. Figure 2 illustrates the available cabling options. The Peripheral Housing Unit contains an 125 watt power supply, internal fan, internal cabling (2.25 ft.) and SCSI Bus terminator. The CSS2/DC contains one or two power

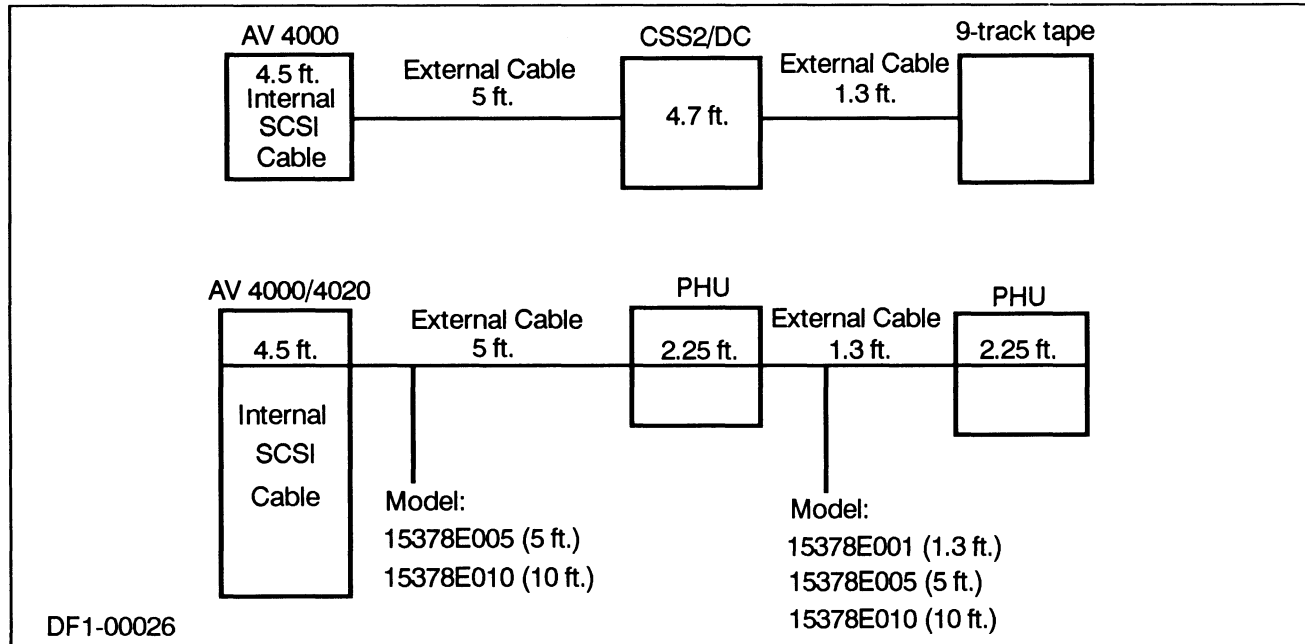


Figure 2. SCSI Cable length configurations.

supplies, internal cabling (4.7') and SCSI bus terminator. The first SCSI cable from the chassis to the first external housing is different than the one used on the AV 3xx workstations.

The 9-track reel-to-reel tape option can replace the last PHU on the SCSI bus.

DG/UX

The AV 4000 Series is supported by a unique set of DG/UX model numbers that authorize the connection of unlimited numbers of users and include media and documentation. Model numbers and their contents include:

Q001AZS1AN	Server/Multiuser Operating System DG/UX RTU GNU C RTU Documenter Tool Kit (DTK) RTU
Q001AZS20A	Media & Documentation for above
P001AZS1AN	DG/UX GNU C Documenter Tool Kit (DTK) TCP/IP ONC/NFS X WINDOWS OSF/MOTIF
P001AZS20A	Media & Documentation for above

Communications

The system board supports two RS232C asynchronous ports and an IEEE 802.3 Ethernet LAN port. In addition, the two-slot VMEbus supports a variety of asynchronous, synchronous, and LAN communications options. These use the same boards that are supported on the AV 5000/ 6000, but all require changes due to chassis differences. For the AV 4000 Series, each board is sold in a 6U Eurocard form factor, with air dams and external connectors. In addition, some modifications have been made to ensure mechanical and environmental compliance with Data General and government standards.

See the MAPS/PLUS VME Communications Controllers article for a complete description of the optional VME communications controllers (page 271-113).

Asynchronous Communications

The two serial ports on the system board provide data rates of up to 19.2 Kbps full duplex. The first of these ports supports the system console. The second can be used to connect an additional asynchronous device. This line supports full modem control.

For low-connect counts, the most cost-effective connectivity scheme is the VAC/ 16 (VME Asynchronous Controller/ 16), since it provides 16 RS-232C lines with modem control. Each VAC/ 16 includes a Motorola 68020 processor, 192 KB

static RAM buffer, 128 KB EPROM, and two custom VLSI octarts. All 16 lines are full duplex. The board has an aggregate data rate of 16 x 19.2 Kbps full duplex.

In AV 4000 Series systems, the VAC/16 connects to two external junction boxes via a 5 ft. shielded cable. Each junction box provides eight DB-25 connectors. The junction boxes use the same board as the VAC/16 bulkhead connector panel which is used on the AV 5000 series.

Larger connect-counts can be handled with the VDA/128 (VME Distributed Adapter) which provides up to 128 asynchronous connections via VDC (VME Distributed Cluster) boxes. For typical commercial applications, however, the users per VDA/128 should be limited to 64 for optimum performance.

The VDA/128 is based on a 12.5 MHz 68010 processor with 512 KB of zero-wait-state DRAM and 16 KB of dual-ported memory. It supports a 2.5 Mbit/second serial bus interface to the cluster controllers over RG62 coax cable. The distributed clusters are based on a 10 MHz 68000 processor with 32 KB of static RAM for buffering and microprocessor support and 2 KB of static RAM for coaxial serial interface buffer support.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines). The aggregate throughput of the eight-line cluster is 8 x 19.2 Kbps half-duplex; that of the sixteen-line cluster is 16 x 9600 bps half-duplex. All cluster controllers support the following RS232C signals: CTS, DCD, DSR, DTR, TRS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

The VAC/16 and VDA/128 are mutually exclusive options.

Synchronous Communications

Synchronous communications for the AV 4000 Series are handled by the VSC/3 (VME Synchronous Controller/3). This board provides three multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips (this same board is called the VSC/4 on AV 5000 systems—only three ports can be connected on AV 4000 systems due to cabling restrictions). The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. This board can handle two inde-

pendent sync protocols simultaneously; however, initial software offerings will support only a single protocol. Aggregate throughput is 1.6 Mb/sec.

LAN Communications

Ethernet LAN communications are provided by the integrated Ethernet controller on the system board and the optional VLC (VME Ethernet LAN Controller). Each provides access to 10 Mbit/second IEEE 802.3 Ethernet LANs via a 15-pin sub-D connector. A drop cable and a standard Ethernet N-tap or a Thin Ethernet BNC-tap transceiver are required.

Hardware Support Services

Field Support Services

Data General Field Engineering supports AViiON systems with state-of-the-art service technology. We offer several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

The *On-Call Agreement* lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. In conjunction with the terms of the basic agreement, users may also purchase additional options such as Extended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The *Multiyear Plus Agreement* includes all of the benefits of an On-Call Agreement and more. Signing a Multiyear Plus Agreement with a term of two to five years gives customers discounts of up to 10 percent over the life of their agreement.

The *Mail-in Maintenance Service Agreement* provides a low-cost alternative to on-site service and requires customer participation in the service effort. Data General provides telephone assistance through its Phone Assistance Center and provides any required parts within xx days. The customer is responsible for calling the Field Engineering Customer Support Center, assisting in problem diagnosis, returning the defective part to Data General, and reinstalling the replacement part provided by Data General.

For more information about service options, contact a Data General salesperson or call the Data General Field Engineering Telemarketing Group at 1-800-325-3065 (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server-specific, shared with AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Ordering

System Packages

The AViiON 4000 and 4100 are offered as systems packages that include a single CPU, 8 or 16MB RAM, single disk and QIC cartridge tape. The AViiON 4020 and 4120 are offered in packages that include dual CPU, 32MB RAM, 1GB disk, and 525 MB cartridge tape. Table 3 lists the packaged systems and model numbers. Table 4 lists the available power suffixes. To provide optimum flexibility, a second CPU, additional memory, mass storage and communications controllers can be ordered as separate options.

<i>Model</i>	<i>Description</i>
G70148	8MB, 16MHz AV 4000 Base System, 332MB disk, 150MB tape
G70277	8MB, 16MHz AV 4000 Base System, 332MB disk, 525MB tape
G70137	8MB, 16MHz AV 4000 Base System, 662MB disk, 150MB tape
G70279	8MB, 16MHz AV 4000 Base System, 662MB disk, 525MB tape
G70281	8MB, 16MHz AV 4000 Base System, 1GB disk, 150MB tape
G70283	8MB, 16MHz AV 4000 Base System, 1GB disk, 525MB tape
G70317	16MB, 16MHz AV 4000 Base System, 332MB disk, 150MB tape
G70318	16MB, 20MHz AV 4100 Base System, 332MB disk, 150MB tape
G70319	16MB, 16MHz AV 4000 Base System, 332MB disk, 525MB tape
G70320	16MB, 20MHz AV 4100 Base System, 332MB disk, 525MB tape
G70321	16MB, 16MHz AV 4000 Base System, 662MB disk, 150MB tape
G70322	16MB, 20MHz AV 4100 Base System, 662MB disk, 150MB tape
G70323	16MB, 16MHz AV 4000 Base System, 662MB disk, 525MB tape
G70324	16MB, 20MHz AV 4100 Base System, 662MB disk, 525MB tape
G70325	16MB, 16MHz AV 4000 Base System, 1GB disk, 150MB tape
G70326	16MB, 20MHz AV 4100 Base System, 1GB disk, 150MB tape
G70237	16MB, 16MHz AV 4000 Base System, 1GB disk, 525MB tape
G70238	16MB, 20MHz AV 4100 Base System, 1GB disk, 525MB tape
G70239	32MB, 16MHz AV 4020 Dual CPU System, 1GB disk, 525MB tape
G70240	32MB, 20MHz AV 4120 Dual CPU System, 1GB disk, 525MB tape

Table 3. AV4000 Series system packages.

System Board Options

The system board can support up to eight 4MB or 16MB SIMMs. Base systems with 8MB use two 4MB SIMMs and can support up to six additional SIMMs. Base systems with 16MB use a single 16MB SIMM and can support up to seven additional SIMMs. Base systems with 32MB use two 16MB SIMMs and can support up to six additional SIMMs. 4MB and 16MB SIMMs can be mixed in a system. An MBUS connector is also available to support AV 4000/4100 second-CPU option daughtercards that contain an 88100 CPU and two 88200 CPUs operating at the same clock speed as the base system processor. Model numbers for these options are in Table 5.

<i>Suffix</i>	<i>Countries</i>
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 4. AV4000 Series power options.

<i>Model</i>	<i>Description</i>
7000-K	4 MB Expansion Memory Module
7006-K	16MHz Second CPU upgrade
7008-K	20 MHz Second CPU upgrade
7014-K	16MB Expansion Memory Module

Table 5. AV4000 Series system board options

VMEbus Communications Options

A maximum of two VME option boards are supported on AV4000 Series systems. Table 6 lists model numbers for the optional VMEbus communications controllers (note that not all of the maximums can be achieved simultaneously).

The integral and optional Ethernet controllers require a transceiver and drop cable. Table 7 lists the available options and model numbers.

Mass Storage

The AV4000 Series chassis can support a maximum of one FH and two HH or four HH peripherals. Each package includes one disk drive and a HH QIC tape. Table 8 lists the available options.

<i>Model</i>	<i>Description</i>	<i>Max. #</i>
7411-K	VME Asynchronous Controller/ 16 (VAC/ 16) & Junction Boxes	2**
7401-K	VME Distributed Adapter/ 128 (VDA/ 128)	1**
7402	VME Distributed Cluster/ 8P (VDC/ 8P)	16
7403	VME Distributed Cluster/ 16 (VDC/ 16)	8
7413-K	VME Synchronous Controller/ 3 (VSC/ 3)*	1
7405-K	VME LAN Controller (VLC) - IEEE 802.3 controller	1

*This board is called VME Synchronous Controller/ 4 on AV 5000/ 6000.
**A VDA/ 128 and a VAC/ 16 are not supported in the same system.

Table 6. AV4000 Series VMEbus Communications Controllers and configuration maximums.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables.
1326	5 foot Ethernet drop cable for connecting system to transceiver.

Table 7. Communications connectivity options.

<i>Model</i>	<i>Description</i>
6577-J	150MB QIC Tape add-on
6539-J	179MB Disk add-on
6563-J	1.2MB 5.25" Floppy diskette with SCSI/SA450 interface board
6562-J	1.44MB 3.5" diskette with SCSI/SA450 interface board
6563-JX	1.2MB 5.25" Floppy Diskette add-on
6562-JX	1.44MB 3.5" Diskette add-on
6662-J	332MB Disk add-on
G6629-J	600MB CD/ROM

Table 8. AV4000 Series internal mass storage options.

Additional mass storage expansion is provided via the external extension of the SCSI channel. Subject to the maximum cable length and seven device limitations described earlier, up to two external chasses or an external chassis and reel-to-reel tape can be attached. See the AViiON Mass Storage MAPS/PLUS article (page 239-29 to 239-49) for PHU and CSS2/DC configuration information.

Systems ordered with DG/UX and a disk will receive the operating system installed on the disk.

Cabling

Cabling must be ordered separately to connect:

- System Console
- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing UNIT (PHU) and 1600bpi reel-to-reel tape drive (using champ connectors on either end)
- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- VDA/128 to VDC/16 and VDC/8P cluster controller boxes

Table 9 lists the model numbers for the AV 4000 and AV 4100 system cables.

<i>Model</i>	<i>Descriptions</i>
15338E025	25 foot cluster extension cable - VDA/128
15338E050	50 foot cluster extension cable - VDA/128
15338E100	100 foot cluster extension cable - VDA/128
15340E010	10 foot async terminal cable VDC.xx or VAC/16 only
15340E015	15 foot async terminal cable VDC.xx or VAC/16 only
15340E025	25 foot async terminal cable VDC.xx or VAC/16 only
15378E001	SCSI single-ended cable, 1.3 feet (not for connecting 1st PHU to system)
15378E005	SCSI single-ended cable, 5 feet
15378E010	SCSI single-ended cable, 10 feet
15345E015	15 foot Centronics printer cable (for VDC/8P only)
15345E025	25 foot Centronics printer cable (for VDC/8P only)
10235	5 foot Centronics printer cable (for integrated parallel port only)
1084M	Modem control (25 foot) processor to modem
1084M-A	Modem control (10 foot) processor to modem
1340-S	RS232 (5 foot) processor to asynchronous device (including system console)
1340-T	15 foot processor to asynchronous device (including system console)
1340	25 foot processor to asynchronous device (including system console)
1340-A	50 foot processor to asynchronous device (including system console)

Table 9. AV4000 Series cable options.

Important Ordering Notes

NOTE: For asynchronous (or parallel) devices connected to VAC or VDC junctions boxes, order devices with a -X suffix. Order cables separately. For devices attached to base system parts (including system console), a bundled cable may be ordered.

For a thorough description of DG/UX and ordering information, please refer to the DG/UX MAPS/PLUS article on page 301-012.3.

To Order:

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage and VME communications options as needed.
3. Each operating system license ordered **MUST** be itemized on the Program License Schedule 501 and purchase order.
4. Order appropriate software distribution and services' packages.

Related Information

See Table 10.

<i>Part Number</i>	<i>Title</i>
012-003773	AV 4000 Series Product Brief
046-000959	AV 400 Series Workstations MAPS/ PLUS article
046-001013-02	DG/UX 4.30 MAPS/ PLUS article
*AV400 series documentation plus an addendum indicating any changes necessary to support the AV40000 configurations.	

Table 10. Related Information

Specifications

Processor:

Motorola 88100
16.67 or 20 MHz 88100 processor with integral FPU
Single- or dual-processor options

Memory Management

Virtual memory
Two 88200 CMMUs/ CPU; 4 GB per
process Caches
Data cache and instruction cache
Size: 16 KB per side
Organization: 4-way set associative

Main Memory

8 MB - 128 MB with byte parity
Expansion: 4- or 16-MB modules
Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O

IEEE 802.3 Ethernet LAN
Bandwidth: 10 Mbits/sec
Parallel Port
Centronics- and Data Products-compatible
Two Serial Ports
RS-232 (one with modem control); baud
rates up to 19.2 kilobaud
SCSI
Asynchronous and synchronous operation
VMEbus Backplane
Motorola's VMEbus Revision C.1
IEEE P1014 Draft 1.2
Two 6U slots

Environmental

Temperature
Operating/ Nonoperating
10 - 38 C/ - 40 - 70 C
Relative Humidity
Operating/ Nonoperating:
20 - 80% / 10 - 90%

Electrical

AC Voltage: 120V nominal (85-138
VAC); 220V nominal (187-276 VAC)
AC Frequency
47 - 63 Hz
Current draw
8 amps at 120Vrms
5 amps at 220Vrms
Power Supply: 325 Watts

Physical

Dimensions:

24.75" high x 5.75" wide by 22" deep

Weight:

System Chassis: 59 lbs. fully loaded
(with disks and tape)

Peripherals

5.25" Winchester disks: 179MB HH
5.25" SCSI 20ms average seek time
1.5MB/s transfer rate
332MB HH 5.25" SCSI
14ms average seek time
4MB/s transfer rate
662MB FH 5.25" SCSI
16.5ms average seek time
4MB/s transfer rate
1GB FH 5.25" SCSI
15ms average seek time
4MB/s transfer rate

Tape Drives:

150MB 5.25" HH QIC Cartridge tape
Can read/write QIC 120MB; can read
QIC 40MB and 60MB
112KB/sec sustained data transfer rate
Single-ended SCSI interface
320/525MB 5.25" HH QIC Cartridge tape
Can read/write QIC 150MB
Single-ended SCSI interface
2GB 5.25" FH 8mm cartridge tape
Auto-load/ auto-thread
1.5MBs burst data rate
246 KBs sustained data rate
Single-ended SCSI interface
1600bpi PE format reel-to-reel tape drive
Auto-thread, auto-load, horizontal mount
25/ 100 ips selectable
160 KB/sec PE transfer rate (instantaneous)

6 to 10.5" diameter reels
Single-ended SCSI interface

Optional Communications Controllers

VMEbus Asynchronous Controller

16 full-duplex RS-232C ports
16 x 9600bps aggregate maximum transfer rate
Motorola 68020 with 192 KB static RAM buffer, 128KB EPROM, 2 custom VLSI octarts

VMEbus Distributed Host Adapter (VDA/128)

Up to 128 asynchronous devices connected on cluster controllers via RG62 coaxial cable

VMEbus Distributed Cluster

Support for 16 RS-232C lines(VDC/16) or 8 RS-232C lines plus Centronics printer port (VDC/8P)
Aggregate throughput (VDC/16)
16x9600 baud, half-duplex (VDC/8) 8 x 19.2 KBps, half duplex
Signals supported CTS, DCD, DSR, DTR, RTS, RXD, TXD, Ground

VMEbus Ethernet LANController

7990 LANCE Ethernet controller chip and 256 KB dual-ported data buffer
10Mbits/sec Bandwidth



AViiON 4000 Series Servers

Fact Sheet

This revision describes a new 20MHz processor and new 4000-Series model numbers.

The AV 4000 Series Servers are cost-effective, office-package systems based on the Motorola 88000 RISC architecture. The series provides a small-footprint tower package in a 16MHz, 88100 uni- (AV 4000) or dual-processor (AV 4020) and a 20MHz, 88100 uni- (AV 4100) or dual processor (AV 4120). They are suitable for a wide spectrum of time-sharing and server environments.

An integrated motherboard (and daughtercards) offers single or dual CPUs, parity memory, SCSI bus controller, Ethernet controller, and VME interface. The second CPU is standard on the AV 4020 and 4120 and optional on the AV 4000 and 4100. Two VMEbus slots support asynchronous and synchronous communications controllers.

In a time-sharing environment, as many as 128 asynchronous devices can be supported via the VME Distributed Async Host Adapter (VDA/128). The AV 4000 systems can be connected to other intelligent systems via an industry-standard IEEE 802.3 Ethernet LAN to act as file, compute, or cleaved application servers.

Integrated System Board

- 16.67 or 20MHz Motorola 88100 RISC Processor
- Two 88200 Cache and Memory Management Units (CMMU)
- Dual processor standard on the AV 4020 and 4120, optional on the AV 4000 and AV 4100.
- 8 to 32 MB byte parity RAM (via 4 MB SIMMs)
- Industry-standard SCSI interface for disk and tape
 - Supports synchronous (4 Mbits/sec) and asynchronous (1.5 Mbits/sec) operation
- IEEE 802.3 LAN interface
- Two RS-232C serial ports (one used for system console)
- Centronics-compatible parallel port
- Hardware support for Motorola's VMEbus (Revision C.1)

Attractive Tower Package

- Compact small-footprint deskside chassis
 - (24.75" H x 5.75" W x 22" D)
- Internal mass storage (see following)
- Two slot (6U) VMEbus card cage
- 325W power supply

Internal Mass Storage/Tape Back-up

- Deskside chassis can hold four 5 1/4" half-height (HH) devices (two can be removeable) or one 5 1/4" full-height (FH) device and two 5 1/4" HH devices (two can be removeable)
 - 150 MB HH QIC tape is standard and uses one removeable media bay
 - Packages include either a HH 332 MB or 662 MB Winchester disk
 - One HH internal removeable/fixed media bay is available for expansion
- Devices supported
 - 662 MB Winchester 5.25" FH SCSI
 - 332 MB Winchester 5.25" HH SCSI
 - 179 MB Winchester 5.25" HH SCSI
 - 150 MB QIC150 Cartridge Tape 5.25" HH SCSI

External Mass storage/Tape back-up

- External mass storage peripheral housing
 - Up to seven SCSI devices (total internal and external) are supported for a maximum of 3.0 GB of disk storage
 - Each housing can hold one 5 1/4" FH device and one 5 1/4" HH device or three 5 1/4" HH devices.
- Devices supported
 - 662 MB Winchester 5.25" FH SCSI
 - 332 MB Winchester 5.25" HH SCSI
 - 179 MB Winchester 5.25" HH SCSI
 - 2 GB Cartridge Tape Backup 5.25" FH SCSI
 - 150 MB QIC Cartridge Tape 5.25" HH SCSI
 - 1600bpi 9-track tape drive (separate tabletop enclosure)

Standard Communications

- Ethernet interface standard (without transceiver or drop cable). Supports either thick or thin net connections.
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud
- Centronics/Data Products compatible parallel printer port

Optional VME expansion boards

- VAC/16 16 RS-232C port asynchronous multiplexor
- VDA/128 asynchronous subsystem host adapter (up to 128 RS-232C asynchronous connections via VDC/8 and VDC/16 cluster controllers) - max. 1
- VSC/3 3 port synchronous communications board - max. 1
- Second Ethernet interface (without transceiver or drop cable) - max. 1. Supports either thick or thin net connections.

Customer environment/use characteristics

- Customer installable and maintainable
- Customer installable add-on memory options, second CPU option and peripherals
- 40db (quiet office) noise levels
- 90 day on-site warranty on all system components

Package Model Numbers

- G70148 : 8 MB, 16 MHz AV 4000 Base System, 332 MB disk, 150 MB tape
- G70137 : 8 MB, 16 MHz AV 4000 Base System, 622 MB Disk, 150 MB tape
- G70139 : 16 MB, dual 16 MHz AV 4020 Base System, 662 MB Disk, 150 MB tape
- G70136 : 8 MB, 20 MHz AV 4100 Base System, 332 MB Disk, 150 MB tape
- G70138 : 8 MB, 20 MHz, AV 4100 Base System, 662 MB disk, 150 MB tape.
- G70147 :16 MB, 20 MHz AV 4120 Base System, 662 MB disk, 150 MB tape.

Product Description

The AViiON 4000 Series desktside servers offer RISC multiprocessor power in an extremely small, compact package. With extensive internal and external mass storage, up to 32 MB of memory, and industry-standard VMEbus controllers, these systems provide a wide range of configurations and options for memory, mass storage and multi-CPU configurations.

The base system board has a 16.67MHz or 20MHz uniprocessor, with an optional second CPU that's standard in AV 4020 and AV 4120. Memory can be expanded from

the 8 MB base configuration to a 32 MB maximum by adding six 4 MB memory modules. See Table 1 for configuration ranges.

CPU's	1-2
VME Slots	2
Memory	8-32 MB
Asynchronous Connects std. (1 VDA Max.)	2 (1 for console)
Asynchronous Connects (1 VAC/16 max.)	128
Asynchronous Connects (1 VAC/16 max.)	32
Ethernet LAN	1-2
Sync Ports (1 VSC/4 max.)	0-3
External PHUs	0-2
Disk	
Integral	332 MB-996 MB
External	0-2.0 GB
150 MB Cartridge Tapes	1-2
Reel-to-Reel Tapes	0-1

Note: Due to mass storage and bus slot limitations, not all maxima can be achieved simultaneously.

Table 1. Configuration range for AV 4000 Series

Architecture

The AViiON 4000 Series servers are based on Motorola 88000 RISC processors and contain the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. The AV 4020 and AV 4120 have two 88100 CPU chips and four 88200 CMMU chips. See the AViiON 5000/6000 Series MAPS/PLUS article on page 202-13 for more information about the 88K processor architecture.

The AV 4000/AV 4100 series board is a single 18" x 12" multilayer PCB that includes

- A 16.67 (AV 4000) or 20MHz (AV 4100) Motorola 88100 RISC CPU (Models AV 4020 & 4120 have two) and two 88200 CMMUs (Models AV 4020 & 4120 have four)
- Closely coupled, integrated floating point unit
- Eight connectors capable of holding up to eight, 4 MB memory modules
- MBUS connector for the second CPU
- Interface logic supporting Revision C.1 of the VMEbus
- Industry-standard SCSI interface for connecting peripherals such as disk and tape
- Industry-standard 802.3 Ethernet Interface (w/o transceiver)
- Two, asynchronous interfaces - RS232 with one offering full modem support
- Parallel line printer interface (Centronics compatible)

- Time-of-Boot clock and calendar
- Power-up diagnostics

Figure 1 shows a block diagram of the AV 4000 system architecture. Note that the AV 4000 Series uses the same system board as the AV 400 series. The mouse and keyboard connectors are on the board, although they are not used for server configurations.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its Eurocard format, performance, and versatility are some of the reasons that it appeals to a wide range of users, especially in the technical marketplace. DGC chose the VMEbus for the AViiON systems because it is an industry-standard bus that offers high performance at a reasonable price. The VMEbus implementation for AViiON 5000/6000 Series Systems incorporates block-mode transfers, but the AViiON 4000 Series doesn't support this option to the C.1 specification.

The VMEbus specification defines an interface system for interconnecting data processing, data storage and peripheral control devices in a closely-coupled hardware configuration. The specification for the VMEbus that is incorporated in the AViiON 4000 and 4100 conforms to Motorola's Revision C.1 VMEbus specification.

The C.1 specification evolved from work by the IEEE P1014 Standard Committee and the IEC 47b Standards Committee. The IEEE P1014 Standards Committee approved the specification in their draft 1.2 which is undergoing IEEE and IEC final approval.

The VMEbus specification provides for a mechanical and an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female connectors. In the AViiON 4000 Series, a separate 6U backplane been designed to provide two slots, each slot consisting of two 96-pin connectors called J1 and J2, the J1 connector being the uppermost connector and J2 the lower. In addition to the VMEbus slots the backplane provides the power connection for the system board.

The VMEbus incorporates the Master/Slave concept. Within this framework, the system board is the Master, since it controls the flow of data between itself and any other device (the Slave). Data transfers initiated by VMEbus devices other than the system board are considered "slave" transfers. VMEbus devices can transfer

data to the AV 400's internal system bus—MBUS—in single words, half-words, or bytes.

VMEbus transactions are governed by a single-bus Master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 4000 Series, the design allows for more than one Master, but the system board is always a Master.

In the AViiON 4000 Series, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, and performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8-, 16-, and 32-bit MBUS masters and slaves as well as the 8-, 16-, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

The C.1 interface specifications and options implemented on the AViiON 4000 Series are listed in Table 2.

Mass Storage

The AV 4000 Series offers an integral SCSI bus controller for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices, then exits the rear of the unit and terminates in a Champ connector for connecting external Peripheral Housing Units. The SCSI controller supports either asynchronous (1.5 MB/s) or synchronous (5 MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU).

In the main deskside chassis, space is provided for one FH and two HH 5.25" devices. Standard in all system packages is a 5.25" HH 150 MB cartridge tape that conforms to the QIC 150 industry standard, and either a 322 MB 5.25" FH Winchester disk with 16ms access time or a 662 MB 5.25" FH Winchester disk with 16ms access time. A 179 MB 5.25" HH Winchester disk with 18ms access time is available to fit the remaining bay. The 662 MB and 179 MB disks are capable of synchronous or asynchronous operation, while the 322 MB disk can operate in asynchronous mode only.

All external Data General peripherals, with the exception of the tabletop 9-track tape option, for the AViiON 4000 Series are mounted in the desktop Peripheral Housing Unit which can accommodate a variety of storage and backup options. These options include the 179 MB, 322

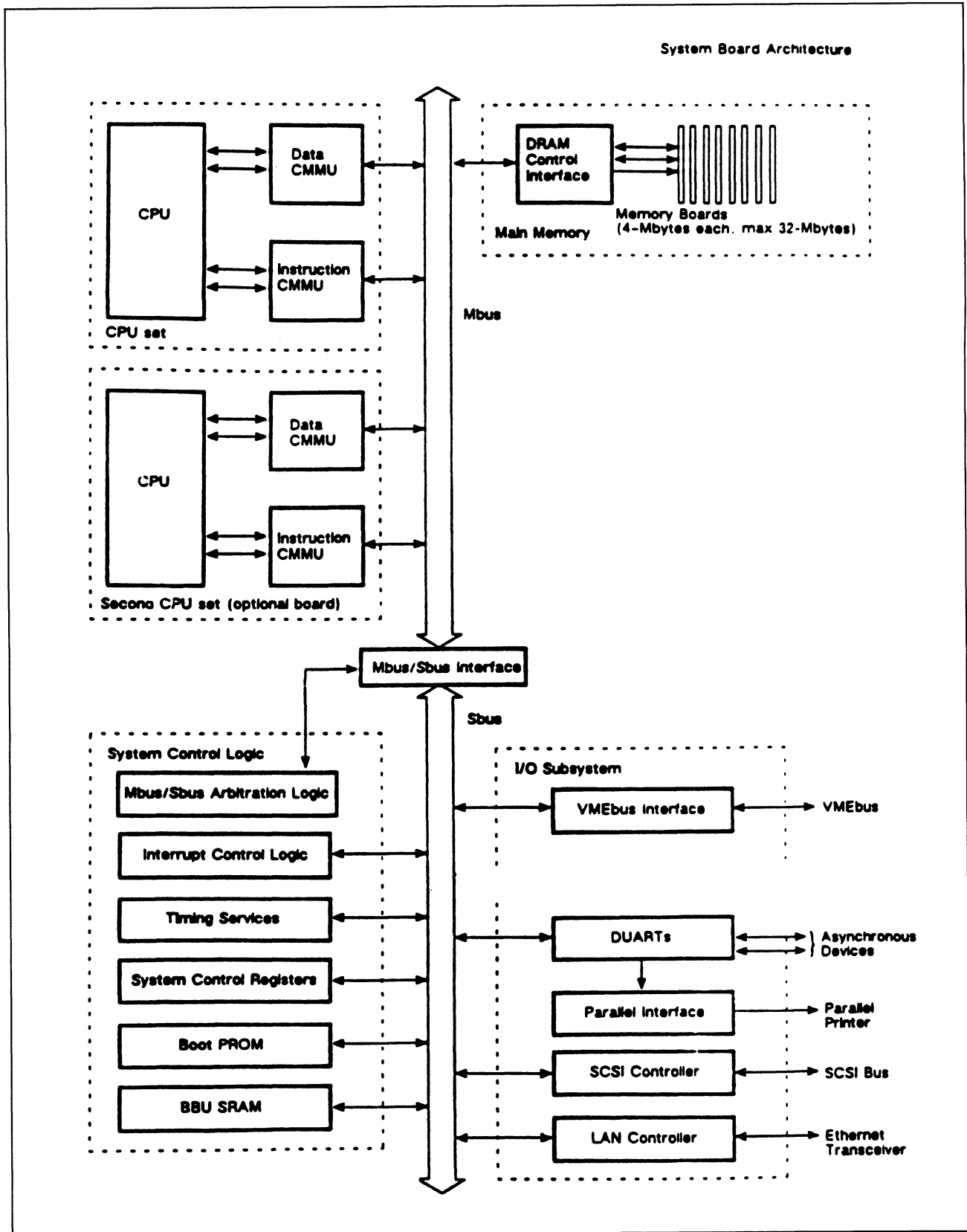


Figure 1. System Block Diagram

Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock. The IACK and VMEbus grant daisy chain driver. The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.). The VMEbus arbitration time out logic (64 micro-sec.). VMEbus watchdog timer (64 micro-sec.).
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C.1 interface specifications and options.

MB and 662 MB Winchester disks, 150 MB QIC tape and 2 GB FH 5.25" cartridge tape drive. Each Peripheral Housing Unit can accommodate one FH and one HH unit or three HH units.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 4000 Series chassis requires 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, enough space for configurations of up to two additional Peripheral Housing Units per workstation. Fig-

ure 2 illustrates the available cabling options. The Peripheral Housing Unit contains an 125 watt power supply, internal fan, internal cabling (2.25 ft.) and SCSI Bus terminator. The first SCSI cable from the chassis to the first PHU is different than the one used on the AV3xx workstations.

The 9-track reel-to-reel tape option can replace the last PHU on the SCSI bus.

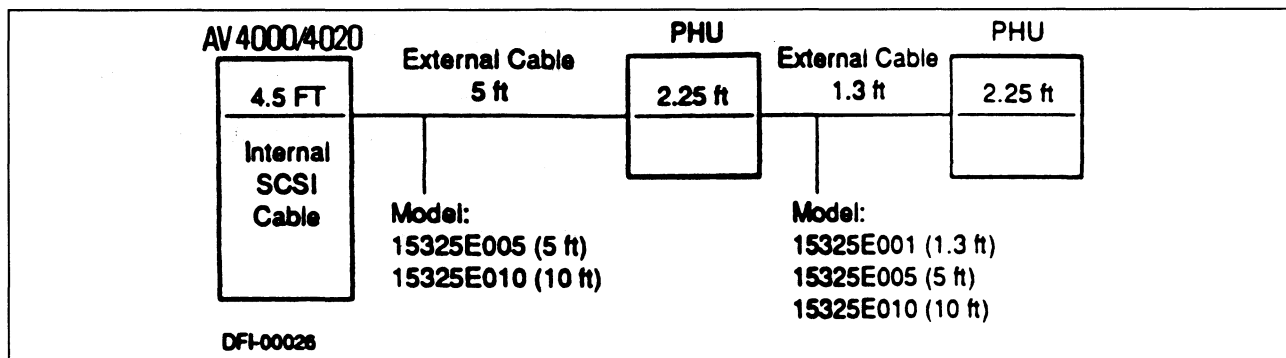


Figure 2. SCSI Cable length configurations.

DG/UX

The AV 4000 Series is supported by a unique set of DG/UX model numbers that authorize the connection of unlimited numbers of users and include media and documentation. Model numbers and their contents include:

Q001AZS1CA	Server/Multiuser Operating System DG/UX GNU C Documenter Tool Kit (DTK)
P001AZS1CA	DG/UX GNU C Documenter Tool Kit (DTK) TCP/IP ONC/NFS X WINDOWS OSF/MOTIF

Communications

The system board supports two RS232C asynchronous ports and an IEEE 802.3 Ethernet LAN port. In addition, the two-slot VMEbus supports a variety of asynchronous, synchronous, and LAN communications options. These use the same boards that are supported on the AV5000/6000, but all require changes due to chassis differences. For the AV 4000 Series, each board is sold in a 6U Eurocard form factor, with air dams and external connectors. In addition, some modifications have been made to ensure mechanical and environmental compliance with Data General and government standards.

See the MAPS/PLUS VME Communications Controllers article for a complete description of the optional VME communications controllers (page 271-113).

Asynchronous Communications

The two serial ports on the system board provide data rates of up to 19.2 Kbps full duplex. The first of these ports supports the system console. The second can be used to connect an additional asynchronous device. This line supports full modem control.

For low-connect counts, the most cost-effective connectivity scheme is the VAC/16 (VME Asynchronous Controller/16), since it provides 16 RS-232C lines with modem control. Each VAC/16 includes a Motorola 68020 processor, 192 KB static RAM buffer, 128 KB EPROM, and two custom VLSI octarts. All 16 lines are full duplex. The board has an aggregate data rate of 16 x 19.2 Kbps full duplex.

In AV 4000 Series systems, the VAC/16 connects to two external junction boxes via a 5' shielded cable. Each junction box provides eight DB-25 connectors. The junction boxes use the same board as the VAC/16 bulkhead connector panel which is used on the AV5000 series.

Larger connect-counts can be handled with the VDA/128 (VME Distributed Adapter) which provides up to 128 asynchronous connections via VDC (VME Distributed Cluster) boxes. For typical commercial applications, however, the users per VDA/128 should be limited to 64 for optimum performance.

The VDA/128 is based on a 12.5 MHz 68010 processor with 512 KB of zero-wait-state DRAM and 16 KB of dual-ported memory. It supports a 2.5 Mbit/second serial bus interface to the cluster controllers over RG62 coax cable. The distributed clusters are based on a 10 MHz 68000 processor with 32 KB of static RAM for buffering and microprocessor support and 2 KB of static RAM for coaxial serial interface buffer support.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines). The aggregate throughput of the eight-line cluster is 8 x 19.2 Kbps half-duplex; that of the sixteen-line cluster is 16 x 9600 bps half-duplex. All cluster controllers support the following RS232C signals: CTS, DCD, DSR, DTR, TRS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

Synchronous Communications

Synchronous communications for the AV 4000 Series are handled by the VSC/3 (VME Synchronous Controller/3). This board provides three multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips (this same board is called the VSC/4 on AV5000 systems—only three ports can be connected on AV 4000 systems due to cabling restrictions). The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. This board can handle two independent sync protocols simultaneously; however, initial software offerings will support only a single protocol. Aggregate throughput is 1.6 MB/sec.

LAN Communications

Ethernet LAN communications are provided by the integrated Ethernet controller on the system board and the optional VLC (VME Ethernet LAN Controller). Each provides access to 10 Mbit/second IEEE 802.3 Ethernet LANs via a 15-pin sub-D connector. A drop cable and a standard Ethernet N-tap or a Thin Ethernet BNC-tap transceiver are required.

Hardware Support Services

Field Support Services

Data General Field Engineering supports AViiON systems with state-of-the-art service technology. We offer several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

The *On-Call Agreement* lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. In conjunc-

tion with the terms of the basic agreement, users may also purchase additional options such as Extended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The *Multiyear Plus Agreement* includes all of the benefits of an On-Call Agreement and more. Signing a Multiyear Plus Agreement with a term of two to five years gives customers discounts of up to 10 percent over the life of their agreement.

The *Mail-in Maintenance Service Agreement* provides a low-cost alternative to on-site service and requires customer participation in the service effort. Data General provides telephone assistance through its Phone Assistance Center and provides any required parts within xx days. The customer is responsible for calling the Field Engineering Customer Support Center, assisting in problem diagnosis, returning the defective part to Data General, and reinstalling the replacement part provided by Data General.

For more information about service options, contact a Data General salesperson or call the Data General Field Engineering Telemarketing Group at 1-800-325-3065 (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server-specific, shared with AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Ordering

System Packages

The AViiON 4000 and 4020 are offered as systems packages that include a single CPU, 8 MB RAM, single disk and 150 MB cartridge tape. The AViiON 4020 and 4120 are offered in packages that include dual CPU, 16 MB

RAM, 662 MB disk, and 150 MB cartridge tape. Table 3 lists the packaged systems and model numbers. Table 4 lists the available power suffixes. To provide optimum flexibility, a second CPU, additional memory, mass storage and communications controllers can be ordered as separate options.

<i>Model</i>	<i>Description</i>
G70148	8 MB, 16 MHz AV 4000 Base System, 332 MB disk, 150 MB tape
G70137	8 MB, 16 MHz AV 4000 Base System, 662 MB Disk, 150 MB tape
G70139	16 MB, 16 MHz AV 4020 Dual CPU System, 662 MB Disk, 150 MB tape
G70136	8 MB, 20 MHz AV 4100 Base System, 332 MB Disk, 150 MB tape
G70138	8 MB, 20 MHz AV 4100 Base System, 662 MB Disk, 150 MB tape
G70147	16 MB, 20 MHz AV 4120 Dual CPU System, 662 MB Disk, 150 MB tape

Table 3. AV 4000 Series system packages.

<i>Suffix</i>	<i>Countries</i>
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 4. AV 4000 Series power options.

System Board Options

The system board can support a maximum of 32 MB of byte parity memory via 4 MB SIMMS. The AV 4000/4100 base package offers 8 MB ; a maximum of six additional SIMMs may be added. The AV 4020/4120 base package offers 16 MB; a maximum of four SIMMs may be added. An MBUS connector is also available to support AV 4000/4100 second-CPU option daughtercards that contain a 88100 CPU and two 88200 CPUs operating at the same clock speed as the base system processor. Model numbers for these options are in Table. 5.

<i>Model</i>	<i>Description</i>	<i>Max. #</i>
7411-K	VME Asynchronous Controller/16 (VAC/16) & Junction Boxes	2
7401-K	VME Distributed Adapter/128 (VDA/128)	1
7402	VME Distributed Cluster/8P (VDC/8P)	16
7403	VME Distributed Cluster/16 (VDC/16)	8
7413-K	VME Synchronous Controller/3 (VSC/3)*	1
7405-K	VME LAN Controller (VLC) - IEEE 802.3 controller	1

*This board is called VME Synchronous Controller/4 on AV5000/6000

Table 6. AV4000 Series VMEbus Communications Controllers and configuration maximums.

<i>Model</i>	<i>Description</i>	<i>Max. #</i>
7000-K	4 MB Expansion Memory Module	6
7006-K	16MHz Second CPU upgrade	1 (on AV 4000 only)
7008-K	20 MHz Second CPU upgrade	1 (on AV 4100 only)
7012-K *	8 MHz Expansion Memory Package (2 SIMMs)	3 (2 on AV 4020 and AV 4120)

Table 5. AV 4000 Series system board options

Available only at time of system purchase.

VMEbus Communications Options

A maximum of two VME option boards are supported on AV 4000 Series systems. Table 6 lists model numbers for the optional VMEbus communications controllers (note that not all of the maximums can be achieved simultaneously).

The integral and optional Ethernet controllers require a transceiver and drop cable. Table 7 lists the available options and model numbers.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables.
1326	5 foot Ethernet drop cable for connecting system to transceiver.

Table 7. Communications connectivity options.

Mass Storage

The AV 4000 Series chassis can support a maximum of one FH and two HH peripherals. Each package includes one disk drive (either 332 HH or 662 FH) and a HH 150 MB QIC tape, leaving room for one additional internal HH device. Table 8 lists the available options.

<i>Model</i>	<i>Description</i>
6577-J	150 MB QIC Tape add-on
6539-J	179 MB Disk add-on
6563-J	1.2 MB 5.25" Floppy diskette with SCSI/SA450 interface board
6562-J	1.44 MB 3.5" diskette with SCSI/SA450 interface board
6563-JX	1.2 MB 5.25" Floppy Diskette add-on
6562-JX	1.44 MB 3.5" Diskette add-on

Table 8. AV 4000 Series internal mass storage options.

Additional mass storage expansion is provided via the external extension of the SCSI channel. Subject to the maximum cable length and seven device limitations described earlier, up to two PHUs or reel-to-reel tapes can be attached. Table 9 gives model numbers for mass storage devices bundled in an external housing. Table 10 provides model numbers for devices that can be used as add-ons to a PHU.

<i>Model</i>	<i>Description</i>
G10565	Peripheral Housing Unit (PHU)
G6605	662 MB Disk in Peripheral Housing Unit
G6604	332 MB Disk/150 MB Tape in Peripheral Housing Unit
G6603	179 MB Disk/150 MB Tape in Peripheral Housing Unit
G6662	332 MB Disk in Peripheral Housing Unit
G6600	179 MB Disk in Peripheral Housing Unit
G6602	150 MB QIC Tape in Peripheral Housing Unit
G6591-A	2 Gbyte Cartridge Tape 5 1/4" full-height in Peripheral Housing Unit
G6587-A	1600bpi Reel-to-Reel Tape in Tabletop Package
G6589-A,T	6250 bpi Reel-to-Reel Tape in Tabletop Package

Table 9. External peripherals in housing.

Systems ordered with DG/UX and a disk will receive the operating system installed on the disk.

<i>Model</i>	<i>Description</i>
6577-E	150 MB QIC Tape add-on for Peripheral Housing Unit
6539-E	179 MB Disk add-on for Peripheral Housing Unit
6662-E	332 MB Disk add-on for Peripheral Housing Unit
6554-E	662 MB Disk add-on for Peripheral Housing Unit
6591-E	2 Gbyte Cartridge Tape 5 1/4" full-height for Peripheral Housing Unit
6562-E	1.44 MB 3.5" HH diskette drive with SCSI/SA450 Converter
6563-E	1.2 MB 5.25" HH diskette drive with SCSI/SA450 Converter
6562-EX	1.44 MB 3.5" HH diskette drive without SCSI/SA450 Converter
6563-EX	1.2 MB 5.25" HH diskette drive without SCSI/SA450 Converter

Table 10. Add-on peripherals for PHU.

Cabling

Cabling must be ordered separately to connect:

- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing UNIT (PHU) and 1600bpi reel-to-reel tape drive (using champ connectors on either end)
- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- VDA/128 to VDC/16 and VDC/8P cluster controller boxes

Table 11 lists the model numbers for the AV 4000 and AV 4100 system cables.

NOTE: For asynchronous (or parallel) devices connected to VAC junction boxes, order devices with an -X suffix. Order cables separately. For devices attached to base system ports (including system console), a bundled cable may be ordered.

<i>Model</i>	<i>Descriptions</i>
15338E025	25' cluster extension cable - VDA/128
15338E050	50' cluster extension cable - VDA/128
15338E100	100' cluster extension cable - VDA/128
15340E010	10' async terminal cable VDC.xx or VAC/16 only
15340E015	15' async terminal cable VCD.xx or VAC/16 only
15340E025	25' async terminal cable VCD.xx or VAC/16 only
15325E001	SCSI champ x champ cable, 1.3' (not for connecting 1st PHU to system)
15325E005	SCSI champ x champ cable, 5'
15325E010	SCSI champ x champ cable, 10'
15345E015	15' Centronics printer cable (for VDC/8P only)
15345E025	25' Centronics printer cable (for VDC/8P only)
10235	5' Centronics printer cable (for integrated parallel port only)
1084M	Modem control (25") processor to modem Modem control (10') processor to modem
1340-S	RS232 (5') processor to asynchronous device (including system console)
1340-T	15' processor to asynchronous device (including system console)
1340	25' processor to asynchronous device (including system console)
1340-A	50' processor to asynchronous device (including system console)

Table 11. AV 4000 Series cable options.

Important Ordering Notes

For a thorough description of DG/UX and ordering information, please refer to the DG/UX MAPS/PLUS article on page 301-012.3.

To Order:

1. Select the system package that best fits your needs.
Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage and VME communications options as needed.

3. Each operating system license ordered **MUST** be itemized on the Program License Schedule 501 and purchase order.
4. Order appropriate software distribution and services' packages.

Related Information

See Table 12.

<i>Part Number</i>	<i>Title</i>
012-003773	AV 4000 Series Product Brief
046-000959	AV 400 Series Workstations MAPS/PLUS article
046-001013-02	DG/UX 4.30 MAPS/PLUS article

Table 12. Related Information

Specifications**Processor:**

Motorola 88100
16.67 or 20 MHz 88100 processor with integral FPU
Single- or dual-processor options

Memory Management

Virtual memory
Two 88200 CMMUs/CPU; 4 GB per
process Caches
Data cache and instruction cache
Size: 16 KB per side
Organization: 4-way set associative

Main Memory

8 MB - 32 MB with byte parity
Expansion: 4- MB modules
Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O

IEEE 802.3 Ethernet LAN
Bandwidth: 10 Mbits/sec
Parallel Port
Centronics- and Data Products-compatible
Two Serial Ports
RS-232 (one with modem control); baud rates up to 19.2 kilobaud

SCSI

Asynchronous and synchronous operation
VMEbus Backplane
Motorola's VMEbus Revision C.1
IEEE P1014 Draft 1.2
Two 6U slots

Environmental

Temperature
Operating/Nonoperating
10 - 38 C/- 40 - 70 C

Relative Humidity
Operating/Nonoperating:
20 - 80% / 10 - 90%

Electrical

AC Voltage: 120V nominal (85-138 VAC); 220V nominal (187-276 VAC)
AC Frequency
47 - 63 Hz
Current draw
8 amps at 120Vrms
5 amps at 220Vrms
Power Supply: 325 Watts

Physical**Dimensions:**

24.75" high x 5.75" wide by 22" deep

Weight:

System Chassis: 59 lbs. fully loaded
(with disks and tape) Monitor: approx.
60 lbs.

Peripherals

5.25" Winchester disks: 179 MB HH
5.25" SCSI 16ms average access time
5 MB/s transfer rate (sync)
1.5 MB/s transfer rate (async)
322 MB FH 5.25" SCSI
18ms average access time
1.5 MB/s transfer rate (async)
662 MB FH 5.25" SCSI
18ms average access time
5 MB/s transfer rate (sync)
1.5 MB/s transfer rate (async)

Tape Drives:

150 MB 5.25" HH QIC Cartridge tape
Can read/write QIC 120 MB; can read
QIC 40 MB and 60 MB
112KB/sec sustained data transfer rate
Single-ended SCSI interface
2 GB 5.25" FH 8mm cartridge tape
1600bpi PE format reel-to-reel tape drive
Auto-thread, auto-load, horizontal
mount
25/100 ips selectable
160 KB/sec PE transfer rate (instantaneous)
6 to 10.5" diameter reels
Single-ended SCSI interface

Optional Communications Controllers

VMEbus Asynchronous Controller

16 full-duplex RS-232C ports
16 x 9600bps aggregate maximum transfer rate
Motorola 68020 with 192 KB static RAM buffer, 128KB EPROM, 2 custom VLSI octarts

VMEbus Distributed Host Adapter (VDA/128)

Up to 128 asynchronous devices connected on cluster controllers via RG62 coaxial cable

VMEbus Distributed Cluster

Support for 16 RS-232C lines(VDC/16) or 8 RS-232C lines plus Centronics printer port (VDC/8P)
Aggregate throughput (VDC/16) 16x9600 baud, half-duplex (VDC/8) 8 x 19.2 Kbps, half duplex
Signals supported: CTS, DCD, DSR, DTR, RTS, RXD, TXD, Ground

VMEbus Ethernet LANController

7990 LANCE Ethernet controller chip and 256 KB dual-ported data buffer 10 Mbits/sec Bandwidth



AViiON 4000 and 4020 Servers

Fact Sheet

The AV4000 and AV4020 are cost-effective entry-level systems in the AViiON Server Family. Based on the Motorola 88000 RISC architecture, they offer uni- (AV4000) or dual-processor (AV4020) 16MHz 88100 performance in a small-footprint tower package. They are suitable for a wide spectrum of time-sharing and server environments.

The AV4000 and AV4020 are based on an integrated motherboard that offers single or dual CPUs (via daughterboard), parity memory, SCSI bus controller, Ethernet controller, and VME interface. The second CPU is standard on the AV4020, optional on the AV4000. Asynchronous and synchronous communications controllers are supported via two 6U VMEbus slots.

In a time-sharing environment, as many as 128 asynchronous devices can be supported via the VME Distributed Async Host Adapter (VDA/128). The AV4000 series systems can be connected to other intelligent systems via an industry-standard IEEE 802.3 Ethernet LAN to act as file, compute, or cleaved application servers.

Integrated System Board

- 16.67 Motorola 88100 RISC Processor
- Two 88200 Cache and Memory Management Units (CMMU)
- Dual processor standard on the AV4020, optional on the AV4000
- Second 16 MHz and two additional 88200 CMMUs
- 8 to 32MB byte parity RAM (via 4MB SIMMs)
- Industry standard SCSI interface for disk and tape
 - Supports synchronous (5 Mbits/sec) and asynchronous (1.5 Mbits/sec) operation
- IEEE 802.3 LAN interface
- Two RS-232C serial ports (one used for system console)
- Centronics/Data Products-compatible parallel port
- Hardware support for Motorola's VMEbus (Revision C.1)

Attractive Tower Package

- Compact small-footprint deskside chassis
 - (24.75" H x 5.75" W x 22" D)
- Internal mass storage (see following)
- Two slot (6U) VMEbus card cage

- 325W power supply

Internal Mass Storage/Tape Back-up

- Deskside chassis can hold four 5 1/4" half-height (HH) devices (two can be removeable) or one 5 1/4" full-height (FH) device and two 5 1/4" HH devices (two can be removeable)
 - 150MB HH QIC tape is standard and uses one removeable media bay
 - Packages include either a FH 322MB or 662MB Winchester disk
 - One HH internal removeable/fixed media bay is available for expansion
- Devices supported
 - 662 MB Winchester 5.25" FH SCSI (18 ms avg. seek)
 - 322 MB Winchester 5.25" FH SCSI (18 ms avg. seek)
 - 179 MB Winchester 5.25" HH SCSI (16 ms avg. seek)
 - 150 MB QIC150 Cartridge Tape 5.25" HH SCSI
 - 1.2 MB 5.25" Diskette HH SCSI/SA450
 - 1.44 MB 3.5" Diskette HH SCSI/SA450

External Mass storage/Tape back-up

- External mass storage Peripheral Housing Unit
 - Up to seven SCSI devices (total internal and external) are supported for a maximum of 2.5GB of disk storage
 - Each housing can hold one 5 1/4" FH device and one 5 1/4" HH device or three 5 1/4" HH devices.
- Devices supported
 - 662 MB Winchester 5.25" FH SCSI
 - 322 MB Winchester 5.25" FH SCSI
 - 179 MB Winchester 5.25" HH SCSI
 - 2 GB Cartridge Tape Backup 5.25" FH SCSI
 - 150 MB QIC Cartridge Tape 5.25" HH SCSI
 - 1.2 MB 5.25" Diskette HH SCSI/SA450
 - 1.44 MB 3.5" Diskette HH SCSI/SA450
- 1600bpi 9-track tape drive (separate tabletop enclosure)
- 6250 bpi 9-track tape drive (separate tabletop enclosure)

Standard Communications

- Ethernet interface standard (without transceiver or drop cable). Supports either thick or thin net connections.
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud
- Centronics/Data Products compatible parallel printer port

Optional VME expansion boards

- VAC/16 16 RS-232C port asynchronous multiplexor (with two 8-port junction boxes) - max. 2
- VDA/128 asynchronous subsystem host adapter (up to 128 RS-232C asynchronous connections via VDC/8 and VDC/16 cluster controllers) - max. 1
- VSC/3 3 port synchronous communications board - max. 1
- Second Ethernet interface (without transceiver or drop cable) - max. 1. Supports either thick or thin net connections.

Customer environment/use characteristics

- Customer installable and maintainable
- Customer installable add-on memory, graphics options, second CPU option and peripherals
- 40db (quiet office) noise levels
- 90 day on-site warranty on all system components

Package Model Numbers

- G70135 : 8 MB, 16 MHz AV4000 Base System, 322 MB disk, 150 MB tape
- G70137 : 8 MB, 16 MHz AV4000 Base System, 662 MB Disk, 150 MB tape
- G70139 : 16 MB, Dual 16 MHz AV4020 Base System, 662 MB Disk, 150 MB tape

Product Description

The AViiON 4000 and 4020 deskside servers offer RISC multi-processor power in an extremely small, compact package. With extensive internal and external mass storage, up to 32 MB of memory, and industry standard VMEbus controllers, these systems provide a wide range of configurations and options for memory, mass storage and multi-CPU configurations.

The base system board has a 16.67MHz uniprocessor, with an optional second CPU (standard in AV4020). Memory can be expanded from 8 MB (the base configuration) to a maximum of 32 MB (by adding six 4 MB memory modules). See Table 1 for configuration ranges.

Architecture

The AViiON 4000 server is based on 88000 RISC processors from Motorola and contain the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. The AV4020 has two 88100 CPU chips and four 88200 CMMU chips. See the AViiON 5000/6000 Series MAPS/PLUS article on page 202-13 for more information about the 88K processor architecture.

The AV4000 system board is a single 18" x 12" multilayer PCB that includes

- 16.67MHz Motorola 88100 RISC CPU and two 88200 CMMUs (two 88100 CPUs and four 88200 CMMUs in AV4020)
- Closely coupled, integrated floating point unit
- Eight connectors capable of holding up to eight, 4MB memory modules
- MBUS connectors for the second CPU

Interface logic supporting Revision C.1 of the VMEbus

CPUs	1-2
VME Slots	2
Memory	8-32MB
Asynchronous Connects std.	2 (1 for console)
Asynchronous Connects (1 VDA Max.)	128
Asynchronous Connects (2 VAC/16 max.)	32
Ethernet LAN	1-2
Sync Ports (1 VSC/3 max.)	0-3
External PHUs	0-2
Disk	
Integral	322MB-841MB
External	0-1.7GB
150MB Cartridge Tapes	1-2
Reel-to-Reel Tapes	0-1

Note: Due to mass storage and bus slot limitations, not all maxima can be achieved simultaneously.

Table 1. Configuration range for AV4000/4020.

- Industry-standard SCSI interface for connecting peripherals such as disk and tape
- Industry-standard 802.3 Ethernet Interface (w/o transceiver)
- Two asynchronous interfaces - RS232 offering full modem support
- Parallel line printer interface (Centronics or Data Products compatible)
- Time-of-Boot clock and calendar
- Power-up diagnostics

Figure 1 shows a block diagram of the AV4000/4020 system architecture. Note that the AV4000/4020 uses the same system board as the AV400 series. The mouse and keyboard connectors are on the board, although they are not used for server configurations.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its Eurocard format, performance, and versatility are some of the reasons that it appeals to a wide range of users, especially in the technical marketplace. DGC chose the VMEbus for the AViiON systems because it is an industry-standard bus that offers high performance at a

reasonable price (on the AViiON 5000/6000 Series Systems, the VMEbus implementation was designed to accommodate block mode transfers, but the AViiON 4000/4020 does not support this option to the C.1 specification).

The VMEbus specification defines an interface system for interconnecting data processing, data storage and peripheral control devices in a closely-coupled hardware configuration. The specification for the VMEbus that is incorporated in the AViiON 4000/4020 conforms to Motorola's Revision C.1 VMEbus specification. (The C.1 specification is a result of both the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. It has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.)

The VMEbus specification provides for a mechanical and an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female connectors. In the AViiON 4000/4020, a separate 6U backplane provides two slots, each slot consisting of two 96-pin connectors called J1 and J2, the J1 connector being the uppermost connector and J2 the lower. In addition to the VMEbus slots the backplane provides the power connection for the system board.

The VMEbus incorporates the Master/Slave concept. Within this framework, the system board is the Master, since it controls the flow of data between itself and any other device (the Slave). Data transfers initiated by VMEbus devices other than the system board are considered "slave" transfers. VMEbus devices can transfer data to the AV4000's internal system bus—MBUS—in single words, half-words, or bytes.

VMEbus transactions are governed by a single-bus Master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 4000, the design allows for more than one Master, but the system board is always a Master.

On the AViiON 4000/4020, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, and performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8-, 16-, and 32-bit MBUS masters and slaves as well as the 8-, 16-, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

The C.1 interface specifications and options implemented on the AViiON 4000 are listed in Table 2.

Mass Storage

The AV4000/4020 offers an integral SCSI bus controller for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices, then exits the rear of the unit and terminates in a Champ connector for connecting external Peripheral Housing Units. The SCSI controller supports either asynchronous (1.5 MB/s) or synchronous (5 MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU).

In the main desktide chassis, space is provided for one FH and two HH 5.25" devices. Standard in all system packages is a 5.25" HH 150MB cartridge tape that conforms to the QIC 150 industry standard, and either a 322MB 5.25" FH Winchester disk with 16ms seek time or a 662MB 5.25" FH Winchester disk with 16ms seek time. A 179MB 5.25" HH Winchester disk with 18ms seek time is available to fit the remaining bay. The 662MB and 179MB disks are capable of synchronous or asynchronous operation, while the 322MB disk can operate in asynchronous mode only.

All external Data General peripherals (with the exception of the tabletop 9-track tape option) for the AViiON 4000 Series are mounted in the desktop Peripheral Housing Unit, which can accommodate a variety of storage and backup options. These options include the 179MB, 322MB and 662MB Winchester disks, 150MB QIC tape and 2GB FH 5.25" cartridge tape drive. Each Peripheral Housing Unit can accommodate one FH and one HH unit or three HH units.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 4000/4020 chassis requires 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, enough space for configurations of up to two additional Peripheral Housing Units per workstation. Figure 2 illustrates the available cabling options. The Peripheral Housing Unit contains an 125 watt power supply, internal fan, internal cabling (2.25 ft.) and SCSI Bus terminator. The SCSI cable from the chassis to the first PHU is different than the one used on the AV3xx workstations.

The 9-track reel-to-reel tape option can replace one of the PHUs on the SCSI bus.

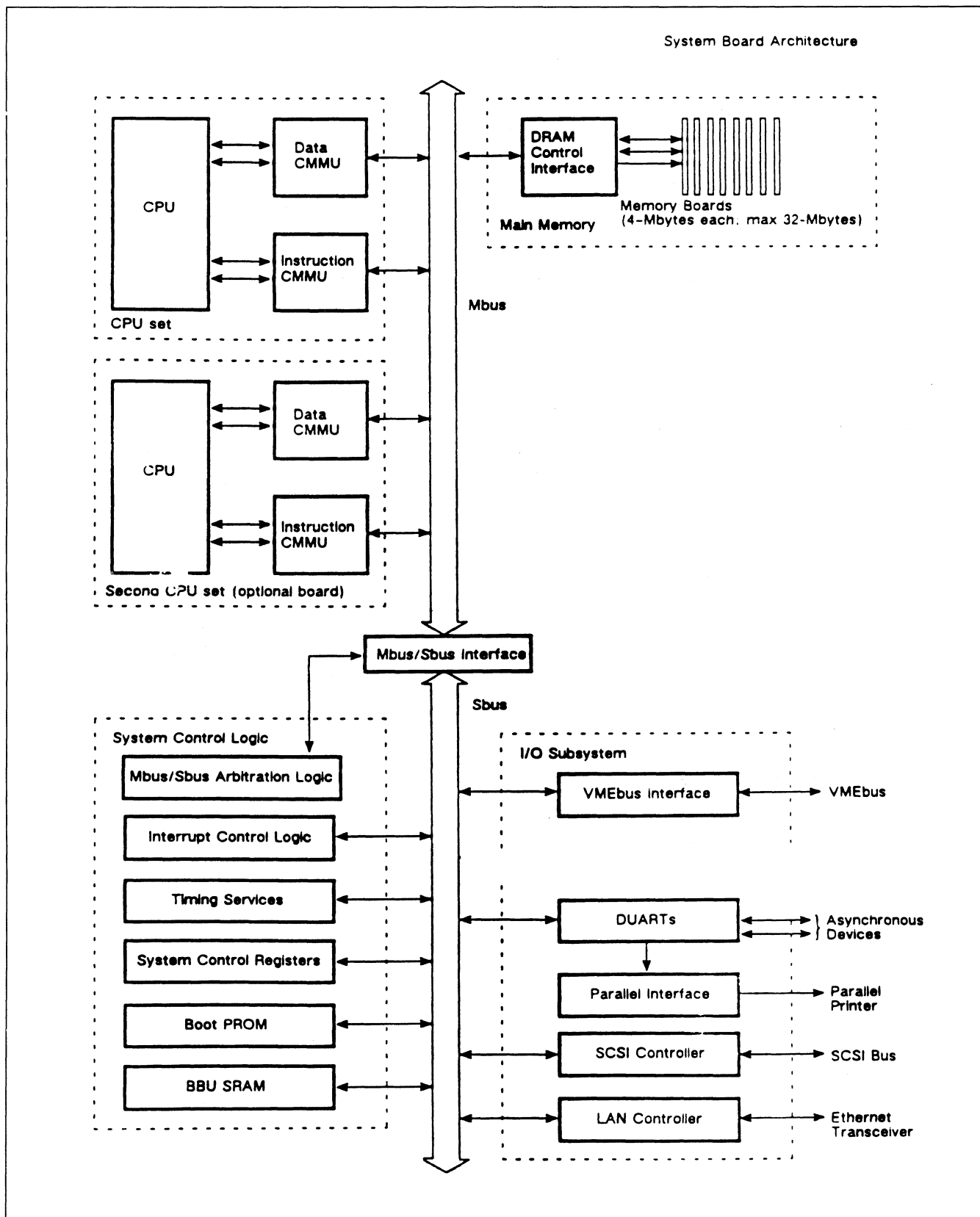


Figure 1. System block diagram

Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock. The IACK and VMEbus grant daisy chain driver. The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.). The VMEbus arbitration time out logic (64 micro-sec.). VMEbus watchdog timer (64 micro-sec.).
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C.1 interface specifications and options.

DG/UX

The AV4000/4020 is supported by DG/UX revision 4.21 or greater. This revision differs from revision 4.20 only in its support for the AV400 and AV4000/4020 systems. A complete discussion of its other features and licensing requirements is found in the DG/UX 4.20 MAPS/PLUS article (page 301-012.3). Model numbers are

Server/Multiuser Operating System - Q001AZS1CA

DG/UX

GNU C

Documenter Tool Kit (DTK)

and

Server/Multiuser/System Software Package - P001AZS1CA
 DG/UX
 GNU C
 Documenter Tool Kit (DTK)
 TCP/IP
 ONC/NFS
 X WINDOWS
 OSF/MOTIF

Both offerings include media and documentation. Both models authorize the connection of unlimited numbers of users.

Communications

The system board supports two RS232C asynchronous ports and an IEEE 802.3 Ethernet LAN port. In addition, the two-slot VMEbus supports a variety of asynchronous, synchronous, and LAN communications options. These use the same boards that are supported on the AV5000/6000, but all require changes due to chassis differences. For the AV4000/4020, each board is sold in a 6U Eurocard form factor, with air dams and external connectors. In addition, some modifications have been made to ensure mechanical and environmental compliance with Data General and government standards.

See the MAPS/PLUS VME Communications Controllers article for a complete description of the optional VME communications controllers (page 271-113).

Asynchronous Communications

The two serial ports on the system board provide data rates of up to 19.2 Kbps full duplex. The first of these ports supports the system console. The second can be used to connect an additional asynchronous device. Both lines support full modem control.

For low-connect counts, the most cost-effective connectivity scheme is the VAC/16 (VME Asynchronous Controller/16), which provides up to 16 RS-232C lines with modem control. Each VAC/16 includes a Motorola 68020 processor, 192 KB static RAM buffer, 128 KB EPROM, and two custom VLSI octarts. All 16 lines are full duplex. The board has an aggregate data rate of 16 x 19.2 Kbps full duplex.

In the AV4000/4020 systems, the VAC/16 connects to two external junction boxes via five-foot shielded cables. Each junction box provides eight DB-25 connectors. The junction boxes use the same board as the VAC/16 bulkhead connector panel which is used on the AV5000 series.

Larger connect-counts can be handled with the VDA/128 (VME Distributed Adapter) which provides up to 128 asynchronous connections via VDC (VME Distributed Cluster) boxes. For typical commercial applications, however, the users per VDA/128 should be limited to 64 for optimum performance.

The VDA/128 is based on a 12.5 MHz 68010 processor with 512 KB of zero-wait-state DRAM and 16 KB of dual-ported memory. It supports a 2.5 Mbit/second serial bus interface to

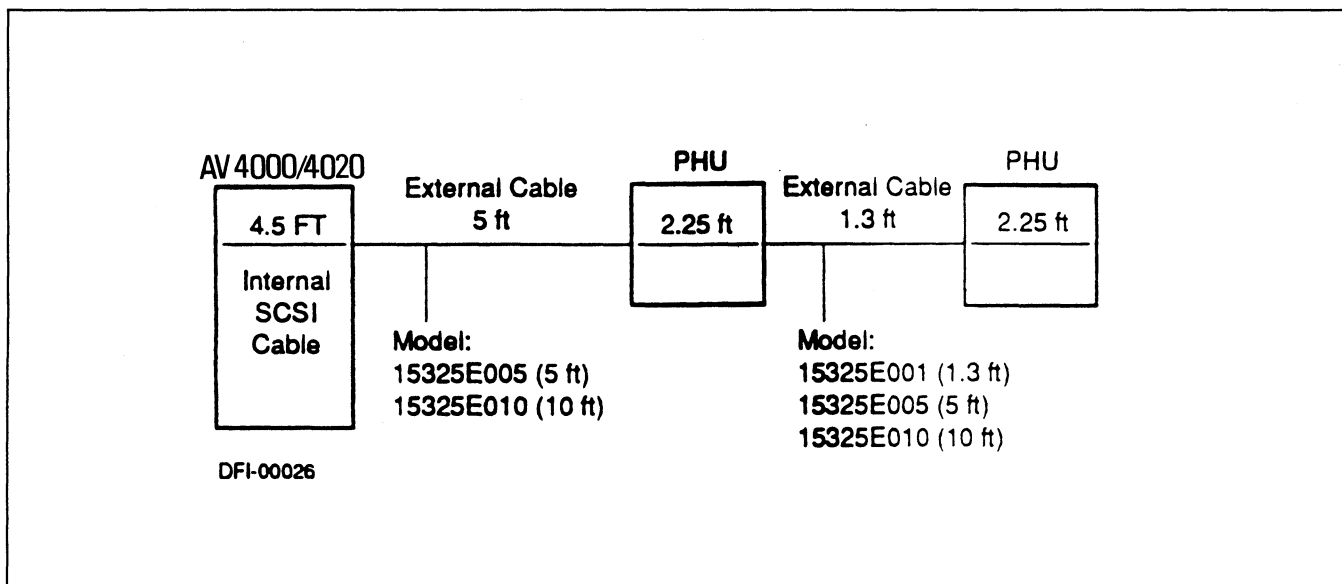


Figure 2. SCSI cable length configurations.

the cluster controllers over RG62 coax cable. The distributed clusters are based on a 10 MHz 68000 processor with 32 KB of static RAM for buffering and microprocessor support and 2 KB of static RAM for coaxial serial interface buffer support.

The distributed clusters are available in two varieties: VDC/8P (eight RS232 lines plus Centronics port) and VDC/16 (sixteen RS232 lines). The aggregate throughput of the eight-line cluster is 8 x 19.2 Kbps half-duplex; that of the sixteen-line cluster is 16 x 9600 bps half-duplex. All cluster controllers support the following RS232C signals: CTS, DCD, DSR, DTR, TRS, RXD, TXD, and Ground as does the VAC/16. This allows every port to support modems.

Synchronous Communications

Synchronous communications for the AV4000 and AV4020 are handled by the VSC/3 (VME Synchronous Controller/3). This board provides three multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips (this same board is called the VSC/4 on AV5000 systems—only three ports can be connected on the AV4000/4020 due to cabling restrictions). The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. This board can handle two independent sync protocols simultaneously; however, initial software offerings will support only a single protocol. Aggregate throughput is 1.6 Mb/sec.

LAN Communications

Ethernet LAN communications are provided by the integrated Ethernet controller on the system board and the optional VLC (VME Ethernet LAN Controller). Each provides access to 10 Mbit/second IEEE 802.3 Ethernet LANs via a 15-pin sub-D connector. A drop cable and a standard Ethernet N-tap or a Thin Ethernet BNC-tap transceiver are required.

Hardware Support Services

Field Support Services

Data General Field Engineering supports AViiON systems with state-of-the-art service technology. There are several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

The *On-Call Agreement* lets the customer select coverage periods and varied options that meet specific application needs.

Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. In conjunction with the terms of the basic agreement, users may also purchase additional options such as Extended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The *Multiyear Plus Agreement* includes all of the benefits of an On-Call Agreement and more. Signing a Multiyear Plus Agreement with a term of three to five years gives customers discounts of up to 10 percent over the life of their agreement.

The *Extended Warranty Service (EWS) Agreement* provides a low-cost alternative to on-site service and requires customer participation in the service effort. Data General provides telephone assistance through its Customer Support Center and provides any required parts. The customer is responsible for calling the Field Engineering Customer Support Center, assisting in problem diagnosis, returning the defective part to Data General, and reinstalling the replacement part provided by Data General.

For more information about service options, contact a Data General salesperson or call the Data General Field Engineering Telemarketing Group at 1-800-325-3065 (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement or an On-Call Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components as well as memory and controller boards.

Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server-specific, shared with AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Ordering

System Packages

The AViiON 4000 is offered in systems packages that include a single CPU, 8MB RAM, single disk and 150MB cartridge tape. The AViiON 4020 is offered in a package that includes dual CPU, 16 MB RAM, 662 MB disk, and 150 MB cartridge tape. Table 3 lists the packaged systems and model numbers. Table 4 lists the available power suffixes. To provide optimum

flexibility, a second CPU, additional memory, mass storage and communications can be ordered as separate options.

Model	Description
G70135	8 MB, 16 MHz AV4000 Base System, 322 MB disk, 150 MB tape
G70137	8 MB, 16 MHz AV4000 Base System, 662 MB Disk, 150 MB tape
G70139	16 MB, 16 MHz AV4020 Dual CPU System, 662 MB Disk, 150 MB tape

Table 3. AV4000 series system packages.

Suffix	Countries
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 4. AV4000 series power options.

System Board Options

The system board can support a maximum of 32MB of byte parity memory via 4MB SIMMs. The AV4000 base packages offer 8MB—a maximum of six additional SIMMs may be added. The AV4020 base package offers 16 MB—a maximum of four SIMMs may be added. An MBUS connector is also available to support a daughtercard for the AV4000 second CPU option (88100 CPU and 2 88200 CPUs operating at the same clock speed as the base system processor). Model numbers for these options are in Table 5.

Model	Description	Max. #
7000-K	4 MB Expansion Memory Module	6
7006-K	Second CPU upgrade 16 MHz	1 (on AV4000 only)
7012-K	8 MB Expansion Memory Module	1

Table 5. AV4000 system board options.

VMEbus Communications Options

A maximum of two VME option boards are supported on AV4000 series systems. Table 6 lists model numbers for the optional VMEbus communications controllers (note that not all of the maximums can be achieved simultaneously).

The integral and optional Ethernet controllers require a transceiver and drop cable. Table 7 lists the available options and model numbers.

Model	Description
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables.
1326	5 foot Ethernet drop cable for connecting system to transceiver.

Table 7. Communications connectivity options.

Model	Description	Max. #
7411-K	VME Asynchronous Controller/16 (VAC/16)	2
7401-K	VME Distributed Adapter/128 (VDA/128)	1
7402-K	VME Distributed Cluster/8P (VDC/8P)	16
7403-K	VME Distributed Cluster/16 (VDC/16)	8
7413-K	VME Synchronous Controller/3 (VSC/3)*	1
7405-K	VME LAN Controller (VLC) - IEEE 802.3 controller	1

*This board is called VME Synchronous Controller/4 on AV5000/6000

Table 6. AV4000 and AV4020 VMEbus Communications Controllers and configuration maximums.

Mass Storage

The AV4000 series chassis can support a maximum of one FH and two HH peripherals. Each package includes one FH disk drive (either 322 MB or 662 MB) and a HH 150MB QIC tape, leaving room for one additional internal HH device. Table 8 lists the available options.

Model	Description
6577-J	150 MB QIC Tape add-on
6539-J	179 MB Disk add-on
6563-J	1.2 MB 5.25" Floppy Diskette Add-on
6562-J	1.44 MB 3.5" Diskette Add-on

Table 8. AV4000 internal mass storage options.

Additional mass storage expansion is provided via the external extension of the SCSI channel. Subject to the maximum cable length and seven device limitations described earlier, up to two PHUs or reel-to-reel tapes can be attached. Table 9 gives model numbers for mass storage devices bundled in an external housing. Table 10 provides model numbers for devices that can be used as add-ons to a PHU.

Model	Description
G10565	Peripheral Housing Unit (PHU)
G6605	662 MB Disk in Peripheral Housing Unit
G6604	322 MB Disk/150 MB Tape in Peripheral Housing Unit
G6603	179 MB Disk/150 MB Tape in Peripheral Housing Unit
G6601	322 MB Disk in Peripheral Housing Unit
G6600	179 MB Disk in Peripheral Housing Unit
G6602	150 MB QIC Tape in Peripheral Housing Unit
G6591-A	2 Gbyte Cartridge Tape 5 1/4" half-height in Peripheral Housing Unit
G6587-A	1600bpi Reel-to-Reel Tape in Tabletop Package
G6589-A,TA	6250 bpi Reel-to-Reel Tape in Tabletop Package

Table 9. External peripherals in housing.

Systems ordered with DG/UX and a disk will receive the operating system installed on the disk.

Model	Description
6577-E	150 MB QIC Tape add-on for Peripheral Housing Unit
6539-E	179 MB Disk add-on for Peripheral Housing Unit
6491-E	320 MB Disk add-on for Peripheral Housing Unit
6554-E	662 MB Disk add-on for Peripheral Housing Unit
6591-E	2 Gbyte Cartridge Tape 5 1/4" half-height for Peripheral Housing Unit
6562-E	1.44 MB 3.5" HH diskette drive with SCSI/SA450 Converter
6563-E	1.2 MB 5.25" HH diskette drive with SCSI/SA450 Converter
6562-EX	1.44 MB 3.5" HH diskette drive without SCSI/SA450 Converter
6563-EX	1.2 MB 5.25" HH diskette drive without SCSI/SA450 Converter

Table 10. Add-on peripherals for PHU.

Cabling

Cabling must be ordered separately to connect:

- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing UNIT (PHU) and 1600bpi reel-to-reel tape drive (using champ connectors on either end)
- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- VDA/128 to VDC/16 and VDC/8P cluster controller boxes

NOTE: For asynchronous (or parallel) devices connected to VAC junction boxes or VDC cluster boxes, order devices with an X-suffix. Order cables separately. For devices attached to base system ports, a bundled cable may be ordered.

Table 11 lists the model numbers for the AV4000 and AV4020 system cables.

Model	Descriptions
15338E025	25' cluster extension cable - VDA/128
15338E050	50' cluster extension cable - VDA/128
15338E100	100' cluster extension cable - VDA/128
15340E010	10' async terminal cable (VDC.xx or VAC/16 only)
15340E015	15' async terminal cable (VDC.xx or VAC/16 only)
15340E025	25' async terminal cable (VDC.xx or VAC/16 only)
15325E001	SCSI champ x champ cable, 1.3' (not for connecting 1st PHU to system)
15325E005	SCSI champ x champ cable, 5'
15325E010	SCSI champ x champ cable, 10'
15345E015	15' Centronics printer cable (for VDC/8P only)
15345E025	25' Centronics printer cable (for VDC/8P only)
10235	5' Centronics printer cable (for integrated parallel port only)
1084M	Modem control (25') processor to modem
1084M-A	Modem control (10') processor to modem
1340-S	RS232 (5') processor to asynchronous device
1340-T	15' processor to asynchronous device
1340	25' processor to asynchronous device
1340-A	50' processor to asynchronous device

Table 11. AV4000 series cable options.

Important Ordering Notes

For a more complete description of DG/UX and ordering information, please refer to the DG/UX MAPS/PLUS article on page 301-012.3.

To Order:

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage and VME communications options as needed.
3. System packages do not include an RS-232C master console—this must be ordered separately.
4. Each operating system license ordered MUST be itemized on the Program License Schedule 501 and purchase order.
5. Order appropriate software distribution and services' packages.

Related Information

See Table 12.

Document	Part Number
AV4000 Product Brief	012-003773
AV400 Series Workstations MAPS/PLUS	046-000959
DG/UX 4.20 MAPS/PLUS	046-001013-01
Technical Notice AViiON 4000 Series Systems	014-001858
Setting Up and Starting AViiON 400 Series Station**	014-001858-00 **
Using the AViiON System Control Monitor**	014-001802-03 **
Using the AViiON System Diagnostics	014-001863
Expanding and Maintaining AViiON 400 Series Stations**	014-001859-00 **
Setting Up and Installing VME Option Cards in AViiON Systems	014-001867
HPS Downloadable Cluster Controller Installation Guide	014-001814
MC88200 User's Manual, Cache Memory/Management Unit	014-001808-01
MC88100 User's Manual, Reduced Instruction Set Computer	014-001809-01
AViiON 300 and 400 Series Stations: Programming System Control and I/O Registers**	014-001800
** AV400 series documentation plus an addendum indicating any changes necessary to support the AV4000/4020 configurations. Titles in boldface are the standard documentation shipped with each unit.	

Table 12. Related information.

Specifications

Processor:

Motorola 88100

16.67 MHz 88100
processor with integral
FPUSingle- or dual-processor
options

Memory Management

Virtual memory

Two 88200
CMMUs/CPU; 4 GB
per process

Caches

Data cache and
instruction cache

Size

16 KB per side

Organization

4-way set associative

Main Memory

8 MB - 32 MB with byte
parity

Expansion

4-MB modules

Busses

32-bit memory-to-cache;
32-bit cache-to-processor

Integrated I/O

LAN - ETHERNET

IEEE 802.3

Bandwidth

10 Mbits/sec

Parallel Port

Centronics- and Data
Products-compatible

Two Serial Ports

RS-232; baud rates up to
19.2 kilobaud; modem
control

SCSI

Asynchronous and
synchronous operation

VMEbus Backplane

Motorola's VMEbus
Revision C.1

IEEE P1014 Draft 1.2

Two 6U slots

Environmental

Temperature

Operating/Nonoperating

10° - 38° C/-40 - 70 C

Relative Humidity

Operating/Nonoperating

0 - 80%/10 - 90%

Electrical

AC Voltage:120V
nominal (85-138 VAC)

220V nominal (187-276 VAC)

AC Frequency

47 - 63 Hz

Current draw:

8 amps at 120Vrms

5 amps at 220Vrms

Power Supply:

325 Watts

MAPS/PLUS

Hardware

AViiON 4000/4020 Servers

January 1990

Physical

Dimensions:

24.75" high x 5.75"
wide by 22" deep

Weight:

System Chassis:

59 lbs. fully loaded (with
disks and tape)

Monitor:

approx. 60 lbs.

Peripherals

5.25" Winchester disks:

179MB HH 5.25" SCSI

-16ms average seek time

- 5MB/s transfer rate
(sync)-1.5MB/s transfer rate
(async)

322MB FH 5.25" SCSI

-18ms average seek time

-1.5MB/s transfer rate
(async)

662MB FH 5.25" SCSI

-18ms average seek time

- 5MB/s transfer rate
(sync)-1.5MB/s transfer rate
(async)

Tape Drives

150MB 5.25" HH QIC
Cartridge tape-Can read/write QIC
120MB; can read QIC
40MB and 60MB-112KB/sec sustained
data transfer rate-Single-ended SCSI
interface2 GB 5.25" FH 8mm
cartridge tape-1600bpi PE format
reel-to-reel tape drive-Auto-thread, auto-load,
horizontal mount

-25/100 ips selectable

-160 KB/sec PE transfer
rate (instantaneous)

-6 to 10.5" diameter reels

-Single-ended SCSI
interfaceOptional Communications
ControllersVMEbus Asynchronous
Controller16 full-duplex RS-232C
ports16 x 9600bps aggregate
maximum transfer rateMotorola 68020 with
192 KB static RAM
buffer, 128KB EPROM,
2 custom VLSI octartsVMEbus Distributed
Asynchronous Hostsup to 128 asynchronous
devicesHost Adapter
(VDA/128) connected
on cluster controllers via
RG62 coaxial cableVMEbus Distributed
Cluster Support for 16
RS-232C lines,
(VDC/16), or 8
RS-232C lines plus
Centronics printer port
(VDC/8P)Aggregate throughput
(VDC/16)16x9600 baud,
half-duplex

(VDC/8)

8 x 19.2 KBps, half
duplex

Signals supported

CTS, DCD, DSR, DTR,
RTS, RXD, TXD,
GroundVMEbus Ethernet LAN
Controller7990 LANCE Ethernet
controller chip and 256
KB dual-ported data
buffer

10Mbits/sec Bandwidth



AViiON 4300 Series Servers

Fact Sheet

The AV 4300 is differentiated from the AV 4100 by a faster clock (25MHz), ECC memory, and on-board distributed async communications.

The AV 4300 Series Servers are cost-effective, office-package systems based on the Motorola 88000 RISC architecture. The series provides a small-footprint tower package in a 25MHz, 88100 uni- (AV 4300) or dual processor (AV 4320). They are suitable for a wide variety of time-sharing (via an integrated Distributed Asynchronous Host Adapter) and network (via integrated Ethernet or optional Token Ring controllers) server environments.

An integrated motherboard (and daughtercards) offers single or dual CPUs, ECC memory, SCSI bus controller, Ethernet controller, Distributed Asynchronous Host Adapter, and VME interface. The second CPU is standard on the AV 4320 and optional on the AV 4300. Two VMEbus slots support synchronous communications controllers and LAN controllers.

In a time-sharing environment, as many as 255 asynchronous devices can be supported via the integrated Distributed Async Host Adapter. This controller is functionally identical to the VME Distributed Async Host Adapter (VDA/255).

Integrated System Board

- 25MHz Motorola 88100 RISC Processor
- Two 88200 Cache and Memory Management Units (CMMU)
- Dual processor standard on the AV 4320 and 4120, optional on the AV 4300 and AV 4100.
- 16 to 128MB ECC RAM
- Industry standard SCSI interface for disk and tape
 - Supports synchronous (4 Mbits/sec) and asynchronous (1.5 Mbits/sec) operation
- IEEE 802.3 LAN interface
- Distributed Asynchronous Host Adapter (equivalent to VDA/255)
- Two RS-232C serial ports (one used for system console)
- Centronics-compatible parallel port
- Hardware support for Motorola's VMEbus (Revision C.1)

Attractive Tower Package

- Compact small-footprint deskside chassis
 - (24.75"H x 5.75"W x 22"D)
- Internal mass storage (see following)
- Two slot (6U) VMEbus card cage
- 325W power supply

Internal Mass Storage/Tape Back-up

- Deskside chassis can hold four 5 1/4" half-height (HH) devices (two can be removable) or one 5 1/4" full-height (FH) device and two 5 1/4" HH devices (two can be removable)
 - 320/525 MB HH QIC tape is standard and uses one removable media bay
 - Packages include either a HH 322MB, FH 662MB, FH 1GB or FH 1.4GB Winchester disk
- Devices supported
 - 1.4GB Winchester 5.25" FH SCSI
 - 1 GB Winchester 5.25" FH SCSI
 - 662 MB Winchester 5.25" FH SCSI
 - 332 MB Winchester 5.25" HH SCSI
 - 320/525 QIC Cartridge Tape 5.25" HH SCSI
 - 600 MB CD-ROM 5.25" HH SCSI

External Mass storage/Tape back-up

- Up to seven SCSI devices (total internal and external) are supported for a system maximum of 8.4GB of disk storage
- External mass storage Peripheral Housing Unit (PHU) (max. 2)
 - Each housing can hold one 5 1/4" FH device and one 5 1/4" HH device or three 5 1/4" HH devices.
- External Combined Storage Subsystem 2/DC (CSS 2/DC) (max. 1)
 - Each housing can hold up to five 5 1/4" FH devices or ten HH devices (limited by system maximum of seven devices)
- Devices supported
 - 1.4GB Winchester 5.25" FH SCSI
 - 1GB Winchester 5.25" FH SCSI
 - 662MB Winchester 5.25" FH SCSI
 - 332MB Winchester 5.25" HH SCSI
 - 179MB Winchester 5.25" HH SCSI
 - 2GB Cartridge Tape Backup 5.25" FH SCSI

- 320/525MB QIC Cartridge Tape 5.25" HH SCSI
- 1600bpi 9-track tape drive (separate tabletop enclosure)
- 600MB CD-ROM 5.25" HH SCSI
- 590MB Erasable Optical Disk Drive 5.25" FH SCSI

Standard Communications

- Ethernet interface standard (without transceiver or drop cable). Supports either thick or thin net connections.
- Distributed Asynchronous Host Adapter (supports up to 255 async devices via external cluster boxes)
- Two asynchronous, RS-232C interfaces - from 150 to 19,600 baud
- Centronics compatible parallel printer port

Optional VME expansion boards

- VSC/3 3 port synchronous communications board - max. 1
- Second Ethernet interface (without transceiver or drop cable) - max. 1. Supports either thick or thin net connections.
- VTRN Token-Ring Controller - max. 2

Customer environment/use characteristics

- Customer installable and maintainable
- Customer installable add-on memory options, second CPU option and peripherals
- 40db (quiet office) noise levels
- 90 day on-site warranty on all system components

Product Description

The AViiON 4300 Series deskside servers offer RISC multi-processor power in an extremely small, compact package. With extensive internal and external mass storage, up to 128 MB of memory, and industry-standard VMEbus controllers, these systems provide a wide range of configurations and options for memory, mass storage and multi-CPU configurations.

The base system board has a 25MHz uniprocessor, with an optional second CPU that's standard in the AV 4320. Base memory is 16MB (four 4MB SIMMs). A maximum of 8 SIMMs are supported. 4MB and 16MB SIMMs can co-exist in a single system, but SIMMs must be added in matched pairs (i.e. two 4MB or two 16MB at a time). Upgrades are available to replace 4MB SIMMs with 16MB in order to reach 128MB maximum. SIMMs used are the same ECC modules used in AV 4600 series.

CPU's	1-2
VME Slots	2
Memory	16-128MB*
Asynchronous Connects std.	2 (1 for console)
Asynchronous Connects opt.	255
Ethernet LAN	1-2
Token Ring LAN	0-2
Sync Ports (1 VSC/3 max.)	0-3
External PHUs	0-2
External CSS2/DC	0-1
Disk	
Total	332MB-8.4GB
Integral	332MB-1.7GB
External	0-7.0GB
Cartridge Tapes	1-2
Reel-to-Reel Tapes	0-1

Note: Due to mass storage and bus slot limitations, not all maxima can be achieved simultaneously.
*128MB requires upgrading 4MB SIMMs to 16MB SIMMs.

Table 1. Configuration range for AV 4300 Series

Architecture

The AViiON 4300 Series servers are based on Motorola 88000 RISC processors and contain the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. The AV 4320 has two 88100 CPU chips and four 88200 CMMU chips. See the AViiON 5000/6000 Series MAPS/PLUS article on page 202-13 for more information about the 88K processor architecture.

The AV 4300 series board is a single 18" x 12" multilayer PCB that includes

- A 25MHz (AV 4300) Motorola 88100 RISC CPU (AV 4320 has two) and two 88200 CMMUs (AV 4320 has four)
- Closely coupled, integrated floating point unit
- Eight connectors capable of holding up to eight memory modules
- MBUS connector for the second CPU
- Interface logic supporting Revision C.1 of the VMEbus
- Industry-standard SCSI interface for connecting peripherals such as disk and tape

- Industry-standard 802.3 Ethernet Interface (w/o transceiver)
- Distributed Asynchronous Host Adapter with RG62 connector for adding external cluster boxes
- Two, asynchronous interfaces - RS232 with one offering full modem support
- Parallel line printer interface (Centronics compatible)
- Time-of-Boot clock and calendar
- Power-up diagnostics

Figure 1 shows a block diagram of the AV 4300 system architecture.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its Eurocard format, performance, and versatility are some of the reasons that it appeals to a wide range of users, especially in the technical marketplace. DGC chose the VMEbus for the AViiON systems because it is an industry-standard bus that offers high performance at a reasonable price. The VMEbus implementation for AViiON 5000/6000 Series Systems incorporates block-mode transfers, but the AViiON 4300 Series doesn't support this option to the C.1 specification.

The VMEbus specification defines an interface system for interconnecting data processing, data storage and peripheral control devices in a closely-coupled hardware configuration. The specification for the VMEbus that is incorporated in the AViiON 4300 and 4100 conforms to Motorola's Revision C.1 VMEbus specification.1

The C.1 specification evolved from work by the IEEE P1014 Standard Committee and the IEC 47b Standards Committee. The IEEE P1014 Standards Committee approved the specification in their draft 1.2 which is undergoing IEEE and IEC final approval.

The VMEbus specification provides for a mechanical and an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female connectors. In the AViiON 4300 Series, a separate 6U backplane is designed to provide two slots, each slot consisting of two 96-pin connectors called J1 and J2, the J1 connector being the uppermost connector and J2 the lower. In addition to the VMEbus slots the backplane provides the power connection for the system board.

The VMEbus incorporates the Master/Slave concept. Within this framework, the system board is the Master, since it controls the flow of data between itself and any other device (the Slave). Data transfers initiated by VMEbus devices other than the system board are considered "slave" transfers. VMEbus devices can transfer data to the AV 4300's internal system bus—MBUS—in single words, half-words, or bytes.

VMEbus transactions are governed by a single-bus Master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 4300 Series, the design allows for more than one Master, but the system board is always a Master.

In the AViiON 4300 Series, the internal high speed system bus (MBUS) is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, and performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8-, 16-, and 32-bit MBUS masters and slaves as well as the 8-, 16-, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

The C.1 interface specifications and options implemented on the AViiON 4300 Series are listed in Table 2.

Mass Storage

The AV 4300 Series offers an integral SCSI bus controller for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices, then exits the rear of the unit and terminates in a Champ connector for connecting external Peripheral Housing Units. The SCSI controller supports either asynchronous (1.5 MB/s) or synchronous (4 MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU), or Combined Storage Subsystem 2/DC (CSS2/DC).

In the main deskside chassis, space is provided for one FH and two (or 4 HH total) HH 5.25" devices. Standard in all system packages is a 5.25" HH 320/525MB QIC cartridge tape, and either a 332MB 5.25" HH Winchester disk with 14ms seek time, a 662MB 5.25" FH Winchester disk with 16ms seek time, a 1GB 5.25" FH Winchester disk with 15ms seek time or a 1.4GB 5.25" FH Winchester disk with 15ms seek time.

All external Data General peripherals, with the exception of the tabletop 9-track tape option, for the AViiON 4300 Series are mounted in the desktop Peripheral Housing Unit or deskside Combined Storage Subsystem 2/DC which can accommodate a variety of storage and backup options. These options currently include the 322MB, 662MB, 1GB, and 1.4GB Winchester disks, 320/525MB QIC tape, 2GB FH 5.25" cartridge tape drive, 600MB CD-ROM and 590MB erasable optical disk drive. Each Peripheral Housing Unit can accommodate one FH and one HH unit or three HH units. Each CSS2/DC can accommodate up to 5 FH or 10 HH 5.25" devices. (Note: AV 4300 series is limited to 7 devices). See CSS2/DC MAPS/PLUS for details. (page 239-22.1)

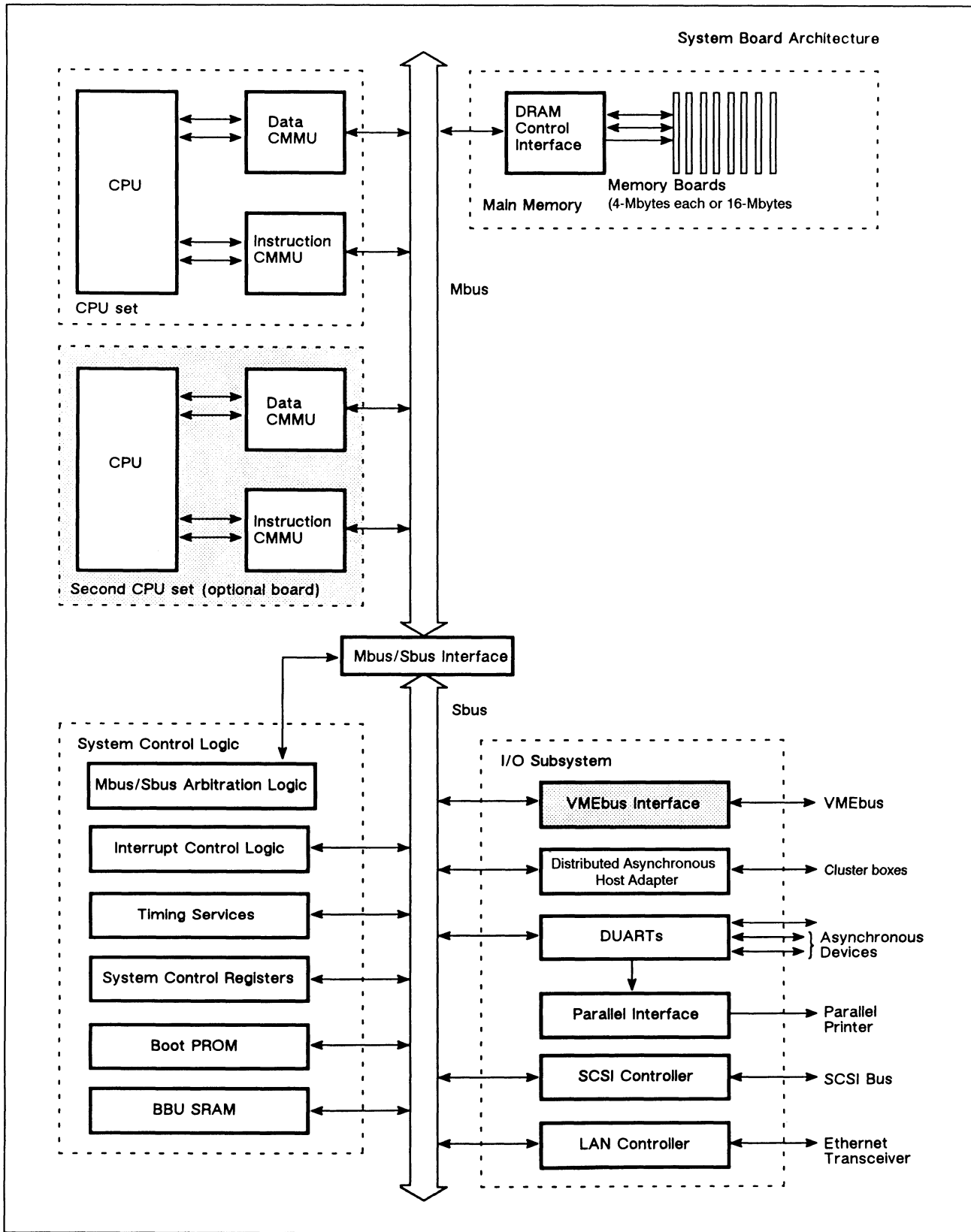


Figure 1. System Block Diagram

Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT A32, A24 Address only cycle RMW No block transfer Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock. The IACK and VMEbus grant daisy chain driver. The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.). The VMEbus arbitration time out logic (64 micro-sec.). VMEbus watchdog timer (64 micro-sec.).
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C.1 interface specifications and options.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 4300 Series chassis requires 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, enough space for configurations of up to two additional Peripheral Housing Units per workstation. Figure 2 illustrates the available cabling options. The Peripheral Housing Unit contains an 125 watt power supply, internal fan, internal cabling (2.25 ft.) and SCSI Bus terminator. The CSS2/DC

contains one or two power supplies, internal cabling (4.7') and SCSI bus terminator. The first SCSI cable from the chassis to the first external housing is different than the one used on the AV 3xx workstations.

The 9-track reel-to-reel tape option can replace the last PHU on the SCSI bus.

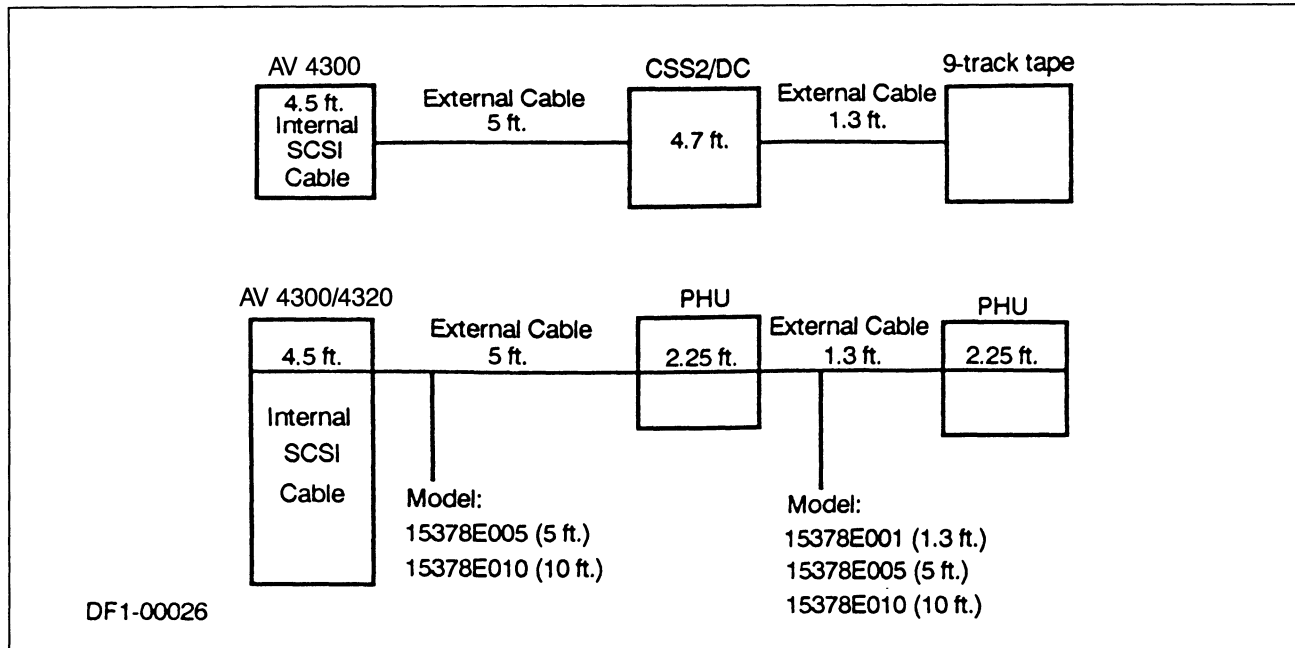


Figure 2. SCSI Cable length configurations.

Communications

The system board supports two RS232C asynchronous ports, Distributed Asynchronous Host Adapter and an IEEE 802.3 Ethernet LAN port. In addition, the two-slot VMEbus supports a variety of synchronous and LAN communications options. These use the same boards that are supported on the AV 5000/ 6000, but all require changes due to chassis differences. For the AV 4300 Series, each board is sold in a 6U Eurocard form factor, with air dams and external connectors. In addition, some modifications have been made to ensure mechanical and environmental compliance with Data General and government standards.

Asynchronous Communications

The two serial ports on the system board provide data rates of up to 19.2 Kbps full duplex. The first of these ports supports the system console. The second can be used to connect an additional asynchronous device. This line supports full modem control.

The integrated Distributed Async Host Adapter is functionally identical to the VDA/255 VME Distributed Asynchronous Host Adapter. It supports a serial bus interface to the cluster controllers over RG62 coax cable (to max. of 255 asynchronous ports).

The distributed clusters are available in two varieties, VDC/8P030 (eight RS232 lines plus Centronics port) and VDC/16030 (16 RS232 lines). All serial lines support modems. See MAPS/PLUS article for further information.

Note: A 10 foot RG62 cable is now available for customers who prefer a local asynchronous interconnection scheme (such as the VAC/16 offered on other AViiON systems).

Synchronous Communications

Synchronous communications for the AV 4300 Series are handled by the VSC/3 (VME Synchronous Controller/3). This board provides three multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips (this same board is called the VSC/4 on AV 5000 systems—only three ports can be connected on AV 4300 systems due to cabling restrictions). The board is built around an 8 MHz INtel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. This board can handle two independent sync protocols simultaneously; however, initial software offerings will support only a single protocol. Aggregate throughput is 1.6 Mb/sec.

<i>Model</i>	<i>Description</i>
G70421	16MB, 25MHz AV 4300 Base System, 332MB disk, 525MB tape
G70357	16MB, 25MHz AV 4300 Base System, 662MB disk, 525MB tape
G70422	16MB, 25MHz AV 4300 Base System, 1GB disk, 525MB tape
G70424	16MB, 25MHz AV 4300 Base System, 1.4GB disk, 525MB tape
G70425	48MB, 25MHz AV 4320 Dual CPU System, 1.4GB disk, 525MB tape
G70423	48MB, 25MHz AV 4320 Dual CPU System, 1.0GB disk, 525 MB tape

Table 3. AV 4300 Series system packages.

LAN Communications

Ethernet LAN communications are provided by the integrated Ethernet controller on the system board and the optional VLC (VME Ethernet LAN Controller). Each provides access to 10 Mbit/second IEEE 802.3 Ethernet LANs via a 15-pin sub-D connector. A drop cable and a standard Ethernet N-tap or a Thin Ethernet BNC-tap transceiver are required.

Token ring connectivity is provided by the VME Token Ring Network Adapter (VTRN).

Ordering

System Packages

The AViiON 4300 is offered in systems packages that include a single CPU, 16MB RAM, single disk and 525MB QIC cartridge tape. The AViiON 4320 is offered in a package that includes dual CPU, 48MB RAM, 1.4GB disk or 1.0GB disk, and 525MB cartridge tape. Table 3 lists the packaged systems and model numbers. Table 4 lists the available power suffixes. To provide optimum flexibility, a second CPU, additional memory, mass storage and communications controllers can be ordered as separate options.

System Board Options

The system board can support up to eight 4MB or 16MB SIMMs. Base systems with 16MB use four 4MB SIMMs and can support up to four additional SIMMs. Base systems with 48MB use two 16MB SIMMs and four 4MB and can support up to two additional SIMMs. (Upgrades are available to replace 4MB SIMMs with 16MB SIMMs, if more than 80MB is required.) An MBUS connector is also available to support the AV 4300 second-CPU option daughtercards that contains an 88100 CPU and two 88200 CMMUs. Model numbers for these options are in Table 5.

<i>Suffix</i>	<i>Countries</i>
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 4. AV 4300 Series power options.

<i>Model</i>	<i>Description</i>
7018	8MB Expansion Memory Package
7023	25 MHz Second CPU upgrade
7019	32MB Expansion Memory Module

Table 5. AV 4300 Series system board options

Communications Options

A maximum of two VME option boards are supported on AV 4300 Series systems. Table 6 lists model numbers for the optional communications controllers (note that not all of the maximums can be achieved simultaneously).

The integral and optional Ethernet controllers require a transceiver and drop cable. Table 7 lists the available options and model numbers.

Mass Storage

The AV 4300 Series chassis can support a maximum of one FH and two HH or four HH peripherals. Each package includes one disk drive and a HH QIC tape. Table 8 lists the available options.

<i>Model</i>	<i>Description</i>	<i>Max. #</i>
7419	VME Distributed Cluster/8P 030 (VDC/8P)	32
7420	VME Distributed Cluster/16 030 (VDC/16)	16
7413-K	VME Synchronous Controller/3 (VSC/3)*	1
7416-K	VME Token Ring Adapter (VTRN)	2
7405-K	VME LAN Controller (VLC) - IEEE 802.3 controller	1
7419-S*	VME Distributed Cluster/16	2

*Consists of specially priced first two VDC/16 030s—only on system orders

Table 6. AV 4300 Series VMEbus Communications Controllers and configuration maximums.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables.
1326	5 foot Ethernet drop cable for connecting system to transceiver.

Table 7. Communications connectivity options.

Additional mass storage expansion is provided via the external extension of the SCSI channel. Subject to the maximum cable length and seven device limitations described earlier, up to two external chasses or an external chassis and reel-to-reel tape can be attached. See the AViiON Mass Storage MAPS/PLUS article (page 239-29 to 239-49) for PHU and CSS2/DC configuration information.

Systems ordered with DG/UX and a disk will receive the operating system installed on the disk.

Cabling

Cabling must be ordered separately to connect:

- System Console (can be ordered bundled with terminal)
- AViiON Server Systems to SCSI peripheral housings such as the Peripheral Housing UNIT (PHU) and 1600bpi reel-to-reel tape drive (using champ connectors on either end)
- Daisy-chained SCSI peripheral housings (such as to connect 2 PHUs)
- Distributed Async Host Adapter VDC/16 and VDC/8P cluster controller boxes

Table 9 lists the model numbers for the AV 4300 system cables.

<i>Model</i>	<i>Descriptions</i>
15338E010	10 foot cluster extension cable - Distributed Async Host Adapter
15338E025	25 foot cluster extension cable - Distributed Async Host Adapter
15338E100	100 foot cluster extension cable - Distributed Async Host Adapter
15340E010	10 foot async terminal cable (including console)
15340E015	15 foot async terminal cable (including console)
15340E025	25 foot async terminal cable (including console)
15378E001	SCSI single-ended cable, 1.3 feet (not for connecting 1st PHU to system)
15378E005	SCSI single-ended cable, 5 feet
15378E010	SCSI single-ended cable, 10 feet
15345E015	15 foot Centronics printer cable (for VDC/8P only)
15345E025	25 foot Centronics printer cable (for VDC/8P only)
10235	5 foot Centronics printer cable (for integrated parallel port only)
15369E025	25 foot modem cable
15369E010	10 foot modem cable

Table 9. AV 4300 Series cable options.

Important Ordering Notes

To Order:

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage and VME communications options as needed.
3. Each operating system license ordered MUST be itemized on the Program License Schedule 501 and purchase order.
4. Order appropriate software distribution and services' packages.

Related Information

See Table 10.

Specifications

<i>Part Number</i>	<i>Title</i>
012-4060	AV 4300 Series Product Brief

Table 10. Related Information

Processor:

Motorola 88100
25 MHz 88100 processor with integral FPU Single- or dual-processor options

Memory Management

Virtual memory
Two 88200 CMMUs/CPU; 4 GB per process
Data cache and instruction cache
Cache Size: 16 KB each
Cache Organization: 4-way set associative

Main Memory

16 MB - 128 MB with ECC
Expansion: 4- or 16-MB modules (added in pairs)
Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O

IEEE 802.3 Ethernet LAN
Bandwidth: 10 Mbits/sec
Parallel Port: Centronics-compatible

Two Serial Ports

RS-232 (one with modem control); baud rates up to 19.2 kilobaud

SCSI

Asynchronous and synchronous operation

VMEbus Backplane

Motorola's VMEbus Revision C.1
IEEE P1014 Draft 1.2
Two 6U slots

Environmental

Temperature

Operating/Nonoperating
10 - 38 C/- 40 - 70 C

Relative Humidity

Operating/Nonoperating:
20 - 80%/10 - 90%

Electrical

AC Voltage: 120V nominal (85-138 VAC);
220V nominal (187-276 VAC)
AC Frequency
47 - 63 Hz
Current draw
8 amps at 120Vrms
5 amps at 220Vrms
Power Supply: 325 Watts

Physical

Dimensions:

24.75" high x 5.75" wide by 22" deep

Weight:

System Chassis: 59 lbs. fully loaded (with disks and tape)

Peripherals

5.25" Winchester disks:

332MB HH 5.25" SCSI
14ms average seek time
4MB/s transfer rate

662MB FH 5.25" SCSI

16.5ms average seek time
4MB/s transfer rate

1GB FH 5.25" SCSI

15ms average seek time
4MB/s transfer rate

1.4GB FH 5.25" SCSI

15ms average seek time
4MB/s transfer rate

Tape Drives:

320/525MB 5.25" HH QIC Cartridge tape

Can read/write QIC 150MB

Single-ended SCSI interface

2GB 5.25" FH 8mm cartridge tape

Auto-load/auto-thread

1.5MBs burst data rate

246 KBs sustained data rate

Single-ended SCSI interface

1600bpi PE format reel-to-reel tape drive

Auto-thread, auto-load, horizontal mount

25/100 ips selectable

160 KB/sec PE transfer rate (instantaneous)

6 to 10.5" diameter reels

Single-ended SCSI interface



AViiON 4600 Series Servers

Fact Sheet

This revision reflects new systems (AV4605/4625) with extended cache (96KB per processor) for greater performance. Also added is support for two integrated synchronous communications ports, 520MB and 1.4GB disks, 4 mm DAT and H.A.D.A. II Storage Subsystem. Previous AV4600 Series Systems (AV4600/4620) are now obsolete.

The AV4605/4625 are high-performance midrange servers based on the 33MHz Motorola 88100 RISC CPU. With uni- and dual-processors, extended cache, ECC memory, high-performance integrated SCSI, LAN and WAN controllers, and VMEbus expansion options, these systems offer balanced, outstanding performance (up to 78 MIPS) for database or network servers.

Integrated System Board

- One or two CPU complexes
 - a 33 MHz Motorola 88100 CPU (one or two)
 - Motorola 88200 CMMUs (Cache and Memory Management Unit)(six to twelve)
 - a 96KB cache per CPU
- 32 to 128MB ECC RAM (in 8 or 32MB increments)
- High-performance single-ended SCSI interface
 - uses NCR 53C700 SCSI controller
 - Supports asynchronous (1.5MB/sec) or synchronous (up to 6.25MB/sec) operation
- High-performance Ethernet (IEEE 802.3) interface using AMD 79C900 controller
- Console port
- Two RS-232C async serial ports with full modem control
- Two RS-232C sync ports (note that X.25 is supported initially; check software support before configuring other protocols)
- Centronics-compatible parallel port
- I/O daughterboard connector
- VMEbus interface

Server	CPU Complexes	Cache	CMMUs
AV4605	one	96KB	six
AV4625	two	192KB	twelve

Daughterboard Options

- Second extended cache CPU complex for AV4605 [Note that tandard cache (AV4600/4620) and extended cache (AV4605/4625) CPU complexes cannot be mixed in a single system.]
 - 32KB data cache
 - 64KB instruction cache
- SCSI/LAN I/O
 - one maximum
 - second single-ended SCSI interface
 - second IEEE 802.3 interface

Mass Storage Controller Options

- SCSI/LAN I/O Option (see Daughterboard Options)
- VSA Dual Channel Fast SCSI-2 Host Bus Adapter
 - Uses NCR 53C710 SCSI Controller
 - Supports up to 10MB/s transfer rate
 - Channels configurable as differential or single-ended SCSI (initial support for differential only on AV4600 Series)
 - Initial supports for H.A.D.A. II Storage Subsystem only
 - one maximum

Internal Single-ended Mass Storage/Back-up

- Deskside chassis can hold:
 - four 5.25" half-height (HH) devices (two of which can be removable), or
 - one 5.25" full-height (FH) device and two 5.25" HH devices (two of which can be removable)
 - 3.5" devices in 5.25" bay via adapter brackets (included with drive)
- 320/525MB HH QIC tape standard
 - uses one removable media bay
- Packages include:
 - a HH 520MB disk, or
 - a FH 1GB disk
 - a FH 1.4GB disk
 - mounted in the rear fixed-media only bays
- Devices supported:
 - 1.4GB Winchester 5.25" FH SCSI
 - 1GB Winchester 5.25" FH SCSI
 - 520MB Winchester 5.25" FH SCSI
 - 2GB (w/compression) 4mm DAT
 - 320/525MB QIC cartridge tape 5.25" HH SCSI
 - 600MB CD-ROM 5.25" HH SCSI
 - 1.2MB 5.25" diskette drive

- 1.44MB 3.5" diskette drive

External Single-ended Mass Storage/Back-up

- External mass storage Peripheral Housing Unit (PHU)
 - holds one 5.25" FH device and one 5.25" HH device or three 5.25" HH devices
 - number of PHUs limited by 19.8' single-ended SCSI cable limit
- External Combined Storage Subsystem 2/DC (CSS 2/DC)
 - holds up to five 5.25" FH devices or seven HH devices (limited by the device maximum per SCSI controller)
 - maximum single-ended disk space (with two SCSI controllers and three CSS 2/DCs) is 18GB using 1.4GB disks
- Devices supported:
 - 1.4GB Winchester 5.25" FH SCSI
 - 1GB Winchester 5.25" FH SCSI
 - 520MB Winchester 3.5" HH SCSI
 - 2GB cartridge tape backup 5.25" FH SCSI
 - 2GB (w/compression) 4mm DAT
 - 320/525MB QIC cartridge tape
 - 1600bpi 9-track tape drive (separate tabletop enclosure)
 - 600MB CD-ROM 5.25" HH SCSI
 - 590MB erasable optical disk 5.25" FH SCSI
 - 1.44MB 3.5" diskette drive
 - 1.2MB 5.25" diskette drive

External Differential SCSI Mass Storage

- Requires VSA Dual Channel Fast SCSI-2 Host Bus Adapter
- HADA II Storage Subsystem
 - Supports Redundant Array of Inexpensive Disks (RAID) levels 0, 1, 3, and 5
 - Repair under power capability
 - Supports up to four stripes of five 3.5" SCSI drives
 - 2.5GB or 5.0GB stripes available
 - Supports 20MB/s transfer rate (requires two H.A.D.A. II IOPs at 10MB/s each)

Standard Communications

- High-performance Ethernet interface
 - without transceiver or drop cable
 - thick or thin Ethernet connections
- Three asynchronous RS-232C interfaces
 - transfer rates from 150 to 19,200 baud

- one used for system console
- Two synchronous RS-232C interfaces
 - Transfer rates to 64Kbps per port
- Centronics compatible parallel printer port

Communications Options

- SCSI/LAN I/O Option (see Daughterboard Options)
- VME Options
 - VAC/16 sixteen-port RS-232C asynchronous multiplexor (maximum per system is two)
 - VDA/255 asynchronous subsystem host adapter (maximum per system is one)
 - 32-user distributed asynchronous package (VDA/255 with two VDC/16 distributed cluster controllers)(max. 1)
 - VLC Ethernet controller (maximum per system is two)
 - VTRC Token Ring Controller (two max per system)
 - VSC/3 three-port synchronous communications controller (maximum per system is one)
 - VTC Terminal Controller (maximum per system is one)

Attractive Tower Package

- Compact small-footprint deskside chassis
 - (24.75" H x 5.75" W x 22" D)
 - Internal mass storage
 - Two-slot 6U VMEbus card cage
 - 325W power supply

Customer Environment/Use Characteristics

- Customer-installable
- Customer-installable add-on memory, second CPU, SCSI/LAN I/O, VME controllers, and peripheral options
- 40db (quiet office) noise levels
- 90-day on-site warranty on all system components

Product Description

The AViiON 4600 series deskside servers bring a new level of processing and I/O performance to the AViiON deskside server line. Like all AViiON servers, they offer a wide range of options for memory, mass storage, and uni- or dual-CPU configurations (see Table 1). They differ from the AV4000/ 4100/4300 systems in the following respects:

Faster 33MHz processor than the AV4000/4100/4300 (16 to 25MHz) gives greater performance in CPU-intensive applications.

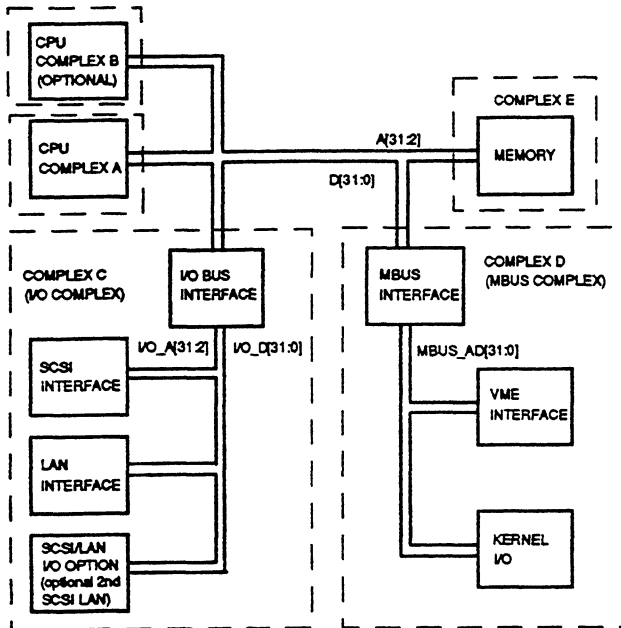


Figure 1. System block diagram.

Larger cache (AV4605/4625) of 96KB per processor improves performance by reducing effective memory access times.

ECC memory improves reliability, particularly in larger configurations (ECC is also standard on AV4300.)

High Availability Disk Array II (H.A.D.A. II) support for highly reliable, high performance disk storage.

AV4600 Series **higher-performance SCSI and LAN controllers** capitalize on balanced system design for better performance at lower cost than VME-based controllers.

SCSI/LAN daughterboard (**second SCSI/LAN**) option increases configurability and means better performance at lower cost than VME-based controllers.

Integrated two-port synchronous communications controller reduces cost for WAN access.

Support of VMEbus block mode transfers enables third-party devices that require block mode.

Item	Range
CPUs	1-2
Memory	32-128MB ECC
SCSI Channels	1-4
Disk	
Single-ended SCSI	520MB-18GB
Diff. SCSI Disk Array	0-40GB
Ethernet LAN	1-4
Token Ring LAN	0-2
Synchronous Ports	2-5
Asynchronous Connections	3-258
VME Slots	two 6U

Table 1. Configuration ranges for AV4600 Series.

Architecture

Processor. AViiON 4600 Series Servers are based on Motorola 88000 RISC processors, and contain the 33MHz 88100 RISC CPU and 88200 CMMU (Cache/Memory Management Unit) chips. The 4605 has one 88100 and six 88200s, while the 4625 has two 88100s and twelve 88200s. See the AViiON 5000/6000 Series MAPS/ PLUS article beginning on page 202-13 for more information about the 88K processor architecture.

System Board. The AV4600 Series board is a single 18" x 12" multilayer PCB that includes:

- two connectors for 33MHz CPU complexes
- eight connectors capable of holding up to eight 4MB or 16MB memory modules (high-performance interleaved memory architecture requires that modules be added in pairs)
- industry standard single-ended SCSI interface for connecting disk and tape peripherals
- industry standard IEEE 802.3 Ethernet interface (without transceiver)
- console port
- two RS-232C asynchronous communications interfaces with full modem control
- two RS-232C sync communications interfaces
- Centronics-compatible printer interface
- one I/O Bus connector for SCSI/LAN daughterboard
- interface logic that supports Revision C.1 of the VMEbus specification
- time-of-boot clock and calendar
- power-up diagnostics

Figure 1 illustrates the AV4600 Series system board architecture. Note that the AV4600 Series systems use

the same system board as the AV530 series. The mouse and keyboard connectors are on the board, although they are not used for server configurations.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, Eurocard format, high performance, and versatility make it appealing to a wide range of users. The AV4600 Series systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price.

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in closely-coupled hardware configuration. The VMEbus specification on the AV4600 Series systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.

The VMEbus specification covers the mechanical and the electrical interface. The mechanical spec defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female-type; in the AV4600 Series Servers, a separate 6U backplane provides two slots, each with two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master. VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AV4600 Series Servers, the design allows for more than one Master.

On the AV4600 Series Servers, the internal high speed system bus is interfaced to the VMEbus. This interface provides a bi-directional data path between the two buses, performs the address decoding and bus arbitration. The MBUS/ VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Mass Storage

Integrated SCSI Interface. The AV4600 Series offers an integral single-ended SCSI interface (based on the NCR 53C700 controller) for connecting mass storage devices. The SCSI bus originates on the system board, connects the internal storage devices (using 4.75' of SCSI cable) and then exits through a connector on the rear bulkhead for external mass storage chasses. The SCSI controller supports asynchronous (1.5MB/s) or synchronous (6.25MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU) or Combined Storage Subsystem 2/DC (CSS 2/DC).

SCSI Daughterboard provides a second single-ended SCSI channel, also based on the 53C700 controller, which supports up to seven additional devices. It plugs into a connector on the system board. The SCSI bus is cabled directly to a second connector on the rear bulkhead (using 0.88' of SCSI cable).

VSA Dual Channel Fast SCSI-2 Host Bus Adapter. The VSA, based on the NCR 53C710 SCSI Controller chip , provides two fast SCSI-2 (10MB/s each) channels from a single 6U VMEbus slot. The channels may be configured as single-ended or differential. On the AV4600 Series, however, the VSA only supports the H.A.D.A. II Storage Subsystem (differential mode). Any other configuration will require marketing approval via CCIS. . illustrates valid configurations.

The VSA uses 3' of internal SCSI cable.

Deskside Chassis. In the main deskside chassis, space is available for four HH (a maximum of two can be removable) or two FH (a maximum of one can be removable) 5.25" devices. Standard in all system packages is a 320/525MB HH QIC tape drive. This leaves one internal HH 5.25" bay supporting either a fixed or removable media device. One HH or FH Winchester disk is also standard. If it is a HH device, an additional HH fixed-media-only bay is available for expansion.

Internal cabling uses 4.75' of SCSI cable on the integrated controller and 0.88' on the daughterboard controller.

H.A.D.A. II Storage Subsystem. The H.A.D.A. II is a high performance disk array subsystem featuring support for RAID levels 0, 1, 3 and 5. It also features repair-under-power (also know as hot repair) capability. Utilizing up to twenty 520MB or 1GB 3.5" drives in five drive "stripes", each H.A.D.A. II can provide up to 20GB

of storage, or 16GB with full redundancy. One or two array I/O Processors (IOPs) can be configured for additional redundancy.

H.A.D.A. II requires a differential SCSI bus (Model 7430-K VSA required, max. one VSA supported) and uses 10' of internal SCSI cable. A maximum of two H.A.D.A. II Storage Subsystems are supported. Figures 2 and 3 show typical configurations.

Additional information on disk arrays and H.A.D.A. II is available in the H.A.D.A. II MAPS/PLUS article (page 239-63).

Peripheral Housing Unit (PHU). The PHU is an external mass storage chassis that holds three 5.25" HH single-ended removable media devices or one FH and one HH device. Each PHU uses 2.25' of internal SCSI cable.

Combined Storage Subsystem 2/DC (CSS 2/DC) is an external mass storage chassis that holds up to five FH single-ended devices or seven HH devices (HH device limit is based on the seven devices per SCSI channel maximum). Each CSS 2/DC uses 4.7' of internal SCSI cable.

1600bpi or a 800/6250bpi 9-track Reel-to-Reel Tape Drives are mounted in a stand-alone chassis and can replace a PHU or CSS 2/DC on the SCSI bus.

Cabling. The single-ended SCSI bus has a maximum cable length of 19.6'. The first cable from the AV4600 chassis to a PHU, CSS 2/DC, or reel-to-reel tape must be

3' or greater (5' for a PHU). Figure 4 illustrates a possible mass storage configuration.

The differential SCSI bus has a maximum cable length of 81' (25m). The VSA utilizes 3' of internal cable and the HADA II subsystem uses 10'.

Mass Storage Devices. The AV4600 Series supports a broad range of mass storage devices. Specific models are described in the Configurations/Ordering section of this article. For device parameters and specifications, see the AViiON Mass Storage MAPS/PLUS article beginning on page 239-29.

Some AViiON mass storage devices are no longer offered on the AV4600 Series. These include the 150MB QIC tape and the following 5.25" SCSI disks: 179MB HH, 332MB HH and 662MB FH. Reducing configurations permits passing along more functionality at a lower cost (for example, substituting a standard 320/525MB tape for the 150MB tape).

Communications

Integrated Asynchronous Controllers. The AV4600 Series system board supports three RS-232C async ports. The first is dedicated to the system console. The remaining ports support full modem control. All support transfer rates from 150 baud to 19.2 Kbaud. Each port has a DB-9 pin connector on the system board bulkhead. Three 9-pin-to-25-pin converter cables are provided with each system.

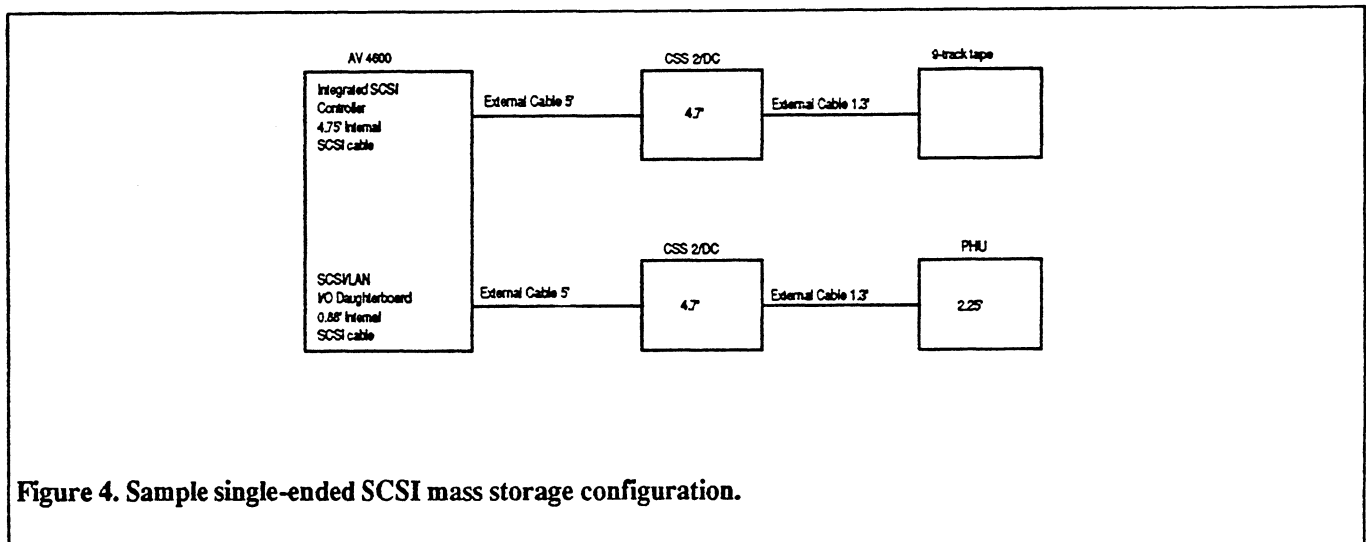
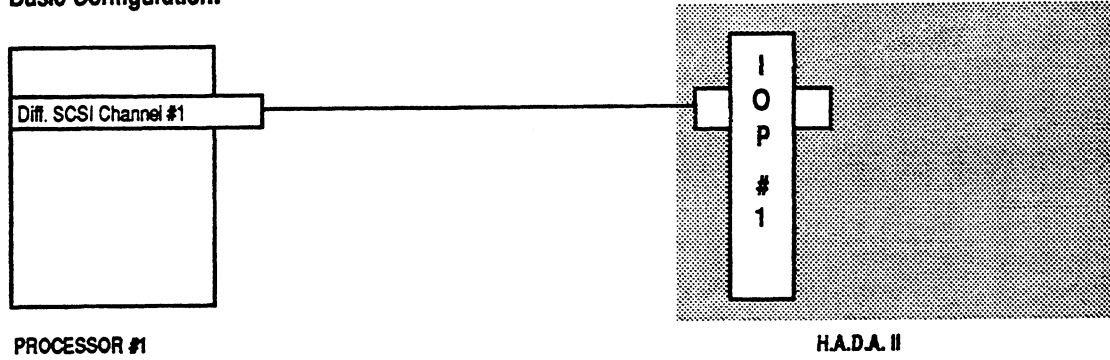
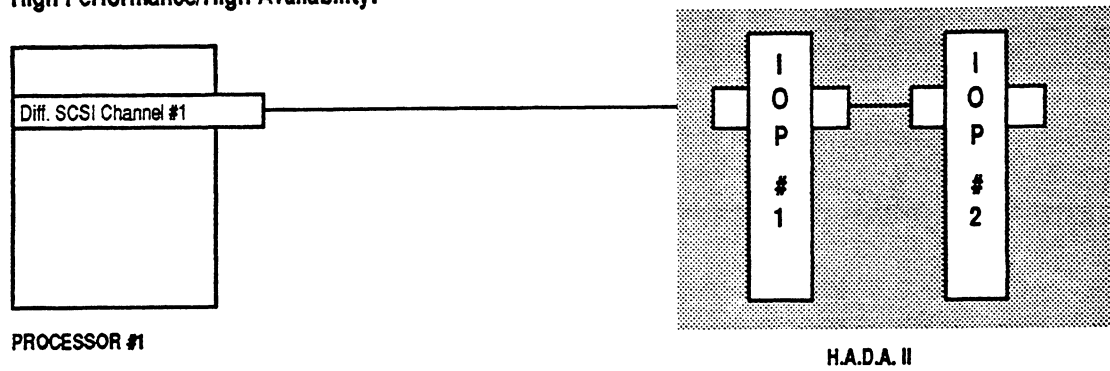


Figure 4. Sample single-ended SCSI mass storage configuration.

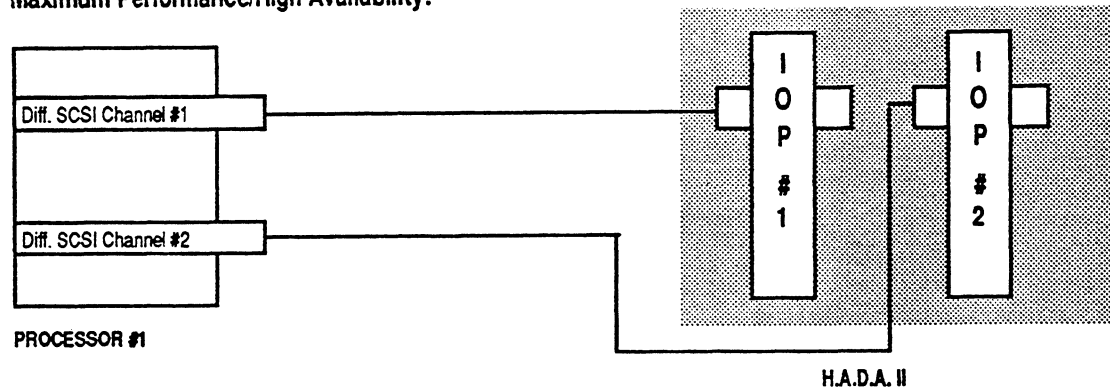
Basic Configuration:



High Performance/High Availability:



Maximum Performance/High Availability:



Note: Only one VSA is supported (both SCSI channels are on a single VSA).

Figure 2. H.A.D.A. II configurations, single host.

Integrated Synchronous Controller. The AV4600 Series system supports two integrated RS-232C synchronous communications ports (DB-25) connectors. Each port supports transfer rates up to 64K bps. DMA is used to reduce system overhead and improve performance. Initially, these ports support X.25. Other protocol stacks will be added.

Integrated Centronics Parallel Port. One Centronics-compatible parallel printer port is available via a DB-25 connector. This port has DMA support to provide improved performance for high-speed printers.

Integrated IEEE 802.3 Ethernet Controller. The integrated Ethernet controller uses an AMD 79C900 controller to attain a 10Mbit/sec. maximum transfer rate. Internal FIFO buffers and DMA support reduce system overhead. A drop cable and outboard transceiver are required for the desired connection (thick or thin Ethernet).

SCSI/LAN I/O Daughterboard. This daughterboard provides a second LAN interface which "mirrors" the interface on the system board (same controller chip and network performance). As with the on-board controller, a drop cable and transceiver are required.

VMEbus Controllers. The AV4600 series supports a full-range of AViiON VME communications controllers.

These include:

- VAC/16 RS-232C port asynchronous multiplexor
- VDA/255 distributed asynchronous host adapter
- VLC IEEE 802.3 Ethernet Controller
- VTRC IEEE 802.5 Token Ring controller
- VSC/3 three-port synchronous communications controller
- VTC Terminal Controller

DG/UX

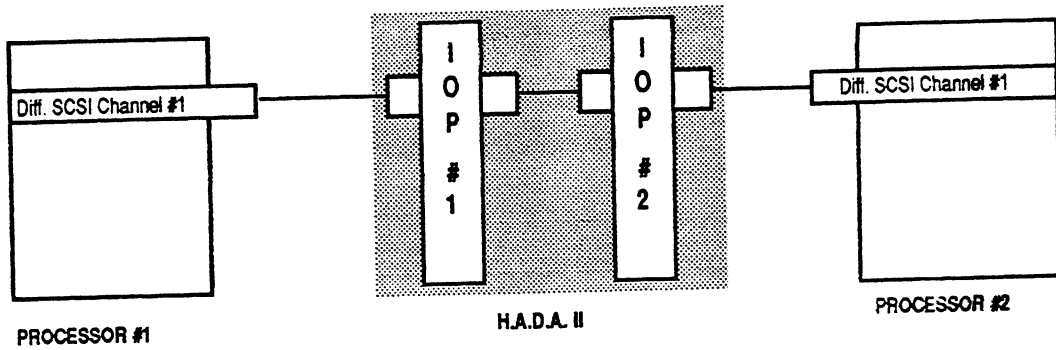
The AV4605 and AV4625 are supported by DG/UX v.4.1 or later. Systems ordered with DG/UX and a hard disk will be shipped with the operating system installed on the disk.

Hardware Support Services

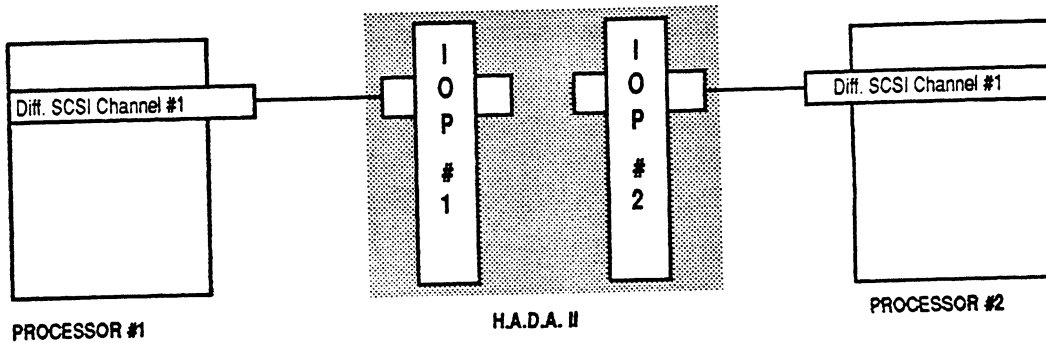
The DGC Customer Service Division supports AViiON systems with state-of-the-art service technology. We offer several service programs that include a full array of options to satisfy users' uptime requirements.

On-Call Service with four-hour response goal lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include:

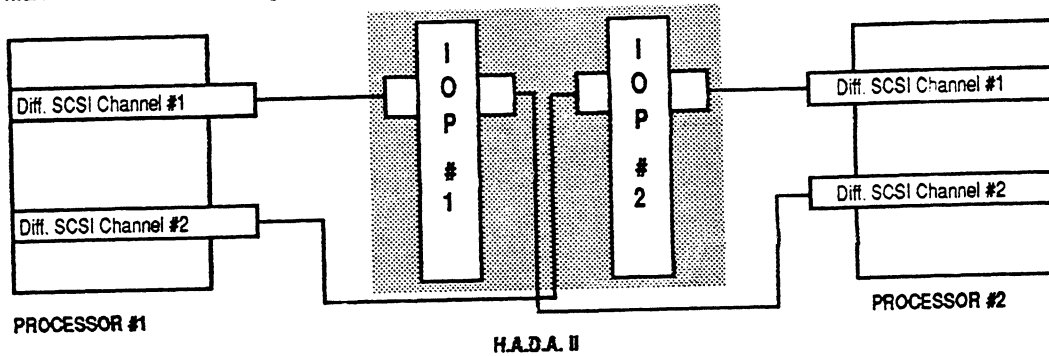
High Performance/High Availability:



Cabinet Sharing/High Availability:



Maximum Performance/High Availability:



Note: Only one VSA is supported (both SCSI channels are on a single VSA).

Figure 3. H.A.D.A. II configurations, dual hosts.

- **Multi-Year Plus**—discounts up to 10% and price protection in return for signing a three-, four-, or five-year agreement
- **Extended Coverage**—coverage up to seven days a week, 24 hours a day
- **Enhanced Response**—two-hour on-site response for installations within 50 miles of a Data General Service Center
- **Basic Response**—on-site response generally within 24 hours
- **Multi-Device Deferred**—standard discounts up to 40% to customers who have large numbers of PCs, workstations, terminals and desktop printers, and who can wait until a specified number are down before placing a service call

On-Site Select Service is available for customer-maintainable equipment. Toll-free telephone support is provided to help customers identify inoperable part. The replacement part is shipped overnight, and the customer may choose to either install it with telephone assistance, or to request next-day dispatch of a Field Engineer to complete the installation.

Additionally, both Services offer pre-payment discounts of up to 25% for non-cancellable pre-payment terms and up to 10% for cancellable pre-payment terms. On-Call Service pre-payment discounts start for terms as short as six months and On-Site Select discounts start at terms of 24 months.

Warranty. AViiON Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components and memory and controller boards.

Configurations/Ordering

Packaged Systems

The AViiON 4600 Series servers are offered in packaged systems that contain one or more disks and a 525MB QIC tape as a load device. Single and dual processor systems are available. A variety of memory, mass storage, and communications options are available to augment these base systems.

Table 2 lists the AV4600 Series system packages. Additional packages may be available in the AViiON

Hardware Price Book. Table 3 lists the available power suffixes.

Model	Description
G70473	AV4605, 33MHz, 32MB, 520MB disk, 525MB QIC tape
G70475	AV4605, 33MHz, 32MB, 1.4GB disk, 525MB QIC tape
G70500	AV4625, Dual 33MHz, 64MB, 2x520MB disk
G70544	AV4625, 33MHz, 64MB, 525MB QIC tape, 2.0GB DAT, VSA, 3.5GB HADA II w/10' cable
G70513*	AV4605 32 user system (32MB, 2x520MB disks, 525MB QIC tape, D1400i console w/cable, VDA/255, 2xVDC 16, DG/UX)
G70514*	AV4625 64 user system (64MB, 3x520MB disks, 525MB QIC, D1400i console w/cable, VDA/255, 4xVDC/16, DG/UX)
*32-user and 64-user packages do not include VDC cables. Order cables of the appropriate length as separate line items.	

Table 2. Packaged systems.

Suffix	Countries
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 3. Power suffixes.

CPU Options

Uni-processor (AV4605) systems support a second customer-installable CPU on a daughterboard (see Table 4).

Model	Description
7,926	AV4605 2nd 33MHz CPU option

Table 4. AV4600 second CPU option.

Memory Options

The AV4600 Series supports memory increments of 8 or 32MB. These are attained with 4MB or 16MB memory modules which must be added in pairs. Configuration guidelines are as follows:

1. System has eight memory slots

2. Each add-on memory increment requires two slots
3. Base memory requires two slots (32MB) or four slots (64MB)

Table 5 lists the AV4600 Series memory options.

Model	Description	Slots
7,018	8MB ECC Memory Package	2
7,019	32MB ECC Memory Package	2

Table 5. Memory options.

Controller Options

AV4600 Systems offer numerous integrated I/O options on the system board:

1. Three asynchronous RS-232 ports
2. Two synchronous RS-232 ports
3. One Centronics parallel port
4. One high performance single-ended SCSI channel
5. One high performance IEEE 802.3 LAN interface

The AV4600 Series also offers one I/O daughterboard interface and two 6U VMEbus slots. The daughterboard interface supports a SCSI/LAN I/O board that provides a second high-performance single-ended SCSI channel and a second high-performance Ethernet interface using the same controller chips as on the system board (see Table 6).

Model	Description	Max.
7,423	2nd SCSI/LAN Option	1

Table 6. Daughterboard I/O option.

The AV4600 Series also supports the VSA Dual Channel Fast SCSI-2 Host Bus Adapter. On the AV4600 Series it is only qualified to support the H.A.D.A. II Storage Subsystem (see Table 7).

Model	Description	Max.
7430-K	VSA Dual Channel Fast SCSI-2 Host Bus Adapter	1

Table 7. VME SCSI option.

The AV4600 supports a full range of VME communications controllers. These include:

- Asynchronous communications
 - VAC/16 asynchronous multiplexor
 - VDA/255 distributed asynchronous communications host adapter (with VDC/16 030 or VDC/8p 030)
 - 32 User Distributed Asynch Package (consists of VDA/255 with two VDC/16 Distributed Cluster

- Controllers)
 - VTC Terminal Controller
- Local Area Networks
 - VLC Ethernet adapter
 - VTRC Token Ring Network Adapter
- Synchronous communications
 - VSC/3 controller

Table 8 lists available AV4600 communications controllers and model numbers.

Model	Description	Max.
7405-K	VLC Ethernet Controller	2
7411-KA	VAC/16 Async Ctr.	2
7413-K	VSC/3 Sync Controller	1
7416-K	VTRC Token Ring Ctr.	2
7418-K	VDA/255 Dist. Adapter	1
7,419	VDC/16 030 16-port cluster	*
7,420	VDC/8p 030 8-port cluster	*
7424-K	32-User Distrib. Async Pkg.	1
7425-K	VTC Terminal Controller	1

Table 8. VME communications controller and distributed clusters.

Internal Mass Storage

All base system packages include one 320/525MB HH QIC Cartridge Tape drive as a load and backup device. This tape is mounted in one of the two forward mass storage bays which can support either removable or fixed media mass storage devices. The remaining bay is available for expansion device (see Table 9).

Model	Description
G6796-F	520MB 3.5" HH disk
G6685-F	1GB 5.25" FH disk
G6716-F	1.4GB 5.25" FH disk
G6562-F	1.44MB 3.5" HH diskette drive with SA450/SCSI converter
G6563-F	1.2MB 5.25" HH diskette drive with SA450/SCSI converter
G6629-F	600MB 5.25" HH CD-ROM
G6677-F	320/525MB QIC Tape
G6762-F	2GB 4mm DAT

Table 9. Internal single-ended SCSI add-on peripherals for the AV4600 Series chassis.

The rear (fixed media only) mass storage bays are filled by either a 520MB FH or 1.4GB FH hard disk. If it is a HH device, an additional bay is available for expansion.

<i>Category</i>	<i>From</i>	<i>To</i>	<i>Length</i>	<i>Model Number</i>		
Asynchronous Cables	VAC/16, VDC/8p 030, VDC/16 030, AV4600 bulkhead	Terminal/Printer	10 ft.	15340E010		
			15 ft.	15340E015		
			25 ft.	15340E025		
		Modem	10 ft.	15369E010		
			15 ft.	15369E015		
			25 ft.	15369E025		
Host Adapter Cables	VDA/255	VDC/16 030, VDC/8p 030	25 ft.	15338E025		
			50 ft.	15338E050		
			100 ft.	15338E100		
				15271D		
				10,235		
Parallel Printer Cables	AV4600 Bulkhead Centronics	Pkg. 5 Barrel Connectors Centronics Printer	5 ft.	10,235		
			30 ft.	15293E030		
			VDC/8p	Centronics Printer	15 ft.	15345E015
			25 ft.	15345E025		
Synchronous Cables	VSC/3, AV4600 Bulkhead	Synchronous Modem	6 ft.	15290E006		
			15 ft.	15290E015		
			25 ft.	15290E025		
Ethernet Transceivers	Ethernet Drop Cable	Thick Ethernet (N-tap)		4,540		
		Thick Ethernet (Vampire Tap)		4540-B		
		Thin Ethernet (BNC-tap)		4540-A		
Eight Port Transceiver Ethernet Drop Cables	Ethernet Drop Cable Ethernet Adapter	Ethernet drop cables (8)		4619-@		
		Ethernet Transceiver	5m (Teflon)	1,326		
SCSI (single-ended)	PHU AV4600, PHU, CSS2/DC, 9-track AV4600, CSS 2/DC, etc. AV4600 AV4600 (7423 only)	PHU CSS2/DC, 9-track	1.3 ft.	15378E001		
			3 ft.	15378E003		
			5 ft.	15378E005		
		PHU, CSS 2/DC, 9-track, etc.	10 ft.	15378E010		
			15 ft.	15378E015		
			5m (PVC)	15274E005		
			20m (PVC)	15274E020		
SCSI (differential)	VSA	HADA II IOP	10 ft.			
			20 ft.			
			40 ft.			
			HADA II IOP	HADA II IOP	1.8 ft.	15325E001

Table 10. AV4600 series cables and transceivers.

	Current (Amperes)			WATTS
	+5V	+12V	-12V	
System Board	17	1	0.5	103
AV4600/4620 CPU Complex	2.5	0	0	12.5
AV4605/4625 CPU Complex	3.5	0	0	17.5
4 Mbyte SIMM (each, average)	0.1	0	0	0.5
16 Mbyte SIMM (each, average)	0.15	0	0	0.75
SCSI LAN I/O Option Card	1.5	0.5	0	13.5
VDA/255	5.2	0	0.55	26.66
VAC/16	4.5	0.25	0.25	28.5
VSC/3	3.4	0.07	0.07	18.68
VTR	2	0	0	10
VLC	2.8	0.45	0	19.4
VTC	3	0.5	0	21
520MB Disk	1	2	0	29
1GB Disk	2	4	0	58
1.4GB Disk	0.65	1.9	0	26.05
525MB Tape	1.5	1.5	0	25.5
600MB CD-ROM	0.79	0.77	0	13.19
1.44MB Diskette (3.5")	0.51	1	0	14.55
1.2MB Diskette (5.25")	1.2	0	0	6
SCSI/SA450 Adapter Board (required for diskettes)	0.07	0	0	0.35
SCSI Terminator	0.07	0	0	0.35

Table 11. AV4600 series power supply; maximum current and power.

Document	Part Number
AV4600, 4620 Product Brief	012-004037-01
Using System Diagnostics (RBOS)	014-001863
Setting Up, Starting, Expanding, Maintaining AViiON 530, AViiON 4600 Computers	014-002091
Setting Up and Installing VMEbus options in AViiON	014-001867
Installation Road Map	069-701084
Guide to AViiON and DG/UX System Documentation	069-701085

Table 12. Related information.

Note that some mass storage devices, such as the 150MB QIC tape and 179MB, 332MB or 662MB Winchester disk are no longer offered on the AV4600 Series. The resultant configuration simplification provides cost savings that permit offering more functionality for less money.

External Mass Storage

Additional mass storage expansion is provided via external extension of the single-ended SCSI channel(s). Subject to the cable length, seven device/channel and supported device limitations described earlier, any combination of CSS 2/DCs and PHUs is supported on the

single-ended SCSI channels. In addition, one reel-to-reel tape may be configured in place of a PHU or CSS 2/DC. See the AViiON Mass Storage MAPS/PLUS article (page 239-29) for PHU and CSS 2/DC configuration information.

Disk array support is provided via the VSA Dual Channel Fast SCSI-2 Host Bus Adapter (set for differential SCSI) and the H.A.D.A. II Storage Subsystem. A maximum of one VSA and two H.A.D.A. II's are supported. See the H.A.D.A. II MAPS/PLUS article (page 239-63) for more configuration information.

Cabling

Terminals ordered with a bundled cable (including system console) come with a 25 ft. cable. All other cables, must be ordered separately. Table 10 lists the model numbers for the AV4600 system cables.

Important Ordering Notes

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage and communications options as needed.
3. Each operating system license must be itemized on the Program License Schedule 501 and purchase order.
4. Order appropriate software distribution and services packages.
5. For parallel devices connected to system bulkhead, order with -X suffix. Order cables separately. For async devices attached to the system bulkhead (including system console), VAC/16, VDC/16, VDC/8p, etc., a bundled cable may be ordered (-N suffix). This is a change from the method previously used for AV4000 systems.

Power

Power consumption for all configurations should be checked against the power supply output--particularly if third party devices will be added to loaded systems. Current draws for all AViiON internal components are listed in Table 11. current draws for all third party devices must be added. The worksheet on the following page will enable you to calculate current and total power requirements; current draw at three voltages (+5, +12, -12) must be summed and compared to what is available from the power supply.

Specifications

Processor:

33 MHz Motorola 88100 processor with integral FPU
Single- or dual-processor options

Virtual Memory Management:

Six 88200 CMMUs/CPU (AV4605/4625)
4GB per process

Caches

Data cache and instruction cache
Size: (AV4605/4625): 96KB per processor (32KB data, 64KB instruction)
Organization: 4-way set associative

Main Memory:

32MB—128MB with ECC
Expansion: 4MB or 16MB modules
increments: 8 or 32MB
Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O:

LAN--
ETHERNET
IEEE 802.3

AMD 79C900 Controller
Bandwidth: 10 Mbits/sec

Centronics-compatible
Parallel Port
Three Async
Serial Ports

RS-232 (two with modem control, one for system console);
Baud rates up to 19.2 kilobaud

Two sync
Communications
Ports

RS-232C
Transfer rates to 64Kbps per port

Asynchronous/
Synchronous
Integrated SCSI

NCR 53C700 Controller
Bandwidth: 6.26 MB/s sync: 1.5 MB/s async.

SCSI/LAN
daughterboard

2nd NCR 53C700 and 2nd AMD 79C900 controllers

Backplane:

Motorola's VMEbus Revision C.1
IEEE P1014 Draft 1.2
Two 6U slots

Environmental:

Operating/Nonoperating rating Temp.: 0 - 38C/-40 - 70C
 Relative Humidity: 20 - 80%/10 - 90%

Electrical:

AC Voltage: 120V nominal (85-138 VAC)
 220V nominal (187-276 VAC)
 AC Frequency: 47 - 63 Hz
 Current draw: 8 amps at 120Vrms; 5 amps at
 220 Vrms
 Power supply: 325 Watts

Physical Dimensions:

 24.75" high x 5.75" wide by 22"
 deep
 System Chassis Weight: 59 lbs fully loaded (with disks
 and tape).

<i>MAXIMUM CURRENT PER DEVICE:</i>	<i>+5V</i>	<i>+12V</i>	<i>-12V</i>
Base system board (no memory or CPU complex)	17	1	0.5
First CPU complex			
16MB memory modules (2)	0.3	0	0
525MB tape drive	1.5	1.5	0
Other components:			
CHECKING POWER LIMITS			
+5V max. A <= 37 A?			
+12V max. A <= 10A?			
-12V max. <= 1 A?			
+5V max. W (5 X amperes) <= 185 W?			
+12V max. W (12 X amperes) <= 120 W?			
-12V max. W (12 X amperes) <= 12 W?			
Total W <= 317 W?			

Figure 5. Power calculation worksheet for AV4600 series.

AV4600 and 4620 Servers

Fact Sheet

The AV4600 and AV4620 are high-performance midrange servers based on the 33MHz Motorola 88100 RISC CPU. With uni- (AV4600) and dual- (AV4620) processors, ECC memory, high-performance integrated SCSI and LAN controllers, and VMEbus expansion options, these systems offer balanced, outstanding performance (up to 78 MIPS) for database or network servers.

Integrated System Board

- Two connectors for Motorola 88100 CPU complexes
 - each complex includes one 33MHz 88100 CPU and two 88200 cache and memory management units
 - AV4600 comes with one complex standard
 - AV4620 comes with two complexes standard
- 32 to 128MB ECC RAM (in 8 or 32MB increments)
- High-performance single-ended SCSI interface
 - uses NCR 53C700 SCSI controller
 - supports asynchronous (1.5MB/sec) or synchronous (up to 6.25MB/sec) operation
- High-performance Ethernet (IEEE 802.3) interface using AMD 79C900 controller
- Console port
- Two RS-232C serial ports with full modem control
- Centronics-compatible parallel port
- I/O daughterboard connector
- VMEbus interface

Daughterboard Options

- Second Motorola 88100 CPU complex for AV4600
- SCSI/LAN I/O
 - one maximum
 - second single-ended SCSI interface
 - second IEEE802.3 interface

Attractive Tower Package

- Compact small-footprint deskside chassis
 - (24.75" H x 5.75" W x 22" D)
- Internal mass storage
- Two-slot 6U VMEbus card cage
- 325W power supply

Internal Mass Storage/Tape Back-up

- Deskside chassis can hold:
 - four 5.25" half-height (HH) devices (two of which can be removable), or

- one 5.25" full-height (FH) device and two 5.25" HH devices (two of which can be removable)
- 320/525MB HH QIC tape standard
 - uses one removable media bay
- Packages include:
 - a HH 332MB disk, or
 - a FH 662MB disk, or
 - a FH 1GB disk
 - mounted in the rear fixed-media only bays
- Devices supported:
 - 1GB Winchester 5.25" FH SCSI
 - 662MB Winchester 5.25" FH SCSI
 - 332MB Winchester 5.25" HH SCSI
 - 320/525MB QIC cartridge tape 5.25" HH SCSI
 - 600MB CD-ROM 5.25" HH SCSI
 - 1.2MB 5.25" diskette drive
 - 1.44MB 3.5" diskette drive

External Mass Storage/Tape Back-up

- External mass storage Peripheral Housing Unit (PHU)
 - holds one 5.25" FH device and one 5.25" HH device or three 5.25" HH devices
 - number of PHUs limited by 19.8' single-ended SCSI cable limit
- External Combined Storage Subsystem 2/DC (CSS 2/DC)
 - holds up to five 5.25" FH devices or seven HH devices (limited by the device maximum per SCSI controller)
 - maximum disk space (with two SCSI controllers and three CSS 2/DCs) is 13GB using 1GB disks
- Devices supported:
 - 1GB Winchester 5.25" FH SCSI
 - 662MB Winchester 5.25" FH SCSI
 - 332MB Winchester 5.25" HH SCSI
 - 2GB cartridge tape backup 5.25" FH SCSI
 - 320/525MB QIC cartridge tape
 - 1600bpi 9-track tape drive (separate tabletop enclosure)
 - 600MB CD-ROM 5.25" HH SCSI
 - 590MB erasable optical disk 5.25" FH SCSI
 - 1.44MB 3.5" diskette drive
 - 1.2MB 5.25" diskette drive

Standard Communications

- High-performance Ethernet interface
 - without transceiver or drop cable
 - thick or thin Ethernet connections
- Three asynchronous RS-232C interfaces

- from 150 to 19,200 baud
- one used for the system console
- Centronics compatible parallel printer port

Optional Communications

- SCSI/LAN I/O Option (see Daughterboard Options)
- VME Options
 - VAC/16 sixteen-port RS-232C asynchronous multiplexor (maximum per system is two)
 - VDA/255 asynchronous subsystem host adapter (maximum per system is one)
 - 32-user distributed asynchronous package (VDA/255 with two VDC/16 distributed cluster controllers)
 - VLC Ethernet controller (maximum per system is two)
 - VTRN Token Ring Controller (two max per system)
 - VSC/3 three-port synchronous communications controller (maximum per system is one)

Customer Environment/Use Characteristics

- Customer-installable
- Customer-installable add-on memory, second CPU, SCSI/LAN I/O, VME controllers, and peripheral options
- 40db (quiet office) noise levels
- 90-day on-site warranty on all system components

Product Description

The AViiON 4600 and 4620 deskside servers bring a new level of processing and I/O performance to the AViiON deskside server line. Like all AViiON servers, they offer a wide range of options for memory, mass storage, and uni- or dual-CPU configurations (see Table 1). They differ from the AV4000/4100 systems in the following respects:

Faster 33MHz processor than the AV4000/4100 (16 or 20MHz) gives greater performance in CPU-intensive applications.

ECC memory improves reliability, particularly in larger configurations.

AV4600 and 4620 **higher-performance SCSI and LAN controllers capitalize** on balanced system design for better performance at lower cost than VME-based controllers.

SCSI/LAN daughterboard (**second SCSI/LAN) option increases configurability and means better performance** at lower cost than VME-based controllers.

Support of VMEbus block mode transfers enables third-party devices that require block mode.

Item	Range
CPUs	1-2
Memory	32-128MB ECC
SCSI channels	1-2
Disk	332 MB-13GB
Ethernet LAN	1-4
Token Ring LAN	0-2
Synchronous ports	0-3
Asynchronous connections	3-258 (1 for console)
VME slots	two 6U

Table 1. Configuration ranges for AV4600 and AV4620.

Architecture

Processor. The AViiON 4600 and 4620 servers are based on Motorola 88000 RISC processors, and contain the 33MHz 88100 RISC CPU and 88200 CMMU (Cache/Memory Management Unit) chips. The 4600 has one 88100 and two 88200s, while the 4620 includes two 88100s (one on the system board, one on a daughterboard) and four 88200s (two on the system board, two on a daughterboard). See the AViiON 5000/6000 Series MAPS/PLUS article beginning on page 202-13 for more information about the 88K processor architecture.

System Board. The AV4600/4620 series board is a single 18" x 12" multilayer PCB that includes:

- two connectors for 33MHz CPU complexes
- a closely coupled, integrated floating point unit
- eight connectors that hold up to eight 4MB or 16MB memory modules (high-performance interleaved memory architecture requires that modules be added in pairs)
- industry-standard single-ended SCSI interface for connecting disk and tape peripherals
- industry-standard IEEE 802.3 Ethernet interface (without transceiver)
- console port
- two RS-232C asynchronous interfaces with full modem control
- Centronics-compatible printer interface
- one I/O Bus connector for SCSI/LAN daughterboard
- interface logic that supports Revision C.1 of the VMEbus specification
- time-of-boot clock and calendar
- power-up diagnostics

Figure 1 illustrates the AV4600/4620 system board architecture. Note that the AV4600/4620 systems use the same system board as the AV530 series. The mouse and keyboard connectors are on the board, but they are not used for server configurations.

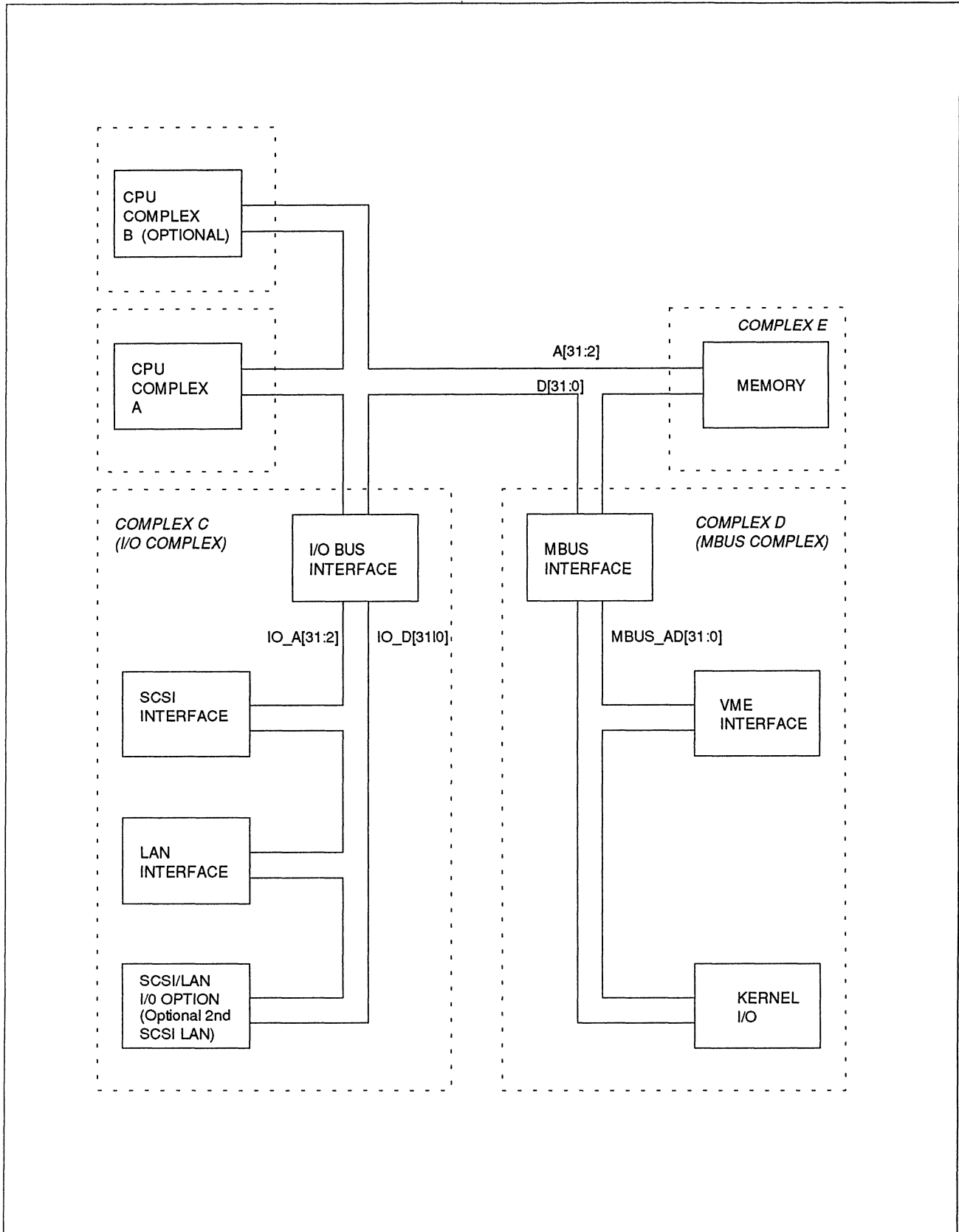


Figure 1. System block diagram.

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, Eurocard format, high performance, and versatility make it appealing to a wide range of users. The AV4600 and 4620 systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price.

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in a closely-coupled hardware configuration. The VMEbus specification on the AV4600 and 4620 systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.

The VMEbus specification covers the mechanical and the electrical interface. The mechanical spec defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female-type; in the AV4600 and 4620 Servers, a separate 6U backplane provides two slots, each with two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master. VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AV4600 and 4620 Servers, the design allows for more than one Master.

On the AV4600 and 4620 Servers, the internal high speed system bus is interfaced to the VMEbus. This interface provides a bi-directional data path between the two buses, performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Table 2 details the C.1 interface specifications and options and the level of implementation on the AV4600 and 4620 Servers.

Mass Storage

Integrated SCSI Interface. The AV4600 and AV4620 offer an integral SCSI interface (based on the NCR 53C700 controller) for connecting mass storage devices. The SCSI bus originates on the system board, connects the internal storage devices (using 4.75' of SCSI cable) and then exits through a connector on the rear bulkhead for external mass storage chasses. The SCSI controller supports asynchronous (1.5MB/s) or synchronous (6.25MB/s) operation. Up to seven devices can be supported internally and through the external Peripheral Housing Unit (PHU) or Combined Storage Subsystem 2/DC (CSS 2/DC).

SCSI Daughterboard provides a second SCSI channel, also based on the 53C700 controller, which supports up to seven additional devices. It plugs into a connector on the system board. The SCSI bus is cabled directly to a second connector on the rear bulkhead (using 0.88' of SCSI cable).

Deskside Chassis. In the main deskside chassis, space is available for four HH (a maximum of two can be removable) or two FH (a maximum of one can be removable) 5.25" devices. Standard in all system packages is a 320/525MB HH QIC tape drive. This leaves one internal HH 5.25" bay supporting either a fixed or removable media device. One HH or FH Winchester disk is also standard. If it is a HH device, an additional HH fixe-media-only bay is available for expansion.

Internal cabling uses 4.75' of SCSI cable on the integrated controller and 0.88' on the daughterboard controller.

Peripheral Housing Unit (PHU). The PHU is an external mass storage chassis that holds three 5.25" HH removable media devices or one FH and one HH device. Each PHU uses 2.25' of internal SCSI cable.

Combined Storage Subsystem 2/DC (CSS 2/DC) is an external mass storage chassis that holds up to five FH devices or seven HH devices (HH device limit is based on the seven devices per SCSI channel maximum). Each CSS 2/DC uses 4.7' of internal SCSI cable.

1600bpi or a 800/6250bpi 9-track Reel-to-Reel Tape Drives are mounted in a stand-alone chassis and can replace a PHU or CSS 2/DC on the SCSI bus.

Cabling. The single-ended SCSI bus has a maximum cable length of 19.6'. The first cable from the AV4600/4620 chassis to a PHU, CSS 2/DC, or reel-to-reel tape must be 5' or greater. Additional cables may be 1.3'. Figure 2 illustrates a possible mass storage configuration.

<i>Specification</i>	<i>Options</i>
Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT. A32, A24 Address only cycle RMW Block transfer supported Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock The IACK and VMEbus grant daisy chain driver The VMEbus/MBUS and MBUS/VMEbus time out logic are programmable The VMEbus arbitration time out logic 1 sec VMEbus watchdog timer (64 micro-sec.)
Type of VMEbus Arbiter:	All types selectable
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C1 Interface specifications and options.

Mass Storage Devices. The AV4600/4620 support a broad range of mass storage devices. Specific models are described in the Configurations/Ordering section of this article. For device parameters and specifications, see the AViiON Mass Storage MAPS/PLUS article beginning on page 239-29.

Some AViiON mass storage devices are *not* supported on the AV4600 and 4620. These include the 150MB QIC tape and 179MB Winchester disk. Reducing configurations permits passing along more functionality at a lower cost (for example, substituting a standard 320/525MB tape for the 150MB tape).

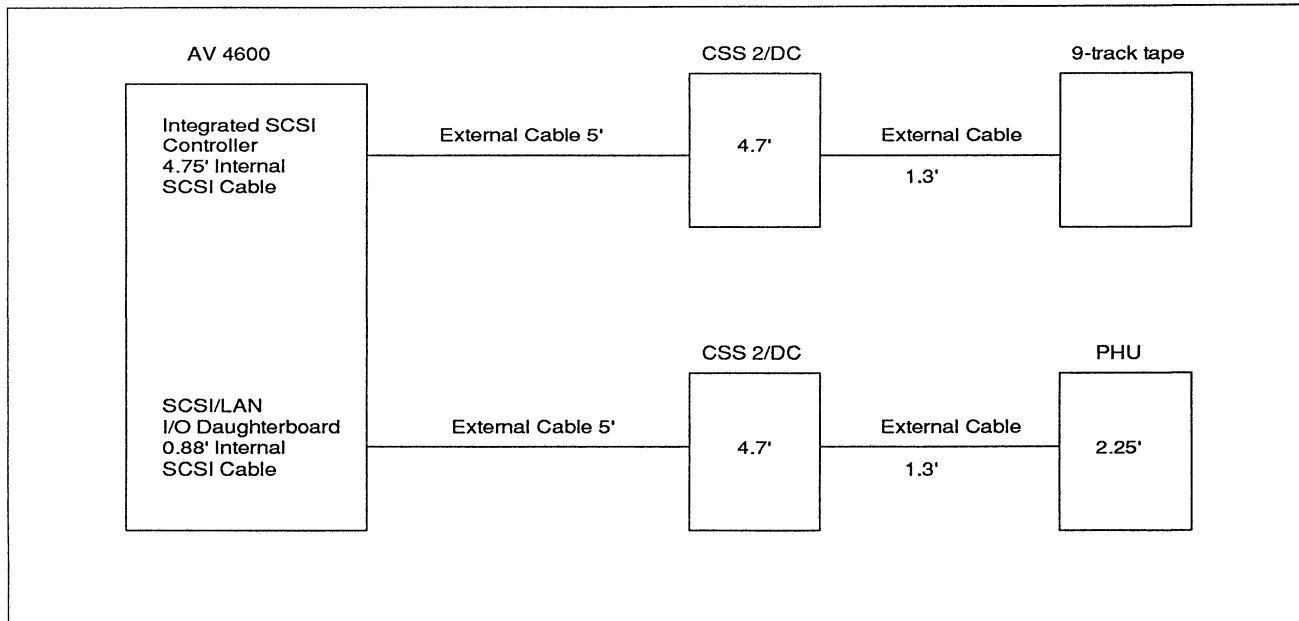


Figure 2. Sample mass storage configuration.

Communications

Integrated Asynchronous Controllers. The AV4600/4620 system board supports three RS-232C ports. The first is dedicated to the system console. The remaining ports support full modem control. All support transfer rates from 150 baud to 19.2 Kbaud. Each port has a DB-9 pin connector on the system board bulkhead. Three 9-pin-to-25-pin converter cables are provided with each system.

Integrated Centronics Parallel Port. One Centronics-compatible parallel printer port is available via a DB-25 connector. This port has DMA support to provide improved performance for high-speed printers.

Integrated IEEE 802.3 Ethernet Controller. The integrated Ethernet controller uses an AMD 79C900 controller to attain a 10Mbit/sec. maximum transfer rate. Internal FIFO buffers and DMA support reduce system overhead. A drop cable and out-board transceiver are required for the desired connection (thick or thin Ethernet).

SCSI/LAN I/O Daughterboard. This daughterboard provides a second LAN interface that "mirrors" the interface on the system board (same controller chip and network performance). As with the on-board controller, a drop cable and transceiver are required.

VMEbus Controllers. The AV4600 and AV4620 support a full-range of AViiON VME communications controllers. These include

- VAC/16 16 RS-232C port asynchronous multiplexor
- VDA/255 distributed asynchronous host adapter
- VLC IEEE 802.3 Ethernet controller
- VTRN IEEE 802.5 Token Ring controller
- VSC/3 three-port synchronous communications controller

These are discussed in the AViiON VME Communications Controllers MAPS/PLUS article beginning on page 271-113.

DG/UX

The AV4600/4620 are supported by DG/UX v.4 or later. Systems ordered with DG/UX and a hard disk will be shipped with the operating system installed on the disk.

Hardware Support Services

The DGC Customer Service Division supports AViiON systems with state-of-the-art service technology. We offer several service programs that include a full array of options to satisfy users' uptime requirements.

On-Call Service with a four-hour response goal lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include:

- **Multi-Year Plus** --discounts up to 10% and price protection in return for signing a three-, four-, or five-year agreement
- **Extended Coverage** --coverage up to seven days a week, 24 hours a day
- **Enhanced Response** --two-hour on-site response for installations within 50 miles of a Data General Service Center
- **Basic Response**--on-site response generally within 24 hours
- **Multi-Device Deferred**--standard discounts up to 40% to customers who have large numbers of PCs, workstations, terminals and desktop printers, and who can wait until a specified number are down before placing a service call

On-Site Select Service is available for customer-maintainable equipment. Toll-free telephone support is provided to help customers identify inoperable part. The replacement part is shipped overnight, and the customer may choose to either install it with telephone assistance, or to request next-day dispatch of a Field Engineer to complete the installation.

Additionally, both Services offer pre-payment discounts of up to 25% for non-cancelable pre-payment terms and up to 10% for cancelable pre-payment terms. On-Call Service pre-payment discounts start for terms as short as six months and On-Site Select discounts start at terms of 24 months.

Warranty. AViiON Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement. With this agreement, warranty service is automatically upgraded to contract service. This warranty covers all base system components and memory and controller boards.

Configurations/Ordering

Packaged Systems

The AViiON 4600 Series Servers are offered in packaged systems that contain one or more disks and a 525MB QIC tape as a load device. Single and uni-processor systems are available. A variety of memory, mass storage, and communications options are available to augment these base systems.

Table 3 lists the AV4600 Series system packages. Table 4 lists the available power suffixes.

<i>Model</i>	<i>Description</i>
70391	AV4600, 33MHz, 32MB, 332MB disk, 525MB tape
70392	AV4600, 33MHz, 32MB, 662MB disk, 525MB tape
70359	AV4600, 33MHz, 32MB, 1GB disk, 525MB tape
70393	AV4620, dual 33MHz, 64MB, 1GB disk, 525MB

Table 3. Packaged systems.

<i>Suffix</i>	<i>Countries</i>
none	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
0	Switzerland

Table 4. Power suffixes.

CPU Options

AV4600 systems are available in single- (AV4600) and dual-processor (AV4620) configurations. Uni-processor systems support a second customer-installable CPU on a daughterboard (see Table 5).

<i>Model Number</i>	<i>Description</i>
7021*	AV4600 second 33MHz CPU option

Table 5. AV4600 second CPU option. *Add suffix S for factory installation at time of initial system order.

Memory Options

The AV4600 Systems support memory increments of 8 or 32MB. These are attained with 4MB or 16MB memory modules which must be added in pairs. Configuration guidelines are as follows:

1. System has eight memory slots
2. Each add-on memory increment requires two slots
3. Base memory requires two slots (32MB) or 4 slots (64MB)

Table 6 lists the AV4600 Series memory options.

Model	Description	Slots
7018	8MB ECC memory package	2
7019	32MB ECC memory package	2

Table 6. Memory options.

Controller Options

AV4600 Systems offer numerous integrated I/O options on the system board. These include:

1. Three asynchronous RS-232 ports
2. One Centronics parallel port
3. One high performance SCSI channel
4. One high performance IEEE 802.3 LAN interface

For further I/O options, the AV4600 Series offers one I/O daughterboard interface and two 6U VMEbus slots. The daughterboard interface supports a SCSI/LAN I/O board. This board provides a second high-performance SCSI channel and a second high-performance Ethernet interface using the same controller chips as on the system board. See Table 7 for model number information.

Model	Description	Max.
7423	Second SCSI/LAN I/O option	1

Table 7. Daughterboard I/O option.

The AV4600 supports a full range of VME communications options. These include

- Asynchronous communications
 - VAC/16 asynchronous multiplexor
 - VDA/255 distributed asynchronous communications host adapter (with VDC/16 030 or VDC/8p 030)
 - 32 User Distributed Asynch Package (consists of VDA/255 with two VDC/16 Distributed Cluster Controllers)
- Local Area Networks
 - VLC Ethernet adapter
 - VTRN Token Ring Network Adapter
- Synchronous communications
 - VSC/3 controller

These are discussed in further detail in the AViiON Communications Controllers MAPS/PLUS article (pp. 271-113).

Table 8 lists available AV4600 communications controllers and model numbers.

Model	Description	Max.
7405-K	VLC Ethernet controller	2
7411-KA	VAC/16 asynch. controller	2
7413-K	VSC/3 synch. controller	1
7416-K	VTRN Token Ring controller	2
7418-K	VDA/255 distributed adapter	1
7419	VDC/16 030 16-port cluster	*
7420	VDC/8 030 8-port cluster	*
7424-K	32-user distributed asynch. package	1

* Maximum supported is equal to the maximum supported by VDA.

Table 8. VME communications controllers and distributed clusters.

Internal Mass Storage

All base system packages include one 320/525MB HH QIC Cartridge Tape drive as a load and backup device. This tape is mounted in one of the two forward mass storage bays which can support either removable or fixed media mass storage devices. The remaining bay is available for expansion devices. Supported expansion devices are listed in Table 9.

Model Number	Description
G6662-F	332MB 5.25" HH SCSI disk
G6554-F	662MB 5.25" FH SCSI disk
G6685-F	1GB 5.25" FH SCSI disk
G6562-F	1.44MB 3.5" HH diskette drive with SA450/SCSI converter
G6563-F	1.2MB 5.25" HH diskette drive with SA450/SCSI converter
G6629-F	600MB 5.25" HH CD-ROM
G6677-F	320/525MB QIC tape

Table 9. Internal add-on peripherals for the AV4600 systems chassis.

The rear (fixed media only) mass storage bays are filled by either a 662 MB FH, 1GB FH or 332MB HH hard disk. If it is a HH device, an additional bay is available for expansion.

Note that some mass storage devices, such as the 150MB QIC tape and 179MB Winchester disk are not supported on the AV4600 Series. The resultant configuration simplification provides cost savings that permit offering more functionality for less money.

<i>Category</i>	<i>From</i>	<i>To</i>	<i>Length</i>	<i>Model Number</i>	
Asynchronous Cables	VAC/16, VDC/8p 030, VDC/16 030	Terminal/Printer	10 ft.	15340E010	
			15 ft.	15340E015	
			25 ft.	15340E025	
		Modem	10 ft.	15369E010	
			15 ft.	15369E015	
			25 ft.	15369E025	
	AV4600 Bulkhead RS-232C (including console)	Terminal/Printer	5 ft.	1340-S	
			15 ft.	1340-T	
			25 ft.	1340	
			50 ft.	1340-A	
		Terminal/Printer (SW busy)	25 ft.	15307E025	
		Modem	25 ft.	1084M	
		50 ft.	1084M-A		
Host Adapter Cables	VDA/255	VDC/16 030, VDC/8p 030	25 ft.	15338E025	
			50 ft.	15338E050	
			100 ft.	15338E100	
		Pkg. 5 Barrel Connectors		15271D	
Parallel Printer Cables	AV4600 Bulkhead Centronics	Centronics Printer	5 ft.	10235	
			30 ft.	15293E030	
		VDC/8p	Centronics Printer	15 ft.	15345E015
				25 ft.	15345E025
Synchronous Cables	VSC/3	Synchronous Modem	6 ft.	15290E006	
			15 ft.	15290E015	
			25 ft.	15290E025	
Ethenet Transceivers	Ethernet Drop Cable	Thick Ethernet (N-tap)		4540	
		Thick Ethernet (Vampire Tap)		4540-B	
		Thin Ethernet (BNC-tap)		4540-A	
Eight Port Transceiver	Ethernet Drop Cable	Ethernet drop cables (8)		4619-@	
Ethernet Drop Cables	Ethernet Adapter	Ethenet Transceiver	5m (Teflon)	1326	
			20m (Teflon)	1326-A	
			5m (PVC)	15274E005	
			20m (PVC)	15274E020	
SCSI	PHU, CSS 2/DC, 9-track, etc.	PHU, CSS 2/DC, 9-track, etc.	1.3 ft.	15378E001	
			3 ft.	15378E003	
	AV4600, PHU, CSS 2/DC, etc.	PHU, CSS 2/DC, 9-track, etc.	5 ft.	15378E005	
			10 ft.	15378E010	
			15 ft.	15378E015	

Table 10. AV4600 cables and transceivers.

External Mass Storage

Additional mass storage expansion is provided via external extension of the SCSI channel(s). Subject to the cable length, seven device/channel and supported device limitations described earlier, any combination of CSS 2/DCs and PHUs is supported. In addition, one reel-to-reel tape may be configured in place of a PHU or CSS 2/DC. See the AViON Mass Storage MAPS/PLUS article (page 239-29 to 239-49) for PHU and CSS 2/DC configuration information.

Cabling

All external cables, including the system console cable, must be ordered separately. Table 10 lists the model numbers for the AV4600 system cables.

Important Ordering Notes

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, second CPU, mass storage, and communications options as needed.
3. Each operating system license must be itemized on the Program License Schedules 501 and purchase order.
4. Order appropriate software distribution and services packages.

5. For asynchronous (or parallel) devices connected to system bulkhead (including system console), order devices with -X suffix. Order cables separately. For devices attached to VAC/16, VDC/16, VDC/8p, etc., a bundled cable may be ordered. This is a change from the method previously used for AV4000 systems.

Power

Power consumption for all configurations should be checked against the power supply output -- particularly if third party devices will be added to loaded systems. Current draws for all AViON internal components are listed in table 12.; current draws for all third party devices must be added. The worksheet on the following page will enable you to calculate current and total power requirements; current draw at three voltages (+5, +12, -12) must be summed and compared to what is available from the power supply.

	CURRENT (Amperes)			WATTS
	+5V	+12V	-12V	
System Board	16.00	1.00	0.50	98.00
CPU Complex	2.50	0.00	0.00	12.50
4 Mbyte SIMM (draw shown for max. 8 SIMMs)	0.80	0.00	0.00	4.00
16 Mbyte SIMM (draw shown for max. 8 SIMMs)	1.20	0.00	0.00	6.00
SCSL LAN I/O Option Card	1.50	1.00	0.00	19.50
VDA/255	3.00	0.20	0.00	17.40
VAC/16	3.00	0.25	0.15	19.80
VSC/3	3.00	0.10	0.06	16.92
VTRN	2.00	0.00	0.00	10.00
VLC	2.50	1.00	0.00	24.50
322 MB Disk	1.20	2.50	0.00	36.00
662 MB Disk	2.00	4.00	0.00	58.00
1 GB Disk	2.00	4.00	0.00	58.00
525 MB Tape	1.50	1.50	0.00	25.50
600 MB CD-ROM	1.60	1.80	0.00	29.60

Table 12. AV 46XX Power Supply; maximum current and power.

Related Information

<i>Document Description</i>	<i>Model Number</i>
AV 4600, 4620 product brief	012-4037
Using System Diagnostics (RBOS)	014-001863
Setting Up, Starting, Expanding, Maintaining AViiON 530, AViiON 4600 Computers	014-002091
Setting Up and Installing VMEbus options in AViiON	014-001867
Installation Road Map	069-701084
Guide to AViiON and DG/UX System Documentation	069-701085

Table 13. Related Information.

<i>MAXIMUM CURRENT PER DEVICE:</i>	<i>+5V</i>	<i>+12V</i>	<i>-12V</i>
Base system board (no memory or CPU complex)	16.00	1.00	0.50
First CPU complex	2.50	0.00	0.00
16 MB memory modules (2)	0.30	0.00	0.00
525 MB tape drive	1.50	1.50	0.00
Other components;	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
<i>CHECKING POWER SUPPLY LIMITS</i>			
+5V max. A \leq 37 A?	_____		
+12V max. A \leq 10 A?		_____	
-12V max. \leq 1 A?			_____
+5V max. W (5 X amperes) \leq 185 W?	_____		
+12V max. W (12 X amperes) \leq 120 W?		_____	
-12V max. W(12 X amperes) \leq 12 W?			_____
Total W \leq 317 W?			_____

Power calculation worksheet for AV 46XX.

Specifications

Processor:

33 MHz Motorola 88100 processor with integral FPU
Single- or dual-processor options
Virtual Memory Management:
Two 88200 CMMUs/CPU; 4 GB per process

Caches:

Data cache and instruction cache
Size: 16 KB per side
Organization: 4-way set associative

Main Memory:

32 MB—128 MB with ECC
Expansion: 4 MB or 16 MB modules
Increments: 8 or 32 MB
Busses: 32-bit memory-to-cache; 32-bit
cache-to-processor

Integrated I/O:

LAN—ETHERNET IEEE 802.3

AMD 79C900 Controller
Bandwidth: 10 Mbits/sec
Centronics-compatible Parallel Port

Three Serial Ports

RS-232 (two with modem control, one for system
console);
Baud rates up to 19.2 kilobaud

Asynchronous/Synchronous SCSI

NCR 53C700 Controller
Bandwidth: 6.26 MB/s sync; 1.5 MB/s async.
SCSI/LAN daughterboard; 2nd NCR 53C700 and 2nd
AMD 79C900 controllers

Backplane:

Motorola's VMEbus Revision C.1
IEEE P1014 Draft 1.2
Two 6U slots

Environmental:

Operating/Nonoperating Temperature: 0 - 38°C/-40 -
70°C
Operating/Nonoperating Relative Humidity: 0 - 80%/10 -
90%

Electrical

AC Voltage: 120V nominal (85-138 VAC); 220V
nominal (187-276 VAC)
AC Frequency: 47 - 63 Hz
Current draw: 8 amps at 120Vrms; 5 amps at 220Vrms
Power supply: 325 Watts

Physical Dimensions:

24.75" high x 5.75" wide by 22" deep
System Chassis Weight: 59 lbs. fully loaded (with disks
and tape)
Monitor Weight: approx. 60 lbs.



AViiON 210D Plus Series Single-User Workstations

Fact Sheet

This revision reflects new, higher performance and new packaged system model numbers.

The AViiON 210D Plus (AV210D) Series of single-user, monochrome workstations is designed for the professional workstation user. These new entry-level workstations deliver the performance and functionality of the AV310 Series workstations in a monochrome environment.

Complete single-board system functionality

- Advanced, entry-level UNIX single-user workstation based on Motorola 88K RISC Processor running at 20 MHz clock speed
- Tightly coupled, on-chip Floating Point Unit
- Two 88200 Cache and Memory Management Units (CMMU) for improved performance (23 MIPS performance based on the Dhrystone benchmark)
- Complete, single board system in small desktop package
- Standard 8 MB memory in base package
- Can operate as a diskless node in a network
- Advanced 32-bit RISC technology
- Packaged in the AV310 desktop package
- 4MB on 16MB parity memory modules
- Memory expansion capability of up to 7, 4MB on 16MB memory modules, for a total of up to 112MB
- Industry standard SCSI interface for disk and tape units
- Three-button optical mouse with pad
- PC/AT-101 compatible keyboards

Graphics

- High performance, bit-mapped graphics with dedicated, dual ported display memory
 - Monochrome: 1280x1024x1 Displayable resolution
- High resolution, flicker-free 20" near flat monochrome monitor
- Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- Low-level graphics library
- Standard MIT distribution of X11 r3
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

Customer environment/use characteristics:

- Customer installable and maintainable
- Customer installable add-on memory and peripherals
- 40db (quiet office) noise levels
- One year mail-in warranty on all components

Communications

- Ethernet controller standard (without transceiver or drop cable)
- Thick or Thin net connections available
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud

Product Description

The AV210D Plus is Data General's most powerful monochrome desktop workstation. It is available in a single configuration: a monochrome system with 8MB memory running at 20 MHz. The system board can accommodate up to 7 memory modules for up to 112MB of main memory.

Architecture

The AV210D Plus Workstation is based on the existing AV310 architecture. The AViiON Workstation system board consists of a single 16" x 16" multilayer PCB, which includes:

- a 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- closely coupled, integrated floating point unit
- 7 connectors capable of holding up to 7 16MB memory modules for a total of 112MB
- industry standard SCSI interface for connecting peripherals such as disk and tape
- industry-standard 802.3 Ethernet interface (w/o transceiver)
- AT-compatible or Japanese AX-compatible keyboard interface
- mouse interface
- monochrome graphics controller
- two asynchronous interfaces - RS232 with full modem support
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot

<i>Model</i>	<i>Description</i>
Packaged System Includes keyboard, monitor, and mouse - Without Disk	
70409	8MB System, 20 MHz, 20" Monochrome Monitor
70410	Japanese 8MB System, 20 MHz, 20" Monochrome Monitor
Packaged System With 322 MB Disk and PHU	
70411	8MB System, 20 MHz, 20" Monochrome Monitor
70412	Japanese 8MB System, 20 MHz, 20" Monochrome Monitor
Options:	
7000	4MB memory expansion module
7012	8MB memory expansion package
7014	16MB memory expansion package
4512	Three-button optical mouse for use on AViiON workstations only. Includes optical pad.
6488	101/102 key AT-Style keyboard - REQUIRES LANGUAGE SUFFIX*
*See Table 2.	

Table 1. Model numbers

Peripherals

The AV210D Plus Workstation is supported by the existing AV310 peripherals. See table.

Graphics Hardware. The AV210 graphics hardware consists of an integrated monochrome controller. The monochrome controller is connected directly to the M-BUS on the main system board for maximum performance. The monochrome unit includes

- NEC uPD72120 Advanced Graphics Display Controller
- eight 256K video RAMS
- RS-343A monitor interface
- video timing logic
- addressable resolution of 1638 horizontal by 1024 vertical
- viewable resolution of 1280 x1024 with 614 x 1024 used as for off-screen storage of fonts or menus

Japanese Language Versions

The monochrome units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard and the ability to add an additional 4 Mbits of memory on the monochrome controller, the AViiON Workstation will allow customers to utilize the workstation for Japanese Language applications and environments.

<i>Model Number</i>	<i>Description</i>
G10565	PHU
G6605	662 MB Disk in PHU
G6603	179 MB Disk/150 MB Tape in PHU
G6600	179 MB Disk in PHU
G6591-A	2GB Cartridge Tape 5 1/4" full height in PHU

Table 4. External Peripherals

<i>Model Number</i>	<i>Description</i>
G6677-E	525 MB QIC Tape add-on for PHU
6539-E	179 MB Disk add-on for PHU
6662-E	332 MB Disk add-on for PHU
6554-E	662 MB Disk add-on for PHU
G6591-E	2 Gbyte Cartridge Tape 5 1/4" full height for PHU
G6562-E	1.44 MB 3 1/2" half height Diskette Drive with SA450/SCSI converter
G6563-E	1.2 MB 5 1/4" half height Diskette Drive with SA 450/SCSI converter
G6562-EX	1.44 MB 3 1/2" half height Diskette Drive without SA450/SCSI converter
G6563-EX	1.2 MB 5 1/4" half height Diskette Drive without SA450/SCSI converter

Table 5. External Add-On Peripherals for PHU

<i>Model Number</i>	<i>Description</i>
G6677-F	525 MB QIC Tape add-on
6539-F	179 MB Disk add-on
6662-F	332 MB Disk add-on
6554-F	662 MB Disk add-on
6685-F	1.0 GB Disk add-on
G6591-F	2 Gbyte Cartridge Tape 5 1/4" full height
G6562-F	1.44 MB 3 1/2" half height Diskette Drive with SA 450/SCSI converter
G6563-F	1.2 MB 5 1/4" half height Diskette Drive with SA450/SCSI converter
G6562-FX	1.44 MB 3 1/2" half height Diskette Drive without SA450/SCSI converter
G6563-FX	1.2 MB 5 1/4" half height Diskette Drive without SA450/SCSI converter

Table 6. Internal Add-On Peripherals for the AV 530 Systems Chassis.

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1326)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1326)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver (Teflon)
15274E005	5 foot Ethernet drop cable for connecting workstation to transceiver (PVC)

Table 7. Ethernet options.

<i>W/CSS2/DC</i>		<i>W/PHU1</i>		<i>W/PHU2 & PHU3</i>		<i>Totals</i>	
<i>Disk</i>	<i>Tape</i>	<i>Disk</i>	<i>Tape</i>	<i>Disk</i>	<i>Tape</i>	<i>Disk</i>	<i>Tape</i>
5GB	-					5GB	-
4GB	2GB					4GB	2GB
		1.3GB	-	1.3GB each	-	3.9GB	-
		1.0GB	525MB	1.3GB each	-	3.6GB	525MB

Table 8. Typical maximum configurations.

Configurations/Ordering

The AV210D Plus Workstation is offered as a packaged system with or without peripherals (see Table 1 for model numbers). The packaged system consists of

- the system chassis,
- 20" monochrome monitor,
- mouse,
- keyboard, and
- a peripheral package.

Each system chassis includes

- a 20 MHz system board,
- 8 MB of main memory,
- integral industry standard Ethernet LAN interface (IEEE 802.3),
- industry standard Small Computer Standard Interface (SCSI) for high performance I/O, and
- two (2) RS-232C async ports with full modem control.

You **must** order a transceiver (model 4540, 4540-A OR 4619) **and** a drop cable (model 1329) for each workstation that is to be connected to Ethernet (see Table 10).

<i>Suffix</i>	<i>Language</i>
-A	US English
-B	UK English
-C	French
-D	German
-S	Japanese—AX-compatible* (available only on the Japanese models)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish

* AX is the International standard for the Japanese Language

Table 9. Language suffixes for keyboards.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard Ethernet cable—requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" Ethernet cable—requires drop cable for connecting from back of the system to the transceiver (model 1329)
4619	Eight-port Ethernet transceiver for connecting up to eight Ethernet drop cables

Table 10. Ethernet transceivers.

Check with DG/Direct for Ethernet drop cables.

The external peripheral options use existing AV310 peripherals. See Tables 4-7, for maximums see Table 8.

Ordering Workstations

1. Select the package that best fits your needs. Add the appropriate suffix for font and power.
2. Each license must be itemized on the Program License Schedule 501 and purchase order.
3. Order appropriate software distribution and service packages.

Related Information

<i>Part Number</i>	<i>Title</i>
012-003861	AViiON 210D Plus Single-User Workstation Product Brief
014-001880	Technical Notice for AViiON 210 Series Systems: Programming System Control and I/O Registers
014-001881	Technical Notice for AV210 Series Systems: Programming System Control and I/O Registers



AViiON 200D Plus Series Single-User Workstations

Fact Sheet

This revision reflects new, higher memory capacity and new packaged system model numbers.

The AViiON 200D Plus (AV200D) Series of single-user, monochrome workstations is designed for technical professionals. These new entry-level workstations deliver the performance and functionality of the AV300 Series workstations.

Complete single-board system functionality

- Advanced, entry-level UNIX single-user workstation based on Motorola 88K RISC Processor running at 16.67 MHz clock speed
- Tightly coupled, on-chip Floating Point Unit
- Two 88200 Cache and Memory Management Units (CMMU) for improved performance (17 MIPS performance based on the Dhrystone benchmark)
- Complete, single board system in small desktop package
- Standard 8 MB memory in base package
- Can operate as a diskless node in a network
- 12 MB/sec Memory bus
- Advanced 32-bit RISC technology
- Packaged in the AV300 desktop package
- 4MB parity memory modules
- Memory expansion capability of up to 7, 4MB memory modules, for a total of 28MB
- Industry Standard SCSI interface for disk and tape units
- Three-button optical mouse with pad
- PC/AT-101 compatible keyboards

Graphics

- High performance, bit-mapped graphics with dedicated, dual ported display memory
 - Monochrome: 1280x1024x1 Displayable resolution
- High resolution, flicker-free 20" near flat monochrome monitor
- Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- Low-level graphics library
- Standard MIT distribution of X11 r3
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

External Mass storage/Tape back-up

- External mass storage uses the existing AV300 Series peripherals

Customer environment/use characteristics:

- Customer installable and maintainable
- Customer installable add-on memory and peripherals
- 40db (quiet office) noise levels
- One year mail-in warranty on all components

Communications

- Ethernet controller standard (without transceiver or drop cable)
- Thick or Thin net connections available
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud

Product Description

The AV200D Plus is Data General's entry-level monochrome desktop workstation. It anchors the AViiON workstation line by providing aggressive pricing at the performance level of the AV300 workstations.

The AV200D Plus Series is available in a single configuration: a monochrome system with 8 MB memory running at 16.67 MHz. The system board can accommodate up to 7 memory modules for a total 28MB of main memory.

Architecture

The AV200D Plus Workstation is based on the existing AV300 architecture (see the AV300 MAPS/PLUS article beginning on page 202-3 for additional information). The AViiON Workstation system board consists of a single 16" x 16" multilayer PCB, which includes

- a 16.67 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- closely coupled, integrated floating point unit
- four connectors capable of holding up to four 4MB memory modules
- industry Standard SCSI interface for connecting peripherals such as disk and tape
- industry-standard 802.3 Ethernet interface (w/o transceiver)
- AT-compatible or Japanese AX-compatible keyboard interface

<i>Model</i>	<i>Description</i>
Packaged System Includes keyboard, monitor, and mouse - Without Disk	
70401	8MB System, 16 MHz, 20" Monochrome Monitor
70420	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Packaged System With 179 MB Disk and PHU	
70403	8MB System, 16 MHz, 20" Monochrome Monitor
70404	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Packaged System With 322 MB Disk and PHU	
70405	8MB System, 16 MHz, 20" Monochrome Monitor
70406	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Options:	
7000	4MB memory expansion module
7012	8MB memory expansion package
4512	Three-button optical mouse for use on AViiON workstations only. Includes optical pad.
6488	101/102 key AT-Style keyboard - REQUIRES LANGUAGE SUFFIX*
*See Table 2.	

Table 1. Model numbers

- mouse interface
- monochrome graphics controller
- two asynchronous interfaces - RS232 with full modem support
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot

Peripherals

The AV200D Plus Workstation is supported by the existing AV300 peripherals.

Graphics Hardware. The AV200 graphics hardware consists of an integrated monochrome controller. The monochrome controller is connected directly to the M-BUS on the main system board for maximum performance. The monochrome unit includes

- NEC uPD72120 Advanced Graphics Display Controller
- eight 256K video RAMS
- RS-343A monitor interface
- video timing logic
- addressable resolution of 1638 horizontal by 1024 vertical
- viewable resolution of 1280 x1024 with 614 x 1024 used as for off-screen storage of fonts or menus

Japanese Language Versions

The monochrome units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard and the ability to add an additional 4 Mbits of memory on the monochrome controller, the AViiON Workstation will allow customers to utilize the workstation for Japanese Language applications and environments.

Configurations/Ordering

The AV200D Plus Workstation is offered as a packaged system with or without peripherals (see Table 1 for model numbers). The packaged system consists of

- the system chassis,
- 20" monochrome monitor,
- mouse,
- keyboard, and
- a peripheral package.

Each system chassis includes

- a 16.67 MHz system board,
- 8 MB of main memory,
- integral industry standard Ethernet LAN interface (IEEE 802.3),
- industry standard Small Computer Standard Interface (SCSI) for high performance I/O, and
- two (2) RS-232C async ports with full modem control.

You *must* order a transceiver (model 4540, 4540-A OR 4619) *and* a drop cable (model 1329) for each workstation that is to be connected to Ethernet (see Table 3).

<i>Suffix</i>	<i>Language</i>
-A	US English
-B	UK English
-C	French
-D	German
-S	Japanese—AX-compatible* (available only on the Japanese models)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish
* AX is the International standard for the Japanese Language	

Table 2. Language suffixes for keyboards.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard Ethernet cable—requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" Ethernet cable—requires drop cable for connecting from back of the system to the transceiver (model 1329)
4619	Eight-port Ethernet transceiver for connecting up to eight Ethernet drop cables

Table 3. Ethernet transceivers.

Check with DG/Direct for Ethernet drop cables.

The external peripheral options use existing AV300 peripherals.

Ordering Workstations

1. Select the package that best fits your needs. Add the appropriate suffix for font and power.
2. Each license must be itemized on the Program License Schedule 501 and purchase order.
3. Order appropriate software distribution and service packages.

Related Information

<i>Part Number</i>	<i>Title</i>
012-003861	AViiON 200D Plus Single-User Workstation Product Brief
014-001878	<i>Technical Notice for AViiON 3000 and 4000 Series Systems: Programming System Control and I/O Registers</i>
014-001879	<i>Technical Notice for AV 3000 and 4000 Series Systems: Programming System Control and I/O Registers</i>
014-001880	<i>Technical Notice for AViiON 200 Series Systems: Programming System Control and I/O Registers</i>
014-001881	<i>Technical Notice for AV 200 Series Systems: Programming System Control and I/O Registers</i>



AViiON 200D Series Single-User Workstations

Fact Sheet

The AViiON 200D (AV200D) Series of single-user, monochrome workstations is designed for technical professionals. These new entry-level workstations deliver the performance and functionality of the AV300 Series workstations *for the price of a PC*.

Complete single-board system functionality

- Advanced, entry-level UNIX single-user workstation based on Motorola 88K RISC Processor running at 16.67 MHz clock speed
- Tightly coupled, on-chip Floating Point Unit
- Two 88200 Cache and Memory Management Units (CMMU) for improved performance (17 MIPS performance based on the Dhrystone benchmark)
- Complete, single board system in small desktop package
- Standard 8 MB memory in base package
- Can operate as a diskless node in a network
- 12 MB/sec Memory bus
- Advanced 32-bit RISC technology
- Packaged in the AV300 desktop package
- 4MB parity memory modules
- Memory expansion capability of up to four, 4MB memory modules, for a total of 16MB
- Industry Standard SCSI interface for disk and tape units
- 3 Button optical mouse with pad
- PC/AT-101 compatible keyboards

Graphics

- High performance, bit-mapped graphics with dedicated, dual ported display memory
 - Monochrome: 1280x1024x1 Displayable resolution
- High resolution, flicker-free 20" near flat monochrome monitor
- Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- Low-level graphics library
- Standard MIT distribution of X11 r3
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

External Mass storage/Tape back-up

- External mass storage uses the existing AV300 Series peripherals

Customer environment/use characteristics:

- Customer installable and maintainable
- Customer installable add-on memory and peripherals
- 40db (quiet office) noise levels
- One year mail-in warranty on all components

Communications

- Ethernet controller standard (without transceiver or drop cable)
- Thick or Thin net connections available
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud

Product Description

The AV200D is Data General's entry-level monochrome desktop workstation. It anchors the AViiON workstation line by providing aggressive pricing at the performance level of the AV300 workstations.

The AV200D Series is available in a single configuration: a monochrome system with 8 MB memory running at 16.67 MHz. The system board can accommodate up to four memory modules for a total 16MB of main memory.

Architecture

The AV200D Workstation is based on the existing AV300 architecture (see the AV300 MAPS/PLUS article beginning on page 202-3 for additional information). The AViiON Workstation system board consists of a single 16" x 16" multilayer PCB, which includes

- a 16.67 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- closely coupled, integrated floating point unit
- four connectors capable of holding up to four 4MB memory modules
- industry Standard SCSI interface for connecting peripherals such as disk and tape

<i>Model</i>	<i>Description</i>
Packaged System Includes keyboard, monitor, and mouse - Without Disk	
70153	8MB System, 16 MHz, 20" Monochrome Monitor
70154	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Packaged System With 179 MB Disk and PHU	
70155	8MB System, 16 MHz, 20" Monochrome Monitor
70156	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Packaged System With 322 MB Disk and PHU	
70157	8MB System, 16 MHz, 20" Monochrome Monitor
70158	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Options:	
7000	4MB memory expansion module.
7012	8MB memory expansion package
4512	Three-button optical mouse for use on AViiON workstations only. Includes optical pad.
6488	101/102 key AT-Style keyboard - REQUIRES LANGUAGE SUFFIX*
*See Table 2.	

Table 1. Model numbers

- industry-standard 802.3 Ethernet interface (w/o transceiver)
- AT-compatible or Japanese AX-compatible keyboard interface
- mouse interface
- monochrome graphics controller
- two asynchronous interfaces - RS232 with full modem support
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot

Peripherals

The AV200D Workstation is supported by the existing AV300 peripherals.

Graphics Hardware. The AV200D graphics hardware consists of an integrated monochrome controller. The monochrome controller is connected directly to the M-BUS on the main system board for maximum perfor-

mance. The monochrome unit includes

- NEC uPD72120 Advanced Graphics Display Controller
- eight 256K video RAMS
- RS-343A monitor interface
- video timing logic
- addressable resolution of 1638 horizontal by 1024 vertical
- viewable resolution of 1280 x1024 with 614 x 1024 used as for off-screen storage of fonts or menus

Japanese Language Versions

The monochrome units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard and the ability to add an additional 4 Mbits of memory on the monochrome controller, the AViiON Workstation will allow customers to utilize the workstation for Japanese Language applications and environments.

Configurations/Ordering

The AV200D Workstation is offered as a packaged system with or without peripherals (see Table 1 for model numbers). The packaged system consists of

- the system chassis,
- 20" monochrome monitor,
- mouse,
- keyboard, and
- a peripheral package.

Each system chassis includes

- a 16.67 Mhz system board,
- 8 MB of main memory,
- integral industry standard Ethernet LAN interface (IEEE 802.3),
- industry standard Small Computer Standard Interface (SCSI) for high performance I/O, and
- two (2) RS-232C async ports with full modem control.

You *must* order a transceiver (model 4540, 4540-A OR 4619) *and* a drop cable (model 1329) for each workstation that is to be connected to Ethernet (see Table 3).

<i>Suffix</i>	<i>Language</i>
-A	US English
-B	UK English
-C	French
-D	German
-S	Japanese—AX-compatible* (available only on the Japanese models)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish

* AX is the International standard for the Japanese Language

Table 2. Language suffixes for keyboards.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard Ethernet cable—requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" Ethernet cable—requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4619	Eight-port Ethernet transceiver for connecting up to eight Ethernet drop cables

Table 3. Ethernet transceivers.

Check with DG/Direct for Ethernet drop cables

The external peripheral options use existing AV300 peripherals

Ordering Workstations

1. Select the package that best fits your needs. Add the appropriate suffix for font and power.
2. Each license must be itemized on the Program License Schedule 501 and purchase order.
3. Order appropriate software distribution and service packages.

Related Information

<i>Product Brief</i>	
012-003861	AViiON 200D Single-User Workstation
014-001878	Technical Notice for AViiON 3000 and 4000 Series Systems: Programming System Control and I/O Registers
014-001879	Technical Notice for AV 3000 and 4000 Series Systems: Programming System Control and I/O Registers
014-001880	Technical Notice for AViiON 200 Series Systems: Programming System Control and I/O Registers
014-001881	Technical Notice for AV 200 Series Systems: Programming System Control and I/O Registers



AViiON 3200 Server

Fact Sheet

The AV 3200 Server provides a low-cost alternative for customers who do not require the configurability and performance of the AV 4000 Series.

The AV 3200 is suitable for many time-sharing and server environments.

The AV 3200, packaged in a small-footprint tower, has an integrated motherboard with CPU-parity memory, SCSI bus controller, Ethernet controller, and VME interface. An asynchronous, synchronous or LAN communications controller is supported by a 6U VMEbus slot.

In a time-sharing environment, as many as 16 asynchronous devices are supported by the VME Asynchronous Controller VAC/16. The AV 3200 can be connected to other intelligent systems by using an industry-standard IEEE 802.3 Ethernet LAN to act as file-, compute-, or cleaved- application servers. As an synchronous communications gateway, up to three ports are supported by using the VME Synchronous Controller (VSC/3). A second Ethernet interface is provided by the VME LAN Controller (VLC).

Integrated System Board

- 16.67 Motorola 88100 RISC Processor
- Two 88200 Cache and Memory Management Units (CMMU)
- Eight- to 16 MB byte-parity RAM (via 4MB SIMMs)
- Industry-standard SCSI interface for disk and tape
 - Supports synchronous (4 Mbits/sec) and asynchronous (1.5 Mbits/sec) operation
 - Supports internal storage only
- IEEE 802.3 LAN interface
- Two RS-232C serial ports (one used for system console)
- Centronics-compatible parallel port
- Hardware support for Motorola's VMEbus (Revision C.1)

Attractive Tower Package

- Compact small-footprint desktide chassis
 - (24.75H x 5.75W x 22D)
- Internal mass storage (see following)
- One-slot (6U) VMEbus card cage
- 325W power supply

Internal Mass Storage/Tape Back-up

- Desktide chassis can hold four 5.25" half-height (HH) devices (two can be removeable) or one 5.25" full-height (FH) device and two 5.25" HH devices (two can be removeable)
 - 150 MB HH QIC tape is standard and uses one removeable media bay
 - Packages include either a HH 332 MB or FH 662 MB Winchester disk
- Devices supported
 - 662 MB Winchester 5.25" FH SCSI
 - 332 MB Winchester 5.25" HH SCSI
 - 179 MB Winchester 5.25" HH SCSI
 - 150 MB QIC150 Cartridge Tape 5.25" HH SCSI

Standard Communications

- Ethernet interface standard (without transceiver or drop cable). Supports either thick or thin net connections
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud (one for system console)
- Centronics compatible parallel printer port

Standard VME Expansion Boards

- VAC/16 16 RS-232C-port asynchronous multiplexor (with two 8-port junction boxes) - maximum of one - OR
- VSC/3 three-port synchronous communications board - maximum of one - OR
- VLC Ethernet LAN controller - maximum of one

Customer Environment/Use Characteristics

- Customer installable and maintainable
- Customer installable add-on memory
- 40db (quiet-office) noise levels
- 90-day on-site warranty on all system components

Package Model Numbers

- G70142: 8 MB, 16 MHz AV 3200 Base System, 332 MB Disk, 150 MB tape, VAC/16
- G70143: 8 MB, 16 MHz AV 3200 Base System, 662 MB Disk, 150 MB tape, VAC/16
- G70145: 8 MB, 16 MHz AV 3200 Base System, 332 MB Disk, 150 MB tape, VSC/3
- G700146: 8 MB, 16 MHz AV 3200 Base System, 662 MB Disk, 150 MB tape, VSC/3
- G70149: 8MB, 16 MHz AV 3200 Base System, 332 MB Disk, tape
- G70150: 8MB, 16 MHz AV 3200 Base System, 662 MB Disk, tape

- Four connectors capable of holding up to four, 4 MB memory modules
- Interface logic supporting Revision C.1 of the VMEbus
- Industry-standard SCSI interface for connecting peripherals such as disk and tape
- Industry-standard 802.3 Ethernet Interface (w/o transceiver)
- Two, asynchronous interfaces – RS232 with one offering full modem support
- Parallel line printer interface (Centronics or Data Products compatible)
- Time-of-Boot clock and calendar
- Power-up diagnostics

Product Description

The AV 3200 is a ‘cousin’ of the AV 4000 Series systems. Both offer RISC power in a compact package. Customers should be aware of the following performance and configuration differences summarized in Figure 1.

Features	AV 3200	AV 4000
CPU	16.7 MHz single only	16.7, 20 MHz single and dual
MIPS	17	17-40
Disk	1 GB internal	1 GB internal 2 GB external
Memory	8-16 MB	8-32 MB
VME slots	1	2
Maximum Async connects	18	130

Table 1. Entry-level server comparison: AV 3200 — AV 4000.

Architecture

The AViiON/3200 server is based on an 88000 RISC processor from Motorola and contains the 88100 RISC CPU and two 88200 cache/MMU (Memory Management Unit) chips. See the AViiON 5000/6000 Series MAPS/PLUS article on page 202-13 for more information about the 88K processor architecture.

The AV 3200 system board is a single 18 x 12" multilayer PCB that includes

- 16.67 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- Closely coupled, integrated floating-point unit

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its Eurocard format, performance, and versatility are some of the reasons that it appeals to a wide range of users, especially in the technical marketplace. DGC chose the VMEbus for the AViiON systems because it is an industry-standard bus that offers high performance at a reasonable price (on the AViiON 5000/6000 Series Systems, the VMEbus implementation was designed to accommodate block mode transfers, but the AViiON 3200 does not support this option to the C.1 specification). The VMEbus specification defines an interface system for interconnecting data processing, data storage and peripheral control devices in a closely-coupled hardware configuration. The specification for the VMEbus that is incorporated in the AViiON 3200 conforms to Motorola’s Revision C.1 VMEbus specification.1

The VMEbus specification provides for a mechanical and an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane. The connectors are 96-pin female connectors. In the AViiON 3200, a separate 6U backplane been designed to provide two slots, each slot consisting of two 96-pin connectors called J1 and J2, the J1 connector being the uppermost connector and J2 the lower. In addition to the VMEbus slots, the backplane provides the power connection for the system board.

The VMEbus incorporates the Master/Slave concept. Within this framework, the system board is the Master, since it controls the flow of data between itself and any other device (the Slave). Data transfers initiated by VMEbus devices other than the system board are considered ‘slave’ transfers. VMEbus devices can transfer data to the AV 3200’s internal system bus (MBUS) in single words, half-words, or bytes.

VMEbus transactions are governed by a single-bus Master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 3200 Series, the design allows for more than one Master, but the system board is always a Master.

On the AViiON 3200 Series systems, the internal high-speed system bus (MBUS) is interfaced to the VMEbus. This inter-

face provides a bi-directional data path between the two busses, and performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8-, 16-, and 32-bit MBUS masters and slaves as well as the 8-, 16-, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

The C.1 interface specifications and options implemented on the AViiON 3200 are listed in Table 2.

Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT A32, A24 Address only cycle RMW No block transfer
VMEbus Slot 1 Functions:	Decodes only 2 address bits along with 5 AM bits AM[5:0] A 16 MHZ VMEbus system clock. The IACK and VMEbus grant daisy chain driver. The VMEbus/MBUS and MBUS/VMEbus time out logic (32 micro-sec.). The VMEbus arbitration time out logic (64 micro-sec.). VMEbus watchdog timer (64 micro-sec.).
Type of VMEbus Arbiter:	SGL (Single Level)
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C.1 interface specifications and options.

Mass Storage

The AV 3200 offers an integral SCSI bus controller for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage devices. The SCSI controller supports either asynchronous (1.5 MB/s) or synchronous (4 MB/s) operation. Up to four devices can be supported internally. Space is provided for four HH (maximum two removable) or one FH and two HH 5.25" devices. Standard in all system packages is a 5.25" HH 150 MB cartridge tape that conforms to the QIC 150 industry standard, and either a 332MB 5.25" HH Winchester disk with 14ms access time or a 662 MB 5.25" FH Winchester disk with 16ms access time. A 179 MB 5.25" Winchester disk with 18ms access time is available to fit the remaining bay. The 662MB and 179MB disks are capable of synchronous or asynchronous operation, while the 322 MB disk can operate in asynchronous mode only.

DG/UX

The AV 3200 is supported by DG/UX revision 4.30 or greater. A complete discussion of its features and licensing requirements is found in the DG/UX 4.30 MAPS/PLUS article (page 301-012.3).

The AV 3200 is supported by a unique set of DG/UX model numbers that authorize the connection of unlimited numbers of users and include a Right to Use only. Media and documentation must be ordered separately.

Q001ASMIAN	Server/Multiuser Operating System DG/UX GNU C Documenter Tool Kit (DTK)
P001ASMIAN	DG/UX GNU C Documentor Tool Kit (DTK) TCP/IP ONC/NFS X WINDOWS OSF/MOTIF

Communications

The system board supports two RS232C asynchronous ports and an IEEE 802.3 Ethernet LAN port. In addition, the VMEbus slot supports either a VAC/16 synchronous communications controller or a VSC/3 synchronous communications controller or a VLC Ethernet controller. These use the same boards that are supported on the AV 5000/6000, but all require changes due to chassis differences. For the AV 3200 Series, each board is sold in a 6U Eurocard form factor, with air dams and external connectors. In addition, some modifications have been made to ensure mechanical and environmental compliance with Data General and government standards. See the MAPS/PLUS VME Communications Controllers article for a complete description of the optional VME communications controllers (page 271-113).

Asynchronous Communications

The two serial ports on the system board provide data rates of up to 192 Kbps full duplex. The first of these ports supports the system console. The second can be used to connect an additional asynchronous device. This line supports full modem control.

The VAC/16 (VME Asynchronous Controller/16), provides 16 RS-232C lines with modem control. Each VAC/16 includes a Motorola 68020 processor, 192 KB static RAM buffer, 128 KB EPROM, and two custom VLSI octarts. All 16 lines are full duplex. The board has an aggregate data rate of 16 x 19.2 Kbps full duplex.

In AV3200 Series systems the VAC/16 connects to two external junction boxes via five-foot shielded cables. Each junction box provides eight DB-25 connectors. The junction boxes use the same board as the VAC/16 bulkhead connector panel which is used on the AV5000 series.

Synchronous Communications

Synchronous communications for the AV 3200 are handled by the VSC/3 (VME Synchronous Controller/3). This board provides three multi-protocol serial communications channels (RS232C/RS422) with full-duplex DMA operation using two Zilog 8530 SCC chips (this same board is called the VSC/4 on AV 5000 systems—only three ports can be connected on AV 3200 systems due to cabling restrictions). The board is built around an 8 MHz Intel 80186 processor and contains 512 KB of on-board zero-wait-state RAM with parity. The hardware design allows for data to be transferred to and from the host system using either the dual-ported memory buffer or the 32-bit full duplex DMA circuitry. This board can handle two independent sync protocols simultaneously; however, initial software offerings will support only a single protocol. Aggregate throughput is 1.6 Mb/sec.

LAN Communications

Ethernet LAN communications are provided by the integrated Ethernet controller on the system board and the optional VLC (VME Ethernet LAN controller). Both controllers provide access to 10 Mbit/second IEEE 802.3 Ethernet LANs via a 15-pin sub-D connector. A drop cable and a standard Ethernet N-tap or a Thin Ethernet BNC-tap transceiver are required.

Hardware Support Services

Field Support Services

Data General Field Engineering supports AViiON systems with state-of-the-art service technology. We offer several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

The **On-Call Agreement** lets the customer select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. In conjunction with the terms of the basic agreement, users may also purchase additional options such as Extended On-Site Coverage, Enhanced On-Site Response and Critical Response.

The **Multiyear Plus Agreement** includes all the benefits of an On-Call Agreement and more. Signing a Multiyear Plus Agreement with a term of two to five years gives customers discounts of up to 10 percent over the life of their agreement.

The **Extended Warranty Service (EWS) Agreement** provides a low-cost alternative to on-site service and requires customer participation in the service effort. Data General provides telephone assistance through its Customer Support Center and provides any required parts. The customer is responsible for calling the Field Engineering Customer Support Center, assisting in problem diagnosis, returning the defective part to Data General, and reinstalling the replacement part provided by Data General.

For more information about service options, contact a Data General salesperson or call the Data General Field Engineering Telemarketing Group at 1-800-325-3065 (in MA, call 1-800-952-4300).

Warranty

AViiON Server Systems include a 90-day on-site warranty. Customers may take advantage of a warranty conversion option by signing a Multiyear Plus Agreement. With this agreement, warranty service will automatically be upgraded to contract service. This warranty covers all base system components as well as memory and controller boards. Mass storage peripherals and packages carry either a 90-day on-site, a one-year mail-in, or a one-year on-site warranty depending upon whether they are AViiON Server-specific, shared with AViiON workstations, or shared with MV/Family systems. Consult your Blue Pages for the correct warranty codes.

Ordering

System Packages

The AViiON 3200 is offered as systems packages that include a single CPU, 8 MB RAM, single disk and 150 MB cartridge tape. Table 3 lists the packaged systems and model numbers. Table 4 lists the available power suffixes. Additional memory or mass storage can be ordered as separate options.

<i>Model</i>	<i>Description</i>
G70142	8 MB, 16 MHz AV 3200 Base System, 332 MB Disk, 150 MB Tape VAC/16
G70143	8 MB, 16 MHz AV 3200 Base System, 662 MB Disk, 150 MB Tape, VAC/16
G70145	8 MB, 16 MHz AV 3200 Base System, 332 MB Disk, 150 MB Tape, VSC/3
G70146	8 MB, 16 MHz, AV 3200 Base System, 662 MB Disk, 150 MB Tape, VSC/3
G70149	8 MB, 16 MHz AV 3200 Base System, 332 MB Disk, 150 MB Tape
G70150	8 MB, 16 MHz AV 3200 Base System, 662 MB Disk, 150 MB Tape

Table 3. AV 3200 system packages.

<i>Suffix</i>	<i>Countries</i>
—	USA, Canada
1	Japan
5	UK, Hong Kong
6	Australia, New Zealand
7	France, Germany, Spain, Sweden
8	Italy
9	Denmark, Greenland
.0	Switzerland

Table 4. AV 3200 power options.

Memory Options

The system board can support a maximum of 16 MB of byte parity memory via 4 MB SIMMs. The base packages offer 8 MB—a maximum of two additional SIMMs may be added. Model numbers for these options are in Table 5.

<i>Model</i>	<i>Description</i>	<i>Max. #</i>
7000-K	4 MB Expansion Memory Module	2
7012-K	8 MB Expansion Memory Package *	1
Available only at time of system purchase.		

Table 5. AV 3200 System board options.

The integral and optional Ethernet controllers require a transceiver and drop cable. Table 6 lists the available options and model numbers.

Model	Description
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4540-A	Ethernet transceiver for connecting to thin ethernet cable, requires drop cable for connecting from the back of the system to the transceiver.
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables.
1326	5 foot Ethernet drop cable for connecting system to transceiver.

Table 6. Communications connectivity options.

Mass Storage

The AV 3200 Series chassis can support a maximum of four HH or one FH and two HH peripherals. Each package includes one disk drive (either 332 MB HH or 662 MB FH) and a HH 150 MB QIC tape. Table 7 lists the available options.

Model	Description
6577-J	150 MB QIC Tape add-on
6539-J	179 MB Disk add-on
6662-J	332 MB Disk add-on

Table 7. AV 3200 internal mass storage options.

Systems ordered with DG/UX and a disk will receive the operating system installed on the disk. Media and documentation must be ordered separately.

Cabling

NOTE: For asynchronous (or parallel) devices connected to VAC junction boxes, order devices with an X-suffix. Order cables separately. For devices attached to base-system ports (including system console), a bundled cable may be ordered.

Table 8 lists the model numbers for the AV 3200.

15340E010	10' async terminal cable (VAC/16 only)
15340E015	15' async terminal cable (VAC/16 only)
15340E025	25' async terminal cable (VAC/16 only)
10235	5' Centronics printer cable
1084M	Modem control (25') processor to modem
1084M-A	Modem control (10') processor to modem
1340-S	RS232 (5') processor to asynchronous device (including system console)
1340-T	15' processor to asynchronous device (including system console)
1340	15' processors to asynchronous device (including system console)
1340-A	50' processor to asynchronous device (including system console)

Table 8. AV 3200 cable options.

Important Ordering Notes

For a complete description of DG/UX and ordering information, please refer to the DG/UX MAPS/PLUS article on page 301-012.3.

To Order:

1. Select the system package that best fits your needs. Add the appropriate suffix for power.
2. Select memory, mass storage options as needed.
3. Each operating system license ordered MUST be itemized on the Program License Schedule 501 and purchase order.
4. Order appropriate software distribution and services' packages.

Related Information

See Table 12.

Title	Part Number
AV 3200 Product Brief	012-003773
AV 4000 Series Servers MAPS/PLUS	046-000982
DG/UX 4.20 MAPS/PLUS article	046-001013-02

Table 9. Related information.

Specifications

Processor:
Motorola 88100
16.67 or 25 MHz 88100 processor with integral FPU

Memory Management
Virtual memory
Two 88200 CMMUs; 4 GB per process

Caches
Data cache and instruction cache
Size: 16 KB per side
Organization: 4-way set associative

Main Memory
8 MB - 16 MB with byte parity
Expansion: 4-MB modules
Busses: 32-bit memory-to-cache; 32-bit cache-to-processor

Integrated I/O
IEEE 802.3 Ethernet LAN
Parallel Port
Two Serial Ports
SCSI
Bandwidth: 10 Mbits/sec
Centronics- and Data Products-compatible
RS-232 (one with modem control); baud rates up to 19.2 kilobaud
Asynchronous and synchronous operation

VMEbus Backplane
Motorola's VMEbus Revision C.1, ieee P1014 DRAFT 1.2
One 6U slots

Environmental
Temperature
Relative Humidity
Operating/Nonoperating:
0 - 38 °C / -40 - 70 °C
Operating/Nonoperating:
20 - 80% / 10 - 90%

Electrical
AC Voltage:
120V nominal (85-138 VAC)
220V nominal (187-276 VAC)

AC Frequency
47 - 63 Hz
Current draw
8 amps at 120Vrms
5 amps at 220Vrms
Power Supply
325 Watts

Physical
Dimensions:
24.75" high x 5.75" wide by 22" deep

Weight:
System Chassis:
59 lbs. fully loaded (with disks and tape)
Monitor:
approx. 60 lbs.

Peripherals

5.25" Winchester disks:
179 MB HH 5.25" SCSI
- 16ms average access time
- 4MB/s transfer rate (sync)
- 1.5MB/s transfer rate (async)
332MB HH 5.25" SCSI
- 14ms average access time
- 4 MB/s transfer rate (sync)
- 1.5MB/s transfer rate (async)

662MB FH 5.25" SCSI
- 18ms average access time
- 4MB/s transfer rate (sync)
- 1.5MB/s transfer rate (async)

Tape Drives:
150MB 5.25" HH QIC Cartridge tape
- Can read/write QIC 120MB;
can read QIC 40MB and 60MB
- 112KB/sec sustained data transfer rate
- Single-ended SCSI interface
- 2 GB 5.25" FH 8mm cartridge tape
1600bpi PE format reel-to-reel tape drive
- Auto-thread, auto-load, horizontal mount
- 25/100 ips selectable
- 160 KB/sec PE transfer rate (instantaneous)
- 6 to 10.5" diameter reels
- Single-ended SCSI interface
16 full-duplex RS-232C ports

VMEbus Asynchronous Controller

- 16 x 9600bps aggregate maximum transfer rate
- Motorola 68020 with 192 KB static RAM buffer, 128KB
- EPROM, 2 custom VLSI octarts
- 3 RS232/RS422 ports
VMEbus Synchronous Controller
- Intel 80186 with 512 KB RAM
64 KB dual-ported RAM



AViiON 100D Series Single-User Workstations

Fact Sheet

The AViiON 100D (AV100D) Series of single-user, monochrome workstations is designed for technical professionals. These new entry-level workstations deliver the performance and functionality of the AV300 Series workstations *for the price of a PC*.

Complete single-board system functionality

- Advanced, entry-level UNIX single-user workstation based on Motorola 88K RISC Processor running at 16.67 MHz clock speed
- Tightly coupled, on-chip Floating Point Unit
- Two 88200 Cache and Memory Management Units (CMMU) for improved performance (17 MIPS performance based on the Dhrystone benchmark)
- Complete, single board system in small desktop package
- Standard 8 MB memory in base package
- Can operate as a diskless node in a network
- 12 MB/sec Memory bus
- Advanced 32-bit RISC technology
- Packaged in the AV300 desktop package
- 4MB parity memory modules
- Memory expansion capability of up to 4, 4MB memory modules, for a total of 16MB (16MB board not available)
- Industry Standard SCSI interface for disk and tape units
- Three-button optical mouse with pad
- PC/AT-101 compatible keyboards

Graphics

- High performance, bit-mapped graphics with dedicated, dual ported display memory
 - Monochrome: 1280x1024x1 Displayable resolution
- High resolution, flicker-free 20" near flat monochrome monitor
- Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- Low-level graphics library
- Standard MIT distribution of X11 r3
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

External Mass storage/Tape back-up

- External mass storage uses the existing AV300 Series peripherals

Customer environment/use characteristics:

- Customer installable and maintainable
- Customer installable add-on memory and peripherals
- 40db (quiet office) noise levels
- One year mail-in warranty on all components

Communications

- Ethernet controller standard (without transceiver or drop cable)
- Thick or Thin net connections available
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud

Product Description

The AV100D is Data General's entry-level monochrome desktop workstation. It anchors the AViiON workstation line by providing aggressive pricing at the performance level of the AV300 workstations.

The AV100D Series is available in a single configuration: a monochrome system with 8 MB memory running at 16.67 MHz. The system board can accommodate up to 7 memory modules for a total 28MB of main memory.

Architecture

The AV100D Workstation is based on the existing AV300 architecture (see the AV300 MAPS/PLUS article beginning on page 202-3 for additional information). The AViiON Workstation system board consists of a single 16" x 16" multilayer PCB, which includes

- a 16.67 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- closely coupled, integrated floating point unit
- four connectors capable of holding up to four 4MB memory modules
- industry Standard SCSI interface for connecting peripherals such as disk and tape
- industry-standard 802.3 Ethernet interface (w/o transceiver)
- AT-compatible or Japanese AX-compatible keyboard interface
- mouse interface
- monochrome graphics controller
- two asynchronous interfaces - RS232 with full modem support

<i>Model</i>	<i>Description</i>
Packaged System	
Includes keyboard, monitor, and mouse - Without Disk	
70301	8MB System, 16 MHz, 20" Monochrome Monitor
70302	Japanese 8MB System, 16 MHz, 20" Monochrome Monitor
Options:	
7000	4MB memory expansion module.
7012	8MB memory expansion package
4512	Three-button optical mouse for use on AViiON workstations only. Includes optical pad.
6488	101/102 key AT-Style keyboard - REQUIRES LANGUAGE SUFFIX*
*See Table 2.	

Table 1. Model numbers

- monochrome graphics controller
- two asynchronous interfaces - RS232 with full modem support
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot

Peripherals

The AV100D Workstation is supported by the existing AV300 peripherals.

Graphics Hardware. The AV100 graphics hardware consists of an integrated monochrome controller. The monochrome controller is connected directly to the M-BUS on the main system board for maximum performance. The monochrome unit includes

- NEC uPD72120 Advanced Graphics Display Controller
- eight 256K video RAMS
- RS-343A monitor interface
- video timing logic
- addressable resolution of 1638 horizontal by 1024 vertical
- viewable resolution of 1280 x1024 with 614 x 1024 used as for off-screen storage of fonts or menus

Japanese Language Versions

The monochrome units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard and the ability to add an additional 4 Mbits of memory on the monochrome controller, the AViiON Workstation will allow customers to utilize the workstation for Japanese Language applications and environments.

Configurations/Ordering

The AV100D Workstation is offered as a packaged system without peripherals (see Table 1 for model numbers). The packaged system consists of

- the system chassis,
- 20" monochrome monitor,
- mouse, and
- keyboard.

Each system chassis includes

- a 16.67 Mhz system board,
- 8 MB of main memory,
- integral industry standard Ethernet LAN interface (IEEE 802.3),
- industry standard Small Computer Standard Interface (SCSI) for high performance I/O, and
- two (2) RS-232C async ports with full modem control.

You **must** order a transceiver (model 4540, 4540-A OR 4619) **and** a drop cable (model 1329) for each workstation that is to be connected to Ethernet (see Table 3).

<i>Suffix</i>	<i>Language</i>
-A	US English
-B	UK English
-C	French
-D	German
-S	Japanese—AX-compatible* (available only on the Japanese models)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish
* AX is the International standard for the Japanese Language	

Table 2. Language suffixes for keyboards.

<i>Model</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard Ethernet cable—requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to “thin” Ethernet cable—requires drop cable for connecting from back of the system to the transceiver (model 1329)
4619	Eight-port Ethernet transceiver for connecting up to eight Ethernet drop cables

Table 3. Ethernet transceivers.

Check with DG/Direct for Ethernet drop cables.

The external peripheral options use existing AV300 peripherals.

Ordering Workstations

1. Select the package that best fits your needs. Add the appropriate suffix for font and power.
2. Each license must be itemized on the Program License Schedule 501 and purchase order.
3. Order appropriate software distribution and service packages.

Related Information

<i>Part Number</i>	<i>Title</i>
012-003955	AViiON 100D Single-User Workstation Product Brief
014-001878	<i>Technical Notice for AViiON 3000 and 4000 Series Systems: Programming System Control and I/O Registers</i>
014-001879	<i>Technical Notice for AV 3000 and 4000 Series Systems: Programming System Control and I/O Registers</i>
014-001880	<i>Technical Notice for AViiON 200 Series Systems: Programming System Control and I/O Registers</i>
014-001881	<i>Technical Notice for AV 200 Series Systems: Programming System Control and I/O Registers</i>



Model 5069 Series VMEbus Vector Processors

Fact Sheet

These single precision (32-bit), 6U, board-level vector processors enhance performance when they do floating-point calculations on arrays of data. They have the power required by signal, image, seismic, and real-time processing applications.

Model 5069 vector processors embody a balanced combination of AViiON computing power, advanced microprocessor architecture, and the efficiency of communications between the vector processor and the host. Each vector processor can deliver a peak performance of 66 MFLOPS (million floating-point operations per second), and interconnect over VME to permit multiple board configurations for increased performance. These processors provide speed, memory, and I/O bandwidth at an impressive price/performance level.

- Vector processors for AViiON systems
 - Accelerate performance when performing floating-point calculations on arrays of data
 - Configurable with AViiON workstations and servers
- Advanced microprocessor architecture
 - Based on the one million transistor Intel i860 microprocessor
 - Parallel instruction execution
 - Provides real-time performance required for processing signal, image, and seismic information
 - Over 66 MFLOPS in a multi-board configuration
- Extensive scientific subroutine library
 - Contains nearly 100 hand-coded (rather than compiler-generated) arithmetic functions of both one- and two-dimensional algorithms, designed for speed
 - Includes vector math, matrix math, Fast Fourier Transforms, FIR/IIR filters, convolution/correlation, format conversions, logicals and signal generators
- Runs under advanced DG/UX operating system (rev. 4.3 or later)
- Fully integrated and supported by Data General

Sales Guide

By integrating this “attached” vector processor, Data General renews its commitment to a complete solution for customers who require increased MFLOPS performance in floating-point calculations on arrays of data. The actual improvement, of

course, depends upon the application and the interaction of the host computer with the vector processor(s).

When you perform three- and five-year cost-of-ownership analyses, you should position and configure these vector processors as part of the total system configuration. The selling strategy should include a price-to-performance analogy.

Customer Qualification

Table 1 describes some likely customers for the 5069 vector processor. See Table 2 to determine whether this vector processor is a viable solution for your customer. Some customers may benefit more from a supercomputer or mini-supercomputer solution, as you can see from Table 2.

Product Description

CPU

Model 5069 vector processors are based on the one million-transistor, 33Mhz, Intel i860 microprocessor. The i860 CPU is a single-chip, 64-bit RISC-based microprocessor. Using parallel instruction execution and super-computer architectural concepts, the i860 chip provides balanced high performance. Although the i860 that is part of the model 5069 is a 64-bit microprocessor, the Scientific Subroutine Libraries achieve only 32-bit, single precision performance.

Parallel execution units form the basis of the i860 performance. The RISC core unit, floating-point adder unit, and floating-point multiplier unit operate concurrently. An add, a multiply, and an integer instruction may run during each clock cycle.

The i860 chip “pipelines” instructions to further enhance its vector performance. Pipelined execution lets each unit complete an operation on every cycle. Software easily switches between vector (pipelined) and scalar (non-pipelined) modes.

On-chip data and instruction caches feed the execution units at 960 Mbytes per second aggregate bandwidth. Each cache is two-way set associative. The data cache uses the writeback technique for main memory update. Without the cache units,

<i>Application Type</i>	<i>Customer</i>
Digital signal processing <ul style="list-style-type: none"> • Sonar/Radar • Speech 	Defense labs/Defense contractors Speech research labs
Geophysical processing <ul style="list-style-type: none"> • Seismic processing • Well log analysis 	Oil companies Exploration firms Systems integrators
Image processing <ul style="list-style-type: none"> • Remote sensing • General image analysis • Industrial diagnostic imaging 	Research labs Defense agencies Contractors Manufacturers
Medical imaging <ul style="list-style-type: none"> • CAT, X-ray, MRI, PET • US, radiation therapy 	Medical imaging suppliers
Neural networks	Systems integrators
Simulation <ul style="list-style-type: none"> • Flight simulation • Sonar/Radar simulation • Mission planning 	Simulator manufacturers Various labs Defense contractors
Automatic test equipment <ul style="list-style-type: none"> • Mixed signal testers 	Manufacturers of equipment for semiconductor testing
Other instrumentation <ul style="list-style-type: none"> • Spectroscopy • Electron microscope • Vibration testers • Any instrument acquiring signals for analysis 	Instrument manufacturers End-users developing their own capability

Table 1. Vector processor customers.

single clock access to code and data at high clock frequencies would be impossible.

Integrating the caches, execution units, and pipelined/parallel architectural features on a single chip breaks through technology and performance barriers. A single chip design completely eliminates costly inter-chip communications overhead. The Intel i860 microprocessor opens the door to new levels of price/performance for the vector processing industry.

Memory

The Model 5069 series memory system is a one-, two-, or four-back page-interleaved design. The memory system feeds data into the i860 at 160 Mbytes per second (the architectural limit of the chip). By using low-cost DRAM chips and providing full-

speed access to main memory, these vector processors yield a cost-effective design that does not compromise performance.

Scientific Subroutine Library (SSL)

The SSL (a complete math library) contains nearly 100 arithmetic functions. It is divided into vector math, matrix math, Fast Fourier Transforms (FFTs), FIR and IIR filters, convolution and correlation, format conversion, logical, and signal generator categories. SSL functions operate on a variety of data types, including single precision, real, complex, and integer.

Model 5069 software minimizes call overhead, so the vector processor makes maximal use of its computational capabilities. A unique control technique completely eliminates driver calls from subroutine invocation and run-time management of the

<i>5069 Vector Processor Customer Characteristics</i>	<i>Super/Mini-Super Computer Customer Characteristics</i>
32-bit performance	64-bit performance
Single Precision Floating Point (Double Precision only for specific algorithms)	Double Precision Floating Point throughout
Real-time or specified response time	Non-real-time
Will accept code changes as an optimization tool	No code changes
90% of CPU time spent in less than 10% of the code	CPU time distributed
Easily vectorizable with subroutines (SSLs)	Vectorizing compilers, mixed scalar/vector
SSL performance, real-time response	Linpack, Livermore loops, large benchmarks
Subroutines, processing, efficiency, overhead	Compiler features, vectorization features/efficiency, OS ..etc
Specific repeatable tasks	Research - code changes frequently

Table 2. 5069 Vector Processor customer qualifiers.

vector processor. As a result, these vector processors realize a call overhead of a few microseconds when they start up one of the SSL functions.

The SSLs take full advantage of the vector processor's parallel and pipelined data path architecture to implement its math functionality. For maximum efficiency, the vector processor uses assembly language programming, yet can be accessed using simple subroutine calls in FORTRAN or C without any knowledge of the underlying assembly language. Compilers for the i860 microprocessor are not currently supported.

AViiON Integration

To take advantage of the processing power of these vector processors, an application must make calls to routines in the SSL. These routines are hand-coded (in assembly language) arithmetic functions that are designed to run on the i860. The SSL resides in the vector processor's memory (using about 1/2MB of memory). However, a program running on the host AViiON can easily direct the i860 to execute an SSL on a data buffer by using the shared memory capability of DG/UX.

At the start of an application, data buffers used by the application are memory-mapped into the vector processor's memory on the VME bus. When an application accesses its data in the primary memory, the virtual memory system automatically refers to that data in the vector processor's memory (the vector processor's system memory requires that additional swap space must equal the vector processor's memory size). Subsequently, data is exchanged between the AViiON and the vector processor in a manner that is transparent to the user, the application, and the i860.

Now that data is stored in the vector processor's memory, an application may invoke SSL routines on this data and read the results back out after processing has been completed. Additional subroutine libraries running on the AViiON are provided to facilitate the invocation of SSL routines on the vector processor.

From the user's and application's point of view, using the vector processor involves little more than making calls to routines in a highly optimized math run-time library. These calls execute automatically on a high-speed auxiliary processor. See Figure 1.

Configurations/Ordering

See Table 3 for model numbers.

<i>Model</i>	<i>Description</i>
5069AP2C†	VMEbus Vector Processor (for 9U-chassis AViiON systems) 2MB memory
5069AP2M	VMEbus Vector Processor (for 6U-chassis AViiON systems) 2MB memory
5069AP8C†	VMEbus Vector Processor (for 9U-chassis AViiON systems) 8MB memory
5069AP8M	VMEbus Vector Processor (for 6U-chassis AViiON systems) 8MB memory
†Model 7409 (a 6U to 9U adapter) is included with these models (see Figure 2).	

Table 3. Model numbers.

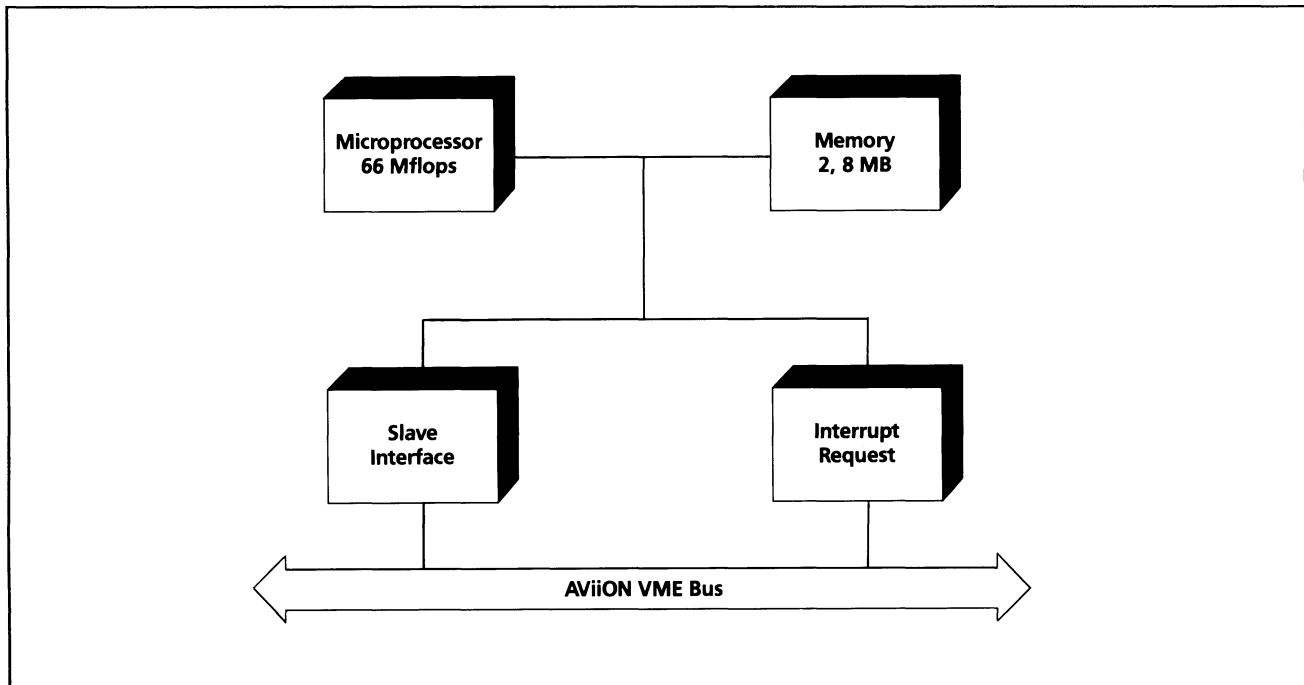


Figure 1. 5069 vector processor architectural block diagram.

The 5069 vector processor ships with the following software:

- Device driver
- Stub library
- Host support library
- Loader
- Scientific Subroutine Library (math libraries)
- Supervisor/Monitor
- Installation test program
- Diagnostics

Cabling

No internal or external cabling is necessary.

Specifications and Timings

Interface:	AViON VME Bus
Board slot(s):	One
Maximum Boards/Server:	Eight

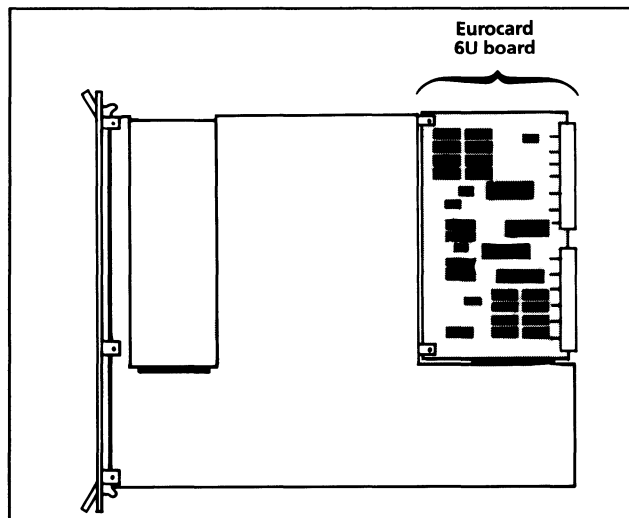


Figure 2. 6U to 9U adapter board.

NOTE: All times are given in milliseconds; they are 33MHZ, 66 MFLOPS estimates, and assume a vector length of 1,024.

Summary of 5069 Specifications and Timings

Processor:	
Floating-point peak performance	66 MFLOPS
Cycle time	30 ns
Multiply/Add per cycle	1 Multiply/Add
Internal memory access	132 MBytes/sec.
VME memory access:	
Single transfers (slave mode)	8 Mbytes/sec.
Block transfers (slave mode)	18 Mbytes/sec.
Block transfers (DMA mode)	18 Mbytes/sec.
Other:	
VME Interrupt Requester	
Performance:	
FFT (1K complex to complex, with bit reversal, cache to cache)	0.96 msec
FFT (1K complex to complex, with bit reversal, memory to memory)	1.2 msec
5069 Memory:	
Basic data memory	2 Mbytes
Expanded data memory	8 Mbytes
Data Formats:	
IEEE 32- and 64-bit floating-point	
16 and 32-bit integer	
Electrical/Mechanical:	
Power	4 amps @ 5 VDC
Size	233.4mm X 160.0mm (6U)
Environmental:	
Operating Temperature Range	10° to 45° C
Storage Temperature Range	-40° to 70° C
Scientific Subroutine Library:	
Routines including FFT, Convolve, IIR filters, complex and real vector arithmetic, maximum and minimum, format conversion, trigonometric and transcendental functions.	

<i>Function</i>	<i>Description</i>		<i>Timing</i>
XFCF/XFCI	FFT, complex forward/inverse	1024 pt.	1.22
	Memory to memory	512 pt.	0.56
		256 pt.	0.26
		128 pt.	0.116
XFCF/XFRI	FFT, real forward/inverse	2048 pt.	1.31
	Memory to memory	1024 pt.	0.61
		512 pt.	0.29
		256 pt.	0.129

Fast Fourier Transforms (FFT including bit reversal)

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XDCOR	Correlation (use XMOVK): $Y(K)=\text{SUM}(U(K+J-1)*\text{REAL}(CV(J)))$	1.1
XDCORD	Correlation with Decimation: $Y(K)=\text{SUM}(U((K-1)*IA+J)*V(J))$	1.1
XDCORI	Correlation with Indirect: $Y(K)=\text{SUM}(U(IU(1,K)+J)*V(IV(1,K)+J))$	4.5
XDCORK	Correlation: $CW(K)=V(K), Y(K)=\text{SUM}(U(K+J-1)*\text{REAL}(CW(J)))$	1.1
XDFL22	IIR Filter (2-pole, 2-zero): $Y(K)=U(K)+A(1)*U(K-1)+A(2)*U(K-2)-$ $A(3)*Y(K-1)-A(4)*Y(K-2)$	0.23
XDINTG	Integration: $Y(K)=U(K)+Y(K-1)$	0.097

Correlations, Convolutions, and Filters

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XVALN	Vector Antilog (exponent): $Y(K)=\text{EXP}(A*U(K)+B)$	0.83
XVATN2	Vector Arctangent: $Y(K)=(A/TWOPI)*\text{ATAN2}(U(K),V(K))+B$	1.00
XVCOS	Vector Cosine: $Y(K)=\text{COS}(A*U(K)+B)$	0.63
XVLN	Vector Logarithm: $Y(K)=A*\text{ALOG}(\text{ABS}(U(K)))+B$	0.72
XVSIN	Vector Sine: $Y(K)=\text{SIN}(A*U(K)+B)$	0.63
XVSINP	Vector Sine, Reduced range: $Y(K)=\text{SIN}(TWOPI*U(K)), -.25 < (K) < .25$	0.27

Trigonometric and Transcendental Functions

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XGINTS	Generate constant REAL vector: $Y((K-1)*YII+1)=A$	0.07
XRSMA	Sum absolute elements: $A=B*\text{SUM}(\text{ABS}(U(K)))$	0.17
XRSMSQ	Sum elements squared: $A=B*\text{SUM}(U(K)**2)$	0.07
XRSUM	Sum elements in vector: $A=B*\text{SUM}(U(K))$	0.04
XVAB	Absolute value of REAL vector: $Y(K)=A*\text{ABS}(U(K))+B$	0.20
XVCLIP	Clip vector within bounds: $Y(K)=\text{AMAX}(\text{AMIN}(U(K),A),B)$	0.33
XVCLR	Generate zero REAL vector: $Y((K-1)*YII+1)=0.0$	0.05
XVNEG	Negate REAL vector: $Y(K)=-Y(K)$	0.07
XVRMP	Generate REAL ramp vector: $Y(K)=B+(K-1)*C$	0.07

One-vector Arithmetic

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XCRMAI	Add COMPLEX vectors: $CY(IYU(1,I)+K)=CY(IYU(1,I)+K)+$ $A(IA(1,I)*CU(IYU(1,NI+I)+K)$	0.21
XCVADD	Add COMPLEX vectors: $CY(K)=CY(K)+CU(K)$	0.21
XCVSBX	Subtract COMPLEX vectors swapped: $CY(K)=CU(K)-CY(K)$	0.21
XCVSUB	Subtract COMPLEX vectors: $CY(K)=CY(K)-CU(K)$	0.21
XVAD	Add REAL vectors: $Y(K)=Y(K)+U(K)$	0.11
XVSAD	Add scalar to REAL vector: $Y(K)=A+Y(K)$	0.07
XVSB	Subtract REAL vectors: $Y(K)=Y(K)-U(K)$	0.11
XVSBX	Subtract REAL vectors swapped: $Y(K)=U(K)-Y(K)$	0.11
XVSMML	Multiply REAL vector by scalar: $Y(K)=A*Y(K)$	0.07
XVSQRT	Vector square root: $Y(K)=A*\text{SQRT}(\text{ABS}(U(K)))+B$	0.55

Two-vector Arithmetic

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XCCVML	Multiply Complex conjugate: $CY(K)=A*CONJG(CU(K))*CV(K)$	0.27
XCRMA1	COMPLEX scalar multiply and add: $CY(K)=A*CU(K)+B$	0.13
XCRMA2	COMPLEX two vector multiply/add: $CY(K)=A*CU(K)+B*CV(K)+C$	0.21
XCRML	Multiply COMPLEX by REAL vectors: $CY(K)=A*CU(K)*V(K)$	0.27
XCVMLS	Multiply COMPLEX vector by vector: $CY(K)=A*CU(K)*CV(K)$	0.27
XVDIV	Divide REAL vectors: $Y(K)=A*(V(K)+C)/(U(K)+B)$	0.30
XVMLS	Multiply REAL vector by vector: $Y(K)=A*U(K)*V(K)$	0.11
XVMVGT	Move greater vector: IF(U(K)-V(K) B) $Y(K)=A(1)*V(K)+A(2)$ ELSE $Y(K)=A(3)*U(K)+A(4)$	0.30
XVPOW	Power of COMPLEX vector: $Y(K)=A*(REAL(CU(K))**2+$ $IMAG(CU(K))**2)+ B*V(K)$	0.18
XVRCP	Reciprocal of REAL vector: $Y(K)=A/(U(K)+B)$	0.30
XVSMA1	REAL scalar multiply and add: $Y(K)=A*U(K)+B$	0.07
XVSMA2	REAL two vector multiply and add: $Y(K)=A*U(K)+B*V(K)+C$	0.11
XVTABI	Table Lookup with interpolation: Let $P=MAX(MIN(NV-1,A*U(K)+B),0),J=P,F=P-J$ $Y(K)=(1-F)*V(J+1)+F*V(J+2)$	0.63

Two-vector, three-argument arithmetic

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XCRDOT	Dot product of COMPLEX vectors: $CA=B*SUM(CU(K)*CV(K))$	0.02
XCRTDC	Dot product of Complex conjugate: $CA=B*SUM(CONJG(CU(K))*CV(K))$	0.20
XRDOT	Dot product of REAL vectors: $A=B*SUM(U(K)*V(K))$	0.07

Dot Products

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XCVCNJ	Complex vector move and conjugate: $CY((K-1)*YII+1)=CONJG(CU((K-1)*UII+1))$	0.14
XCVMOV	Move COMPLEX vector: $CY((K-1)*YII+1)=CU((K-1)*UII+1)$	0.14
XMOVK	Move filter vector (use w/ XDCOR): $CW(K)=U(K)$	—
XVMOV	Move REAL vector: $Y((K-1)*YII+1)=U((K-1)*UII+1)$	0.14
XVMOVI	Move REAL vector, indirect: $Y(IYU(1,I)+(K-1)*YII+1)=,0.23$ $U(IYU(1,I+NI)+(K-1)*UII+1),$	

Vector moves

<i>Function</i>	<i>Description</i>
X	$CA=CB*CC$
XCJMUL	Multiply COMPLEX by CONJUGATE: $CA=CONJ(CB)*CC$
XCRMUL	Multiply COMPLEX by REAL: $CA=RB*CC$
XCSADD	Add COMPLEX scalars: $CA=CB+CC$
XCSSUB	Subtract COMPLEX scalars: $CA=CB-CC$
XSADD	Add REAL scalars: $A=B+C$
XSDIV	Divide REAL scalars: $A=B/C$
XSMUL	Multiply REAL scalars: $A=B*C$
XSSUB	Subtract REAL scalars: $A=B-C$

Scalar Arithmetic

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XSFL4	Float INTEGER*4 scalar to REAL: $A=IB$	—
XSF4	Fix REAL scalar to INTEGER*4: $IA=B$	—
XVFL2	Float INTEGER*2 vector to REAL: $Y(K)=A*FLOAT(IU(K))+B$	0.13
XVFL4	Float INTEGER*4 vector to REAL: $Y(K)=A*FLOAT(IU(K))+B$	0.17
XVFX2	Fix REAL vector to INTEGER*2: $IY(K)=INT(A*U(K))+B$	0.13
XVFX4	Fix REAL vector to INTEGER*4: $IY(K)=INT(A*U(K))+B$	0.11

Format Conversion

<i>Function</i>	<i>Description</i>	<i>Timing</i>
XREQS	Find first element .EQ. scalar: IF (U(K)EQ. B) A=K-1	0.14
XRGES	Find first element .GE. scalar: IF (U(K)GE. B) A=K-1	0.14
XRGTS	Find first element .GT. scalar: IF (U(K)GT. B) A=K-1	0.14
XRLES	Find first element .LE. scalar: IF (U(K)LE. B) A=K-1	0.14
XRLTS	Find first element .LT. scalar: IF (U(K)LT. B) A=K-1	0.14
XRMX	Maximum element in REAL vector: A=AMAX(U(K))	0.14
XRMN	Minimum element in REAL vector: A=AMIN(U(K))	0.14
XRNES	Find first element .NE. scalar: IF (U(K)NE. B) A=K-1	0.14

Vector maximum/minimum

Related Information

<i>Part Number</i>	<i>Title</i>
012-003844	Model 5069 Series Product Brief



AViiON 530 Workstations

Fact Sheet

The AViiON 530 Series workstations extend the range of power and performance of the AViiON Workstation Family, offering advanced graphics features, industry standard I/O bus (VMEbus™), and a greater range of performance specifications. Housed in a compact desktop package with internal mass storage options, these single-user graphics workstations are designed for technical professionals who currently use traditional 32-bit high-end workstations. The AViiON 530 workstations are personal productivity tools manufactured by Data

General that incorporate the Motorola 88K RISC (Reduced Instruction Set Computer) technology.

The AViiON 530 Series workstations offer advanced 32-bit stand-alone or distributed computing capabilities for single-user graphics applications, contained on three separate daughter boards that connect to the base system board's MBUS and provide 24-bit or 8-bit color graphics, and an optional 24-Bit Z-buffer.

Table 1 summarizes the major features of the AViiON 530 Series workstations.

<i>Feature</i>	<i>Description</i>
Advanced single-user system	Based on Motorola 88K RISC processor running at 33 MHz clock speed. Tightly coupled, on-chip floating point unit (FPU) Two 88200 cache and memory management units (CMMU) for improved performance Dual processor option Support for symmetric multiprocessing in DG/UX Advanced 32-bit RISC technology Hardware support for Motorola's VMEbus (Revision C.1) Two 6U VMEbus slots in a compact, internal card cage
16 or 4 MB ECC parity memory	Memory expansion capability: up to eight 16 MB memory modules, for a total of 128 MB, in 8 or 32 MB increments.
Graphics	Choice of high performance, bit-mapped graphics with dedicated, dual ported display memory Color: 8/2 or 24/4 graphics controller High resolution, flicker-free 19" or 17" color monitors Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance Standard MIT distribution of X11 r4 or higher X Server, Xlib, XToolkit, X Clients PHIGS and GKS support through third party ISVs Compatible with AViiON 300 or 400 Series graphics OSF/Motif
Internal mass storage/ tape back-up	Desktop chassis can hold two 5 1/4" Full Height devices; or one 5 1/4" Full Height device and two 5 1/4" Half Height devices; or four 5 1/4" Half Height devices. The supported devices are: 2 GB Cartridge Tape Backup 5.25" FH SCSI 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 1.0 GB Winchester 5.25" FH SCSI 525 MB QIC Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI 1.2 MB 5.25" Diskette Disk HH SA4 50/SCSI Attractive, compact desktop packaging (24.75"H X 5.75"W X 22"D)

Table 1. AViiON 530 Series features (continued on next page).

<i>Feature</i>	<i>Description</i>
External mass storage/ tape back-up	External PHU (Peripheral Housing Unit) can support up to seven SCSI devices. Each housing can hold one 5 1/4" Full Height device and one 5 1/4" Half Height device or three 5 1/4" Half Height devices. The supported devices are 1.0 GB Winchester 5.25" FH SCSI 662 MB Winchester 5.25" FH SCSI 332 MB Winchester 5.25" HH SCSI 179 MB Winchester 5.25" HH SCSI 2 GB Cartridge Tape Backup 5.25" FH SCSI 150 MB QIC Cartridge Tape 5.25" HH SCSI 1.44 MB 3.5" Diskette Disk HH SA450/SCSI 1.2 MB 5.25" Diskette Disk HH SA450/SCSI 590 MB Eraseable 5.25" Optical Disk FH SCSI 600 MB CD-ROM 5.25" HH SCSI 525 MB QIC Tape 5.25" HH SCSI
Customer environment/ use characteristics	Customer installable Customer installable add-on memory, graphics options second CPU option and peripherals 40db (quiet office) noise levels Industry Standard SCSI interface for disk and tape (synchronous/asynchronous) Three-button optical mouse with pad PC/AT-101 compatible keyboards 90 day warranty on all system components
Communications	Ethernet interface standard (without transceiver or drop cable) Thick or Thin net connections available Four asynchronous (two RS232C interfaces—from 150 to 19,600 baud, plus mouse) Centronics line printer port Two synchronous interfaces (RS232 only)

Table 1. (con't) AViiON 530 Series features.

Product Description

The AViiON 530 Series workstations are deskside systems that provide the power and performance of a mainframe in an extremely small, compact package—the main chassis housing is only 24.75"H X 5.75"W X 22"D. These workstations are available in a wide range of configurations and with options for expandable graphics, memory, mass storage, and multi-CPU configurations. The base system board is available in 33 MHz performance range, with a second CPU option of 33 MHz. Memory is expandable from 16 MB to 128 MB with 16 or 4 MB ECC memory modules. Memory must be ordered/installed in pairs ie 8 and/or 32 MB.

Architecture

Processor. The AViiON 530 Series Workstation is based on the 88000 series of RISC processors from Motorola. The 88000 series is comprised of the 88100 RISC CPU, and two 88200 cache/MMU (Memory Management Unit) chips.

System board. The AViiON 530 Series Workstation system board consists of a single 18" X 12" multilayer PCB that includes

- a 33 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- a closely coupled, integrated floating point unit
- eight connectors capable of holding up to eight 16 MB ECC memory modules
- two MBUS connectors for connecting the second CPU and graphics options
- interface logic that supports Revision C.1 of the VMEbus
- industry standard SCSI interface for connecting peripherals such as disk and tape
- industry standard 802.3 Ethernet Interface (w/o transceiver)
- keyboard interface—AT-compatible and Japanese AX-compatible
- mouse interface
- two asynchronous interfaces—RS232 offering full modem support
- two synchronous interfaces
- parallel line printer interface (Centronics-compatible)
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot.

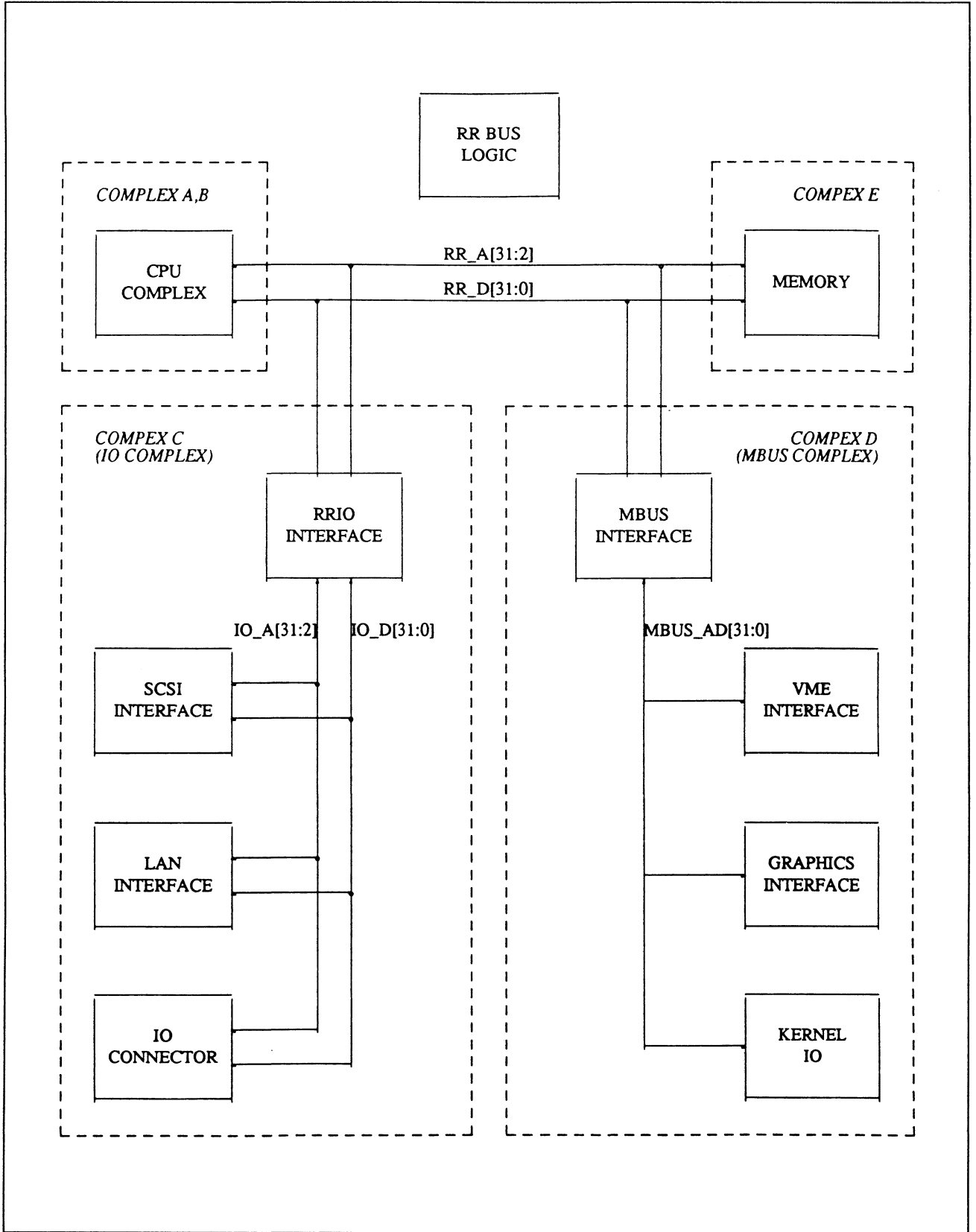


Figure 1. System Block Diagram

VMEbus

The VMEbus is one of the most popular 16/32-bit backplane buses on the market today. Its wide use in the technical market, its use of the Eurocard format, its high performance, and its versatility are some of the reasons that it appeals to a wide range of users. The AViiON 530 Series systems use the VMEbus because it is an industry standard bus that offers high performance at a reasonable price.

The VMEbus specification defines an interfacing system for interconnecting data processing, data storage, and peripheral control devices in a closely coupled hardware configuration. The VMEbus specification on the AViiON 530 systems conforms to Motorola's Revision C.1 VMEbus specification. The C.1 specification is a result of both the IEEE P1014 Standard Committee and the IEC 47b Standards Committee work. The C.1 specification has been approved by the IEEE P1014 Standards Committee as draft 1.2. It is presently undergoing the final stages of approval in both the IEEE and IEC.

The VMEbus specification provides for a mechanical as well as an electrical interface. The base mechanical specification defines the types of connectors, spacing between connectors, and physical layout of the backplane: the connectors are 96-pin female type, and in the AViiON 530, a separate 6U backplane provides two slots, each slot consisting of two 96-pin connectors called J1 and J2 (J1 is the upper one, and J2 is the lower). The power connection for the system board is also on the backplane.

The VMEbus incorporates the concept of a Master and Slave. The system board is considered a Master. VMEbus transactions are governed by a single bus master that is determined through an arbitration process. Bus arbitration is a mechanism that enables control of the data bus transfer (DTB) to be passed to one master in a group of masters, all of which are requesting use of the DTB. On the AViiON 530, the design allows for more than one Master.

On the AViiON 530, the internal high speed system bus is interfaced to the VMEbus. This interface provides a bi-directional data path between the two busses, performs the address decoding and bus arbitration. The MBUS/VMEbus interface provides an integrated link between the 8, 16, and 32-bit MBUS masters and slaves and the 8, 16, and 32-bit VMEbus masters/slaves. It also defines the bus arbitration mechanism.

Table 2 details the C.1 interface specifications and options and the level of implementation on the AViiON 530.

<i>Specification</i>	<i>Options</i>
Data Transfer Master:	D32, D16, DO8(EO) No UAT (Unaligned Address Transfer) A32, A24, A16 No Address only cycle RMW (Read Modify Write) No block transfer
Data Transfer Slave:	D32, D16, DO8(EO) No UAT: A32, A24 Address only cycle RMW Block transfer supported Decodes only 2 address bits along with 5 AM bits AM[5:0]
VMEbus Slot 1 Functions:	A 16 MHZ VMEbus system clock The IACK and VMEbus grant daisy chain driver The VMEbus/MBUS and MBUS/VMEbus time out logic are programmable The VMEbus arbitration time out logic 1 sec VMEbus watchdog timer (64 micro-sec.)
Type of VMEbus Arbiter:	All types selectable
Type of VMEbus Requester:	RWD (Release When Done)
Interrupt Registers:	IEN0 (Interrupt enable reg.) IEN1 IEN ALL Not Supported IST (Interrupt Status) SETSWI (Set Software Interrupt) CLRSWI (Clear Software Interrupt) ISTATE (Interrupt State Reg.) CLRINT (Clear Interrupt) VIACK1 (VMEbus Interrupt Acknowledge) VIACK2 VIACK3 VIACK4 VIACK5 VIACK6 VIACK7
Control Registers:	EXTAD supported EXTAM supported WHOAMI supported

Table 2. C1 Interface specifications and options

Peripherals

The AViiON 530 Series Workstation has a SCSI bus for connecting mass storage devices. The SCSI bus originates on the system board and provides connection for the internal storage

devices, then exits via the rear of the unit and terminates in a Champ connector for external Peripheral Housing Units.

In the main deskside chassis, space is available for two 5 1/4" Full Height devices or one 5 1/4" Full Height device and two 5 1/4" Half Height devices. Up to seven SCSI devices can be supported through the external PHU.

All external Data General peripherals for the AViiON 530 Series Workstation are mounted in the desktop PHU or CSS2/DC subsystem, which can accommodate a variety of storage and backup options. These options include

- a 1.0 GB 5 1/2" Full Height Winchester disk
- a 662 MB 5 1/4" Full Height Winchester disk with 16 ms access time,
- 332 MB 5 1/4" Half Height Winchester disk with 14 ms seek time,
- a 179 MB 5 1/4" Half Height Winchester Disk with 18 ms access time.
- 5 1/4" Half Height 525 MB cartridge tape drive conforming to industry standards, and
- 5 1/4" Half Height 150 MB tape (external only)

Each PHU can accommodate one full height and one half height units or three half height units.

In addition to the standard storage devices, Data General offers two diskettes; 1.44 MB 3.5" half-height and 1.2 MB 5.25" half-height. These diskettes offer industry standard format and compatibility with existing MS-DOS environments. The 1.44 MB diskette can read, write and format data in the 720KB diskette format. The 1.2 MB diskette is also read, write and format compatible with the 360KB diskette format. These diskettes have an interface called the SA450 which must be converted to the SCSI interface (a small converter board is packaged with the diskette). Mounted within the AViiON 530 chassis, the converter board can support up to two diskettes. When configured with the external PHU, the converter board can support up to two diskettes. The diskettes are available either with or without the converter board, but for use with the

AViiON 300, 400 or 530 systems, the first diskette must contain the converter board.

The SCSI bus has a maximum cable length of 19.6 feet (6 meters). The AViiON 530 Series chassis consumes 4.5 feet for the internal peripherals, leaving 15.1 feet for external peripherals, which will support configurations of up to two additional PHUs per workstation. The PHU contains a 125 watt power supply, internal fan, internal cabling (2.5 ft), and SCSI Bus terminator. The first SCSI cable from the chassis to the first PHU is different than the one used on the AV300 workstations.

Graphics Hardware

Graphics hardware for the AViiON 530 Series Workstation consists of either an 8-bit or 24-bit color controller contained on separate daughter cards that mount on the main system board through a 96 pin MBUS connector for maximum performance. The Z-buffer option is a separate daughter card that plugs into the graphics board.

8-Bit Color. The 8-bit color unit consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The design of the 8-bit color controller is compatible with the AViiON 300/400 Series 8-bit color controller (see Figure 3). The 8-bit color controller includes:

- sixty 256K dual ported video RAMS
- video timing logic
- color Look Up Table (LUT) for 256 displayable colors from a palette of 16.7 million combinations for the 8-bit color
- one 256-location LUT
- addressable resolution of 1536 X 1024
- double buffering: 2 x 4 Planes (16 colors displayable)
- 2-bits for overlay
- flat or Gouraud shading.

24-Bit Color. The 24-bit color unit consists of three special high density gate arrays for the display and control of the video display

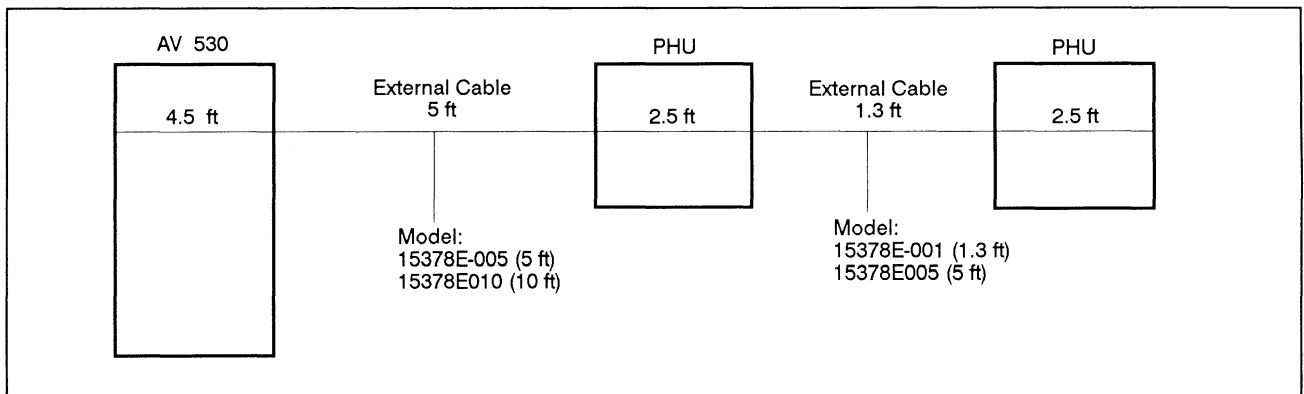


Figure 2. SCSI Cable length configurations

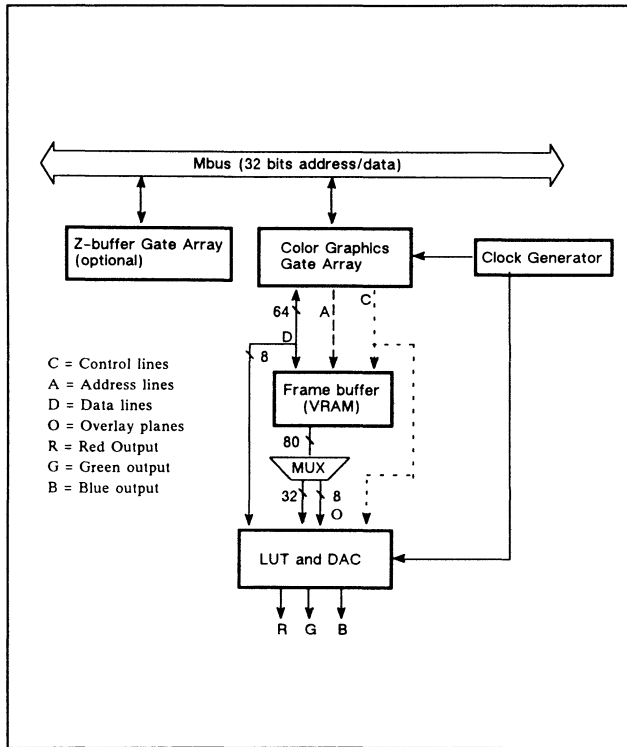


Figure 3. 8-Bit Color Graphics Subsystem

and video memory for the frame buffer (see Figure 4). The 24-bit color controller is compatible with the AV 400 and includes:

- fifty-six 1 MB dual ported video RAMS
- Video timing logic
- color Look Up Table (LUT) for 16.7 million displayable colors from a palette of 16.7 million combinations for true color representation
- three 256-location LUTs
- addressable resolution of 2048 X 1024
- 4-bits for overlay
- double buffering: 2 x 12 plane (4096 colors displayable)
- flat or Gouraud shading

24-Bit Z-Buffer. The Z-Buffer option consists of a special high density gate array for the display and control of the video display and video memory for the frame buffer. The 24-Bit Z-Buffer option provides greater accuracy and picture quality (than commonly used 16-Bit Z-Buffers) in performing hidden line and hidden surface removal. The Z-Buffer includes

- 256KB X 4 DRAMS
- programmable Hither and yon clipping planes

Japanese Language Support. The color units can be configured to support the Japanese language character set. With the availability of the Japanese AX-compatible keyboard, the AViiON 530 Series Workstation allows customers to use the workstation for Japanese applications and environments.

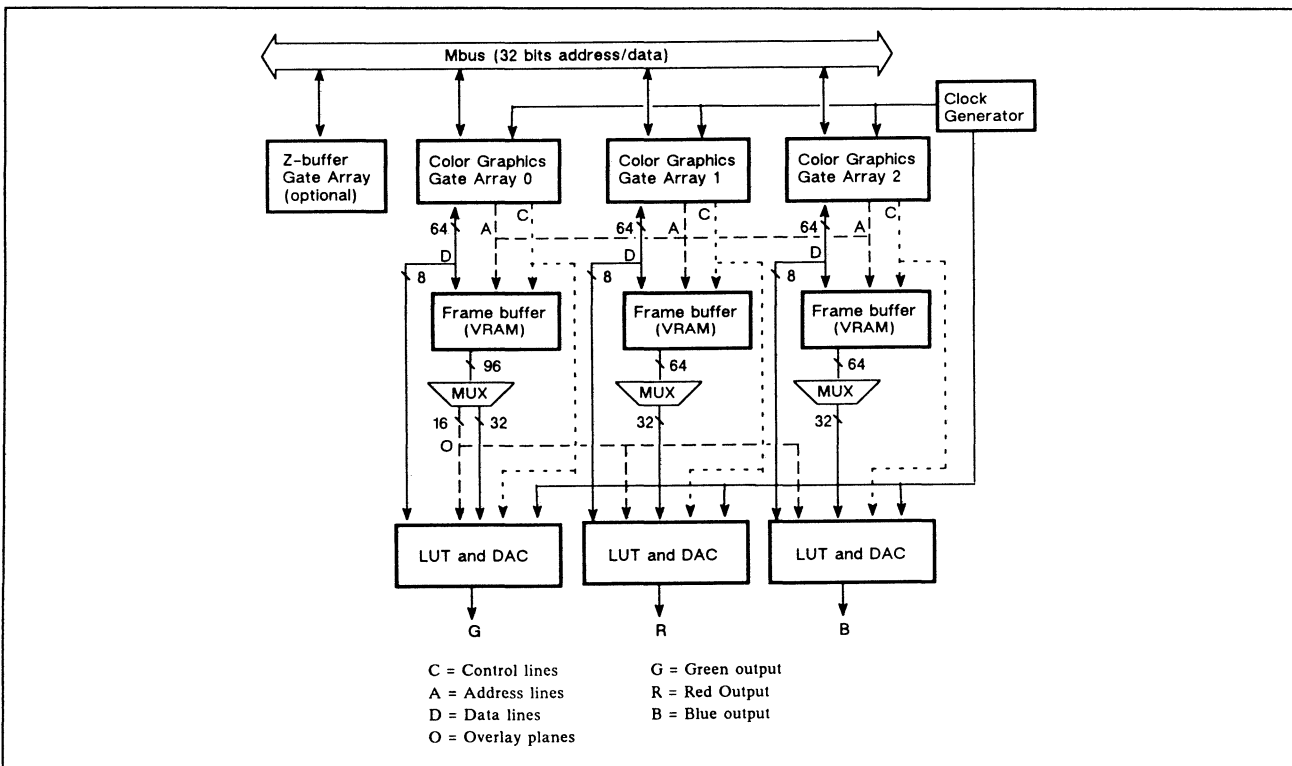


Figure 4. 24-bit Color Graphics Subsystem

Ordering

The AViiON 530 Series Workstations are offered as either Packaged Systems without graphics (graphics controller, monitor, mouse or keyboard), and with or without peripherals, an arrangement that allows for greater flexibility in configurations and ordering (see Tables 3 - 11). In addition, the open architecture design of the workstations allows customers to use keyboards and external peripherals that are compatible with the different industry standards supported. For example, the keyboard controller supports either AT-compatible or Japanese AX-compatible keyboards, and the SCSI interface supports SCSI-compatible peripherals.

Each system board includes:

- a 33 MHz CPU,
- hardware support for industry standard VMEbus (through the use of connectors on the system board),
- integral Ethernet LAN interface (IEEE 802.3),
- Small Computer Standard Interface (SCSI) for high performance I/O,
- four RS-232C async ports (2 serial, 1 mouse and keyboard)
- one parallel printer port (Centronix compatible)

The Graphics Packages include:

- 3-button optical mouse,
- keyboard,
- a 19" color monitor, and
- either an 8-plane or a 24-plane graphics controller.
(Sony 17" & 19" are offered from special systems)

Systems ordered with DG/UX and a disk have the operating system installed on the disk. Media and documentation must be ordered separately. The first system ordered (either a workstation or server) must include a 525 MB tape to hold the operating system (included in the event of a disk failure).

In configurations that include a disk but no tape drive, media (the tape with the operating system) will not be shipped with the system, as the operating system is pre-loaded on the disk. This could pose a problem with a system installed in a network on non-Data General systems. The operating system will be pre-loaded at the factory but in the event of a disk malfunction, it would be difficult to reload the operating system without the media.

NOTE: A transceiver (model 4540, 4540-A OR 4619) and drop cable (model 1326) are necessary for the workstation to be connected to an Ethernet LAN.

<i>Model Number</i>	<i>Description</i>
70338	16 MB, 33 MHz System
70358	16 MB, 33 MHz, 662 disk, 525 MB tape
70367	32 MB, 33 MHz, 332, 525 tape

<i>Model Number</i>	<i>Description</i>
70394	32 MB, 33 MHz System
70368	16 MB, 33 MHz System, 332 MB Disk, 525 MB tape
70366	32 MB, 33MHz System, 662 MB Disk, 525 MB tape

Table 3. Packaged Base System—without graphics, monitor, keyboard or mouse

<i>Model Number</i>	<i>Description</i>
7206	19" monitor, 8-Bit color Controller
G7208A	19" monitor, 24-Bit color Controller

Table 4. Graphics Package—includes keyboard, mouse, graphics controller and monitor

<i>Model Number</i>	<i>Description</i>
7202	8-Bit Color Controller
7203A	24-Bit Color Controller
7204	Optional 24-bit Z-buffer

Table 5. Board Level Components

<i>Model Number</i>	<i>Description</i>
7019	32 MB ECC Memory Package
7018	8 MB ECC Memory Package
G6487	19" Color Monitor
7021*	Second CPU upgrade 33 MHz
4512	3 Button Optical Mouse
G6488	101/102 key AT-Style keyboard—REQUIRES LANGUAGE SUFFIX

Table 6. Options

<i>Model Number</i>	<i>Description</i>
—A	US
—B	UK
—C	French
—D	German
—S	Japanese AX-compatible (AX is the international standard for the Japanese Language)
—G	Spanish
—I	Italian
—Y	Swiss
—N	Swedish/Norwegian

Table 7. Language Suffix for Keyboard

* add suffix S for factory installation at time of initial system order

<i>Model Number</i>	<i>Description</i>
G10565	PHU
G6605	662 MB Disk in PHU
G6603	179 MB Disk/150 MB Tape in PHU
G6600	179 MB Disk in PHU
	525 MB QIC Tape in PHU
G6591-A	2 GB Cartridge Tape 5 1/4" full height in PHU

Table 8. External Peripherals

<i>Model Number</i>	<i>Description</i>
G6677-E	525 MB QIC Tape add-on for PHU
6539-E	179 MB Disk add-on for PHU
6662-E	332 MB Disk add-on for PHU
6554-E	662 MB Disk add-on for PHU
G6591-E	2 Gbyte Cartridge Tape 5 1/4" full height for PHU
G6562-E	1.44 MB 3 1/2" half height Diskette Drive with SA450/SCSI converter
G6563-E	1.2 MB 5 1/4" half height Diskette Drive with SA 450/SCSI converter
G6562-EX	1.44 MB 3 1/2" half height Diskette Drive without SA450/SCSI converter
G6563-EX	1.2 MB 5 1/4" half height Diskette Drive without SA450/SCSI converter

Table 9. External Add-On Peripherals for PHU

<i>Model Number</i>	<i>Description</i>
G6677-F	525 MB QIC Tape add-on
6539-F	179 MB Disk add-on
6662-F	332 MB Disk add-on
6554-F	662 MB Disk add-on
6685-F	1.0 GB Disk add-on
G6591-F	2 Gbyte Cartridge Tape 5 1/4" full height
G6562-F	1.44 MB 3 1/2" half height Diskette Drive with SA 450/SCSI converter
G6563-F	1.2 MB 5 1/4" half height Diskette Drive with SA450/SCSI converter
G6562-FX	1.44 MB 3 1/2" half height Diskette Drive without SA450/SCSI converter
G6563-FX	1.2 MB 5 1/4" half height Diskette Drive without SA450/SCSI converter

Table 10. Internal Add-On Peripherals for the AV 530 Systems Chassis.

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the to the transceiver (model 1326)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1326)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver (Teflon)
15274E005	5 foot Ethernet drop cable for connecting workstation to transceiver (PVC)

Table 11. Ethernet options.

In addition, the AV530 power supply provides the following power for the system boards and peripherals mounted within the chassis. See table 12. The desktop Peripheral Housing Unit supplies its own power. When configuring systems, subtract the power for each component from the total power supplied. This is important for systems which have the maximum number of graphics options, memory, disk and tapes installed if third party VME boards are to be installed. For power calculation worksheet, see figure 5.

The AViiON 530 Series Workstation will also operate with any DG/UX supported general purpose printer.

To Order Workstations:

1. Select the package that best meets your needs. This will consist of a Base Package with a Graphics Package. Add the appropriate suffix for font and power.
2. Fill out the Program License Schedule 501 and purchase order. Remember to itemize each operating system license.
3. Order the appropriate software distribution and services' packages.

<i>MAX CURRENT PER DEVICE:</i>	+5V	+12V	-12V
<i>- Minimum Configuration -</i>			
AViiON 530 System board	16.00	1.00	0.50
CPU Complex (1)	2.50	0.00	0.00
4 MByte memory modules (2)	0.20	0.00	0.00
322 MByte Disk (WHIZ IV)	1.20	2.50	0.00
150 Mbyte Tape (BANSHEE)	1.50	1.50	0.00
<i>- Optional Added System Components -</i>			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
<i>CHECKING POWER SUPPLY LIMITS:</i>			
+5V max. A \leq 37 A ?	_____		
+12V max. A \leq 10 A ?		_____	
-12V max. A \leq 1 A ?			_____
+5V max. W (5 x amperes) \leq 185 W ?	_____		
+12V max. W (12 x amperes) \leq 120 W ?		_____	
-12V max. W (12 x amperes) \leq 12 W ?			_____
Total W \leq 317 W ?			_____

Figure 5. Power Calculation Worksheet for AV 530

	<i>CURRENT (Amperes)</i>			<i>WATTS</i>
	<i>+5V</i>	<i>+12V</i>	<i>-12V</i>	
System Board	16.00	1.00	0.50	98.00
CPU Complex	2.50	0.00	0.00	12.50
4 Mbyte SIMM (8)	0.80	0.00	0.00	4.00
16 Mbyte SIMM (8)	1.20	0.00	0.00	6.00
8 b/p Graphics	1.00	0.00	0.00	5.00
24+4 b/p Graphics	3.00	0.00	0.00	15.00
Z Buffer Module	0.50	0.00	0.00	2.50
VAC/16	3.00	0.25	0.15	19.80
VSC/3	3.00	0.10	0.06	16.92
VLC	2.50	1.00	0.00	24.50
322 MB Disk	1.20	2.50	0.00	36.00
662 MB Disk	2.00	4.00	0.00	58.00
1.5 GB Disk				
Whiz III 179 MB Disk	1.30	1.40	0.00	23.30
1 GB Disk	2.00	4.00	0.00	58.00
I 150 MB Tape	1.50	1.50	0.00	25.50
II 525 MB Tape	1.50	1.50	0.00	25.50
2 GB Tape	2.40	0.65	0.00	20.30
RW MO Disk	1.20	3.20	0.00	44.40
600 MB CD/ROM	1.60	1.80	0.00	29.60

Table 12. AV 530 Power Supply; maximum current and power.

Related Information

See Table 13.

<i>Document Description</i>	<i>Model Number</i>
AV 530 product brief	012-4036
Using System Diagnostics (RBOS)	014-001863
Setting Up, Starting, Expanding, Maintaining AViiON 530, AViiON 4600 Computers	014-002091
Setting Up and Installing VMEbus options in AViiON	014-001867
Installation Road Map	069-701084
Guide to AViiON and DG/UX System Documentation	069-701085

Table 13. Related Information.

Specifications**Processor:**

33 MHz Motorola 88100 processor with integral FPU
 Single- or dual-processor options
 Virtual Memory Management:
 Two 88200 CMMUs/CPU; 4 GB per process

Caches:

Data cache and instruction cache
 Size: 16 KB per side
 Organization: 4-way set associative

Main Memory:

16 MB—128 MB with ECC
 Expansion: 4 MB or 16 MB modules
 Increments: 8 or 32 MB
 Busses: 32-bit memory-to-cache; 32-bit
 cache-to-processor

Integrated I/O:

LAN—ETHERNET IEEE 802.3
 Bandwidth: 10 Mbits/sec
 Centronics-compatible Parallel Port
Four Serial Ports
 RS-232 (two with modem control, one for mouse)

 Baud rates up to 19.2 kilobaud
Asynchronous/Synchronous SCSI
 Bandwidth: 6.26 MB/s sync; 1.5 MB/s async.

Backplane:

Motorola's VMEbus Revision C.1
 IEEE P1014 Draft 1.2
 Two 6U slots

Graphics Processor:

8-plane gray-scale or color
 24-plane color
 24-bit Z-buffer

Monitors

Pixel aspect ratio: 1:1.
 Refresh Rate: 70 Hz flicker-free, 19" non-interlaced
 Pixel Rate: 125 MHz
 Controls: brightness, contrast

8-plane Color Monitor

Monitor Format : 19" landscape
 Displayable Res.: 1280x1024
 Addressable Res.: 1536x1024
 Colors Display: Single Buffered 256; Double Buffered 16
 Color LUT: 1 x 256
 Color Palette 16.7 million
 Overlay Planes: 2
 Z-buffer: 24-bit

24-plane color Monitor

Format: 19" landscape
 Displayable Res.: 1280x1024
 Addressable Res.: 1536x1024
 Colors Display: Single Buffered, True; Double Buffered
 4096
 Color LUT: 3 x 256
 Color Palette: 16.7 million
 Overlay Planes: 4
 Z-buffer: 24-bit

User Interface

Keyboard Style: 101/102-key PC-AT compatible
 Available keyboard versions: French German Italian,
 Japanese, Spanish, Swedish, UK, US
 3-button Optical Mouse

Environmental:

Operating/Nonoperating Temperature: 0 - 38°C/-40 -
 70°C
 Operating/Nonoperating Relative Humidity: 0 - 80%/10 -
 90%

Electrical

AC Voltage: 120V nominal (85-138 VAC); 220V
 nominal (187-276 VAC)
 AC Frequency: 47 - 63 Hz
 Current draw: 8 amps at 120Vrms; 5 amps at 220Vrms
 Power supply: 325 Watts

Physical Dimensions:

24.75" high x 5.75" wide by 22" deep
 System Chassis Weight: 59 lbs. fully loaded (with disks
 and tape)
 Monitor Weight: approx. 60 lbs.



AViiON 310 Series Single-User Workstations

Fact Sheet

The AViiON 310 (AV310D) Series of single-user, color workstations is designed for the commercial and technical professionals. These entry-level workstations deliver 20 MHz performance at a new entry price.

Complete single-board system functionality

- Advanced, entry-level UNIX single-user workstation based on Motorola 88K RISC Processor running at 20 MHz clock speed
- Tightly coupled, on-chip Floating Point Unit
- Two 88200 Cache and Memory Management Units (CMMU) for improved performance (23 MIPS performance based on the Dhystone benchmark)
- Complete, single board system in small desktop package
- Standard 8 MB memory in base package
- Can operate as a diskless node in a network
- 80 MB (theoretical) memory bus
- Advanced 32-bit RISC technology
- Packaged in compact desktop package
- 4MB or 16MB parity memory modules
- Memory expansion capability of up to seven, 4MB or 16MB memory modules, for a total of 112MB
- Industry Standard SCSI interface for disk and tape units
- Three-button optical mouse with pad
- PC/AT-101 compatible keyboards

Graphics

- High performance, bit-mapped graphics with dedicated, dual ported display memory
 - Color 1280x1024x10 (8 bit plus 2 O/L) displayable resolution
 - 256 colors from a palette of 16.7 million
 - RS 343A monitor interface
 - Addressable resolution of 1638 x 1024
- Tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- Low-level graphics library
- Standard MIT distribution of X11 r4
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

External Mass storage/Tape back-up

- External mass storage using standard SCSI peripherals.

Customer environment/use characteristics:

- Customer installable and maintainable
- Customer installable add-on memory and peripherals (see attached chart)
- 40db (quiet office) noise levels
- One year mail-in warranty on all components

Communications

- Ethernet controller standard (without transceiver or drop cable)
- Thick or Thin net connections available
- Two asynchronous, RS232C interfaces - from 150 to 19,600 baud

Product Description

The AV310D is Data General's entry-level color desktop workstation. It anchors the AViiON workstation line by providing aggressive pricing and high performance at the color entry level.

The AV310D is available in the configurations outlined in attached tables.

Architecture

The AV310D Workstation system board consists of a single 16" x 17 1/2" multilayer PCB, which includes

- a 20 MHz Motorola 88100 RISC CPU and two 88200 CMMUs
- closely coupled, integrated floating point unit
- seven connectors capable of holding up to seven 4MB or 16 MB memory modules
- industry Standard SCSI interface for connecting peripherals such as disk and tape
- industry-standard 802.3 Ethernet interface (w/o transceiver)
- AT-compatible or Japanese AX-compatible keyboard interface
- mouse interface
- color graphics controller
- two asynchronous interfaces - RS232 with full modem support
- time-of-boot clock and calendar
- power-up diagnostics and auto netboot

<i>Model</i>	<i>Description</i>
Packaged System Includes keyboard, monitor, and mouse - Without Disk	
70346	16MB System, 20 MHz, 19" Color Monitor
70215	8MB System, 20 MHz, 19" Color Monitor
Packaged System With 322 or 662 MB Disk and PHU (no tape)	
70352	16 MB System, 20 MHz, 19" Color w/332 Disk in PHU
70354	16 MB system, 20 MHz, 19" Color w/662 Disk in PHU
70232	8 MB System, 20 MHz, 19" Color w/332 Disk in PHU
70240	8 MB System, 20 MHz, 19" Color w/662 Disk in PHU
Options:	
7014	16 MB memory expansion Module
7000	4MB memory expansion module
7012	8MB memory expansion package
4512	Three-button optical mouse for use on AViiON workstations only. Includes optical pad.
6488	101/102 key AT-Style keyboard - <i>REQUIRES LANGUAGE SUFFIX*</i>
-X Model numbers are available for systems w/o keyboards	

Table 1. Model numbers

<i>Model Number</i>	<i>Description</i>
-A	US
-B	UK
-C	French
-D	German
-S	Japanese AX-compatible (AX is the international standard for the Japanese Language)
-G	Spanish
-I	Italian
-Y	Swiss
-N	Swedish/Norwegian

Table 2. Language Suffix for Keyboard

<i>Model Number</i>	<i>Description</i>
G10565	PHU
G6605	662 MB Disk in PHU
G6603	179 MB Disk/150 MB Tape in PHU
G6600	179 MB Disk in PHU
G6602	150 MB Tape in PHU
G6591-A	2 GB Cartridge Tape 5 1/4" full height in PHU

Table 3. External Peripherals

<i>Model Number</i>	<i>Description</i>
6577-E	150 MB QIC Tape add-on for PHU
6677-E	525 MB QIC Tape add-on for PHU
6539-E	179 MB Disk add-on for PHU
6662-E	332 MB Disk add-on for PHU
6554-E	662 MB Disk add-on for PHU
G6591-E	2 Gbyte Cartridge Tape 5 1/4" full height for PHU
G6562-E	1.44 MB 3 1/2" half height Diskette Drive with SA450/SCSI converter
G6563-E	1.2 MB 5 1/4" half height Diskette Drive with SA 450/SCSI converter
G6562-EX	1.44 MB 3 1/2" half height Diskette Drive without SA450/SCSI converter
G6563-EX	1.2 MB 5 1/4" half height Diskette Drive without SA450/SCSI converter

Table 4. External Add-On Peripherals for PHU

You must order a transceiver and a drop cable for each workstation.

<i>Model Number</i>	<i>Description</i>
4540	Ethernet transceiver for connecting to standard ethernet cable, requires drop cable for connecting from the back of the to the transceiver (model 1329)
4540-A	Ethernet transceiver for connecting to "thin" ethernet cable, requires drop cable for connecting from the back of the system to the transceiver (model 1329)
4619	Eight port Ethernet transceiver for connecting up to eight Ethernet drop cables
1326	5 foot Ethernet drop cable for connecting workstation to transceiver (Teflon)
15274E005	5 foot Ethernet drop cable for connecting workstation to transceiver (PVC)

Table 5. Ethernet options.

Configurations/Ordering

The AV310D Workstation is offered as a packaged system with or without peripherals (See Table 1 for model numbers). The packaged system consists of

- the system chassis,
- 19" color monitor,
- mouse,
- keyboard, and
- a peripheral package where designated.

Each system chassis includes

- a 20 MHz system board,
- 8 MB of main memory (or 16 where stated),
- integral industry standard Ethernet LAN interface (IEEE 802.3),
- industry standard Small Computer Standard Interface (SCSI) for high performance I/O, and
- two (2) RS-232C async ports with full modem control.

You *must* order a transceiver (model 4540, 4540-A OR 4619) *and* a drop cable (model 1329) for each workstation that is to be connected to Ethernet (see Table 3).

Ordering Workstations

1. Select the package that best fits your needs. Add the appropriate suffix for font and power.
2. Each license must be itemized on the Program License Schedule 501 and purchase order.
3. Order appropriate software distribution and service packages.

Related Information

<i>Part Number</i>	<i>Title</i>
014-001886-01	Setting up and starting and maintaining your AV100/210/310 workstation
069-701085	AViiON and DG/UX System Guide
014-001809-00	881100 User Manual (RISC)
014-001808-00	881100 User Manual Cache/Memory

Specifications

Processor:

- Motorola 88100
20 MHz 88100 processor with integral FPU

Memory Management

- Virtual memory
2 88200 CMMUs; 4 GB per process

Caches

- Data cache and instruction cache
Size: 16 KB
Organization: 4-way set associative
Cycle time: 50 ns

Main Memory

- 8 MB - 112 MB with parity
Expansion: 16-MB memory SIMMS
Buses: 32-bit memory-to-cache; 32 bit
cache-to-processor

Integrated I/O

- II LAN - ETHERNET
IEEE 802.3
Bandwidth: 10Mbits/sec-
- Serial Ports: two one wall RS-232/422 with modem
control; baud rates up to 19.2 kilobaud
- SCSI
Asynchronous/Synchronous

Graphics Processor

- Color
Custom graphics processor

Monitors

- Pixel aspect ratio
1:1
- Refresh Rate
70 Hz, flicker-free

- Pixel Rate
125 MHz
- Controls
Brightness, contrast

Color

Monitor Format	19" landsc.
Displayable Res.	1280x1024
Addressable Res.	1536x1024
Colors Display	256
Color Palette	16.7 mill.
Overlay Plane	2

User Interface

- Keyboard
Style: 101/102-key PC-AT compatible
Available versions: French, German, Italian, Japanese,
Spanish, Swedish, UK, US
- Mouse
3-button optical

Environmental

- Temperature
Operating/Nonoperating: 0-55°C/-40-70°C
- Relative Humidity
Operating/Nonoperating: 0-80%/10-90%
- Electrical
AC Voltage: 120V nominal (85-138 VAC)
220V nominal (187-276 VAC)
AC Frequency: 47-63Hz
Power Supply: 78 Watts

Physical

- Dimensions:
16" x 17.5" x 2.5" (front); 3.5" (back)
- Weight
18.25 lbs.

Commonly used Peripherals

- 5.25 SCSI peripheral housing



AV6280 and AV8000-8 High Availability Servers

Fact Sheet

This article is an addendum to the AV5200+/6200 Servers MAPS/PLUS article (046-001191-06). It also references the H.A.D.A. II Disk Array Subsystems MAPS/PLUS article (045-001442).

The AViiON 6280 is the new high-end system in the 62XX family of rack-mounted servers, providing eight 25MHz 88100-based CPUs in a 20-slot chassis. The 6280 provides a straightforward upgrade path for 62XX customers by supporting most VME controllers and memory boards used in current systems. The AV8000-8 is a packaged system that includes a 6280 CPU and H.A.D.A. II subsystem, with optional UPS. Applications running under DG/UX 5.4 run without change on 6280 systems.

AViiON 6280 systems can deliver up to twice the throughput of 6240 systems on commercial benchmarks (such as TPC-A, TPC-B and AIM III) when properly configured. For multi-programming compute-intensive applications, the AV6280 can deliver over 3000 jobs/week as measured by the SPECint_rate92 benchmark (see Table 1 for comparisons among the 62xx series servers).

- Eight 25Mhz Motorola 88100 CMOS/RISC CPUs.
- New two-level cache design providing 64KB of instruction cache and 64KB of data cache per CPU and a secondary cache of 1MB per CPU pair, for a total of 5MB of cache per system.
- Dual memory buses provide double the memory bandwidth of 6240 systems.
- Intelligent interrupt-steering by VIO (VME I/O) board shares interrupt load evenly across all CPU boards.
- High performance dual-channel SCSI-2 controller for improved performance and increased disk storage.
- 11 VME I/O slots.
- AV/Alert service supports machine-initiated diagnostic calls to DG response center and remote service by DGC personnel.
- Supports H.A.D.A. II and original H.A.D.A. disk arrays.
- Supported by DG/UX 5.4.2, a new high-performance release tuned for 8-way SMP and faster TCP/IP and NFS operations.
- Compact package allows CPU and 20GB of disk storage to be configured in a single 59" cabinet.

	AV 6225	AV 6240	AV 6280
Packaging	Rack-mount	Rack-mount	Rack-mount
VME slots	18	18	11
Max. memory	832MB	768MB	768MB
Async connects	1275	1275	1275
VTC max	6	8	8
LAN max	6	8	8
Synch bds/ports	6/24	12/48	8/24*
Max. SCSI ctnrs/channels	8/16	8/16	8/16
Max. disk capacity	>300GB	>300GB	>300GB
Max. cartridge tapes(525MB/DAT/8mm)	4	4	6
Max. reel-to-reel tapes	4	4	4
*Synch support will be available in early Q1FY93 and will offer three ports per controller.			

Table 1. Comparison of 62XX servers.

Product Description

The AViiON 6280 server can be configured to address a wide range of applications in multi-user or network modes. The AV 6280 can support 600-800 users in typical commercial applications. User counts achieved in customer environments will vary widely from this estimate, depending upon the applications.

CPU complex

The eight CPUs are implemented on four identical boards that contain the following functions:

- Two 88100 CPUs
- Four 88204 cache controllers
- A 1MB second level cache
- Cache snoop filter
- Cross-bar switch for access to dual memory buses

A fifth board contains the system global logic, which includes such things as console interface, boot PROM, AV/Alert support, parallel printer interface (Centronics compatible), interrupt-steering logic, time-of-day clock & timers, NOVRAM for configuration data and error log, and VME interface logic.

To double the memory bandwidth to the eight CPUs, the memory bus is split into two parts (odd and even addresses), and the memory slots are paired. This results in a slightly different backplane at the CPU/Memory end, and necessitates a chassis swap when upgrading.

The system cannot be configured with fewer than eight CPUs. As with the current 62XX systems, there is no ability to recover from a CPU failure by deconfiguring a failed CPU.

Memory

Four slots are reserved for standard 62XX memory boards, but the smaller (16MB, 32MB, 48MB) boards are not supported. Memory boards must be configured in pairs of matching boards. See Table 2 for valid memory configurations.

<i>Boards</i>	<i>Total</i>
2x64MB	128MB
2x128MB	256MB
4x64MB	256MB
2x192MB	384MB
2x64MB 2x128MB	384MB
4x128MB	512MB
2x64MB 2x192MB	512MB
2x128MB 2x192MB	640MB
4x192MB	768MB

Table 2. Legal memory configurations.

Memory Upgrades

Smaller boards can be upgraded to 128MB or 192MB (see Table 3).

<i>Model</i>	<i>Upgrade Path</i>
UMA1664	16MB (7001) to 64MB (7015)
UMA16128	16MB (7001) to 128MB (7016)
UMA16192	16MB (7001) to 192MB (7017)
UMA64128	64MB (7015) to 128MB (7016)
UMA64192	64MB (7015) to 192MB (7017)
UMA128192	128MB (7016) to 192MB (7017)

Table 3. Memory upgrades.

I/O Controllers

The following I/O controllers are offered in new 6280 systems:

- SCSI-2 controller (model 7421-W or 7422-W) (Ciprico Brushfire)
- Dual-channel SCSI-2 controller (7430)
- VTRC VMEbus Token-Ring controller (model 7416-W)
- VTC VMEbus Terminal controller (model 7425-W)
- VLC VMEbus LAN controller (model 7405)
- VDA/255 VMEbus Distributed Asynchronous Controller (model 7418-W)
- H.A.D.A. IOP (model 7417-W)

Note that for customers upgrading from 10-slot chassis (e.g. 5225) to the 20-slot 6280, new internal cables will be required for the "-V" versions of these controllers to convert them to the equivalent "-W" model. Refer to Table 2 for internal cable numbers.

The controllers listed in Table 4 will *not* be supported in any configuration, and should be replaced with the corresponding second-generation controller. These controllers are not supported because their replacements offer higher performance and higher reliability.

Synch support will not be qualified for the 6280 and AV8000-8 systems until early Q1FY93. Contact the 6280 Helpdesk if you need to configure synch hardware.

Controller Upgrades

Older controllers may be upgraded by ordering the upgrade model numbers shown in Table 5.

All SCSI peripherals must be mounted in a CSS2 chassis. The PHU, CSS2/DC and CSS2/DA are *not* supported on 6280 systems.

SCSI peripherals

The following mass-storage peripherals are supported in new 6280 systems:

- 520MB HH 5.25" disk (model G6796-G)
- 1.0GB FH 5.25" disk (model G6685-G)
- 1.4GB FH 5.25" disk (model G6716-G)
- CD-ROM (model G6629-G)
- 590MB FH rewritable optical disk (model G6627-G)
- 5.25" HH floppy disk (model G6563-GX)
- 3.5" HH floppy disk (model G6562-GX)
- 525MB QIC cartridge tape (model G6677-G)
- 2GB 8mm tape (model G6591-G)
- 2GB 4mm DAT tape (model G6762-G)
- reel-to-reel tapes (models 6586/7 and 6588/9)
- Opstar jukeboxes (Opstar products will be qualified in phases. Some models may not be available at 6280 FCS, but will be available within 90 days. Contact AViiON Product Marketing for details.)

The following disks and tapes in CSS2 chassis are also supported in upgrade configurations:

- 332MB HH 5.25" disk (model 6662-G)
- 662MB FH 5.25" disk (model 6554-G)
- 150MB QIC cartridge tape (model G6577-G)

All H.A.D.A. configurations are supported in upgrade configurations.

Unsupported Peripherals

The following peripherals are *not* supported in any configurations:

- 1.066GB ESDI disk (model G6541-#, G6542-#)
- 179MB HH 5.25" SCSI disk (model G6539-G)
- SMD and ESDI disks from older AV 5000/6000 series packages

<i>Model</i>	<i>Description</i>
UCVDA255A	VDA/128 (7401) to VDA/255 (7418-W)
UCVDA255B	VAC/16RM (7406) to VDA/255 (7418-W)
UCD7421	SCSI controller (7407-W or 7415-W) to SCSI controller (7421-W or 7422-W)

Table 5. Controller upgrades.

Upgrade Philosophy

A major goal of the 6280 product is to support hardware upgrades from 6240 systems in an 8-hour shift or less, to minimize disruption to production systems. To achieve this goal, the following strategy is implemented:

1. The software upgrade to DG/UX 5.4.2 will be performed prior to the hardware upgrade. If possible, the software upgrade should be performed a week prior to the hardware upgrade to verify that the customer's applications run correctly on 5.4.2 and that the 5.4.2 update has been correctly installed.

<i>Existing Model</i>	<i>Replacement</i>
VSC/4 (7404-W)	not qualified till Q1FY93
VDA/128 (7401)	VDA/255 (7418-W)
VAC/16RM (7406)	VDA/255 (7418-W) or VTC(7425-W)
SCSI controller (7407-W, 7415-W)	Dual-channel SCSI-2 controller (7430) or SCSI-2 (7421-W/7422-W)

Table 4 Controllers not supported.

2. The 6280 chassis will always be shipped in a 59" cabinet, and the old 6240 chassis and cabinet will be returned to DGC. This speeds the swap-out and eliminates the time-consuming chassis swap and associated heavy lifting.
3. Any additional peripherals ordered with the upgrade will be tested in the 6280 chassis before shipment.
4. Any CSS2 chassis in the old cabinet will be moved to the new cabinet. This is easily done since the CSS2 is mounted on slide-rails.
5. For information on ordering upgrades, see the section Ordering Upgrades below.

Packaging

The 20-slot chassis has a 1750 W power supply in a NEMA-standard, 28" high 19" wide form factor. It offers 11 VMEbus I/O only slots, and four memory-only slots. There are no PEX-bus slots. Two I/O slots can support the H.A.D.A. IOP controller. The chassis is installed in a standard 59" (1.5m) cabinet. Due to the high power requirements, the system is only available in 240V 50/60Hz power configurations.

The 6280 is available in a minimal configuration for a la carte orders entry-level competitive bidding, as well as in more typical disk array configurations that should meet the needs of 80% of customers, based on current AV6240 and AV8000 configurations. The AV8000-8 packages can be expanded into very high availability packages by adding uninterruptible power supplies and redundant IOPs and SCSI controllers.

The 6280 is the first AViiON system to require a CD-ROM for DG/UX software distribution, and as a result is always configured with at least one single-ended CSS2 chassis. Typically, the customer will order additional backup devices such as 8mm or DAT tapes to provide high volume backup for the large disk configurations found on 6280 and AV8000-8 systems. One DAT tape is included in each packaged system that contains a disk array, and the DAT is configured in the CSS2 on the second channel of the dual-channel SCSI 2 controller. Not all products will be initially available on CD-ROM. The AV8000-8 packages all include a QIC tape and a CD-ROM.

The bulkhead design of the 6280 and AV8000-8 is identical to that of the 6240. The AV8000-8 packaged systems will include a 7612-W bulkhead sub-panel which can support the following combinations of mass-storage:

- Two H.A.D.A. IOPs **OR**
- One H.A.D.A. IOP and three dual-channel SCSI-2 controllers (connected to H.A.D.A. II disk arrays or CSS2 chassis) **OR**
- Up to six dual-channel SCSI-2 controllers (connected to H.A.D.A. II disk arrays or CSS2 chassis).

The SCSI-2 controller (7421/7422) connects to the four SCSI cutouts on the main bulkhead. If additional 7421/7422 controllers are configured, a 7611-W subpanel will be configured. Please refer to the 6240 MAPS and 6240 section of the pricebook for more information on configuring bulkhead panels.

With the introduction of new H.A.D.A. II packages, the H.A.D.A. will no longer be offered in packages. However, the 6280 does support the H.A.D.A.

<i>Model</i>	<i>Description</i>
US6262A	AV 6200 to AV 6280, 20-slot, 59" cabinet
US6262B	AV 6225 to AV 6280, 20-slot, 59" cabinet
US6262C	AV 6240 to AV 6280, 20-slot, 59" cabinet

Table 6. Upgrade model numbers.

Model G70536 is for bidding purposes only. Do not quote this system as it contains an inadequate amount of memory for real applications. Add-on memory is attractively priced when configured with the system using the 7015S, 7016S and 7017S memory boards.

Models G70536 through G70541 are the basis of all "typical" configurations. They offer a very competitively priced High Availability system with excellent performance and growth potential. These packages are designed to simplify ordering of 6280 systems by providing a common base package that meets the minimum requirements of 80% of sales orders. You will typically have to add some components to this system, but not a lot. The H.A.D.A. II disk array subsystems will be supported on future 88110 systems and provide excellent investment protection for AViiON customers.

<i>Model</i>	<i>Description</i>
G70536	6280 CPU, 2x64MB memory, dual-channel SCSI-2 controller, single-ended CSS2 chassis, 1.4GB disk, QIC525 tape, CD-ROM, 20-slot chassis, 59" cabinet.
G70537	6280 CPU, 2x128MB memory, dual-channel SCSI-2 controller, single-ended CSS2 chassis, 1.4GB disk, QIC525 tape, CD-ROM, 20-slot chassis, 59" cabinet.
G70538	6280 CPU, 2x192MB memory, dual-channel SCSI-2 controller, single-ended CSS2 chassis, 1.4GB disk, QIC525 tape, CD-ROM, 20-slot chassis, 59" cabinet.
G70540	AV8000-8 package, comprising 6280 CPU, 2x128MB memory, dual-channel SCSI-2 controller, CSS2 chassis, 1.4GB disk, DAT tape, QIC525 tape, CD-ROM, 20-slot chassis, 59" cabinet, H.A.D.A. II subsystem with 2x2.5GB array groups and 2x525MB add-on drives.
G70542	AV8000-8. Same as G70540, but with 2x192MB memory.
Power suffixes: -F, -F1, -F2, -F4	

Table 7. Standard packages.

Power Considerations

After configuring memory and controllers, check that sufficient current is available on the +5V supply. Table 9 provides updated information on the current draw of all controllers and options for the 6280 systems.

Cooling

The heat output from a fully configured 6280 and associated H.A.D.A. II chassis will require some air conditioning. The BTU ratings are shown in Table 8.

<i>Component</i>	<i>BTU/hr</i>
Fully configured 6280	5950
20GB H.A.D.A. II array	2050

Table 8. Output.

Cabling

The dual-channel SCSI-2 controller uses a new connector scheme that provides a higher density connector with a smaller space requirement. As a consequence, all H.A.D.A. packages include a 10' universal SCSI cable (suitable for single-ended or differential configurations) connecting the SCSI-2 controller to the first IOP in the H.A.D.A. II; the packages also include 5' universal SCSI cable to connect the CSS2 to the second channel of the SCSI-2 controller. To order additional universal cables use the model number 15396EXXX, where XXX is 005, 010, 020 and denotes the length of the cable in feet.

The 7421-W SCSI controller uses the older style Champ connector and the existing 15378EXXX cables. Where

the 7421-W controller is structured in a package (model G7XXX1), a 15378E005 cable is also included.

All systems include a 25' RS232C system console cable (15339E025), and a 25' RS232C cable (1340) for the disk array console.

Service Strategy

The 6280 and AV8000-8 are positioned as high-powered systems likely to replace mainframes in downsizing situations, or as very large enterprise servers which must provide high availability during business hours. In order to guarantee high availability, it is mandatory that AV/Alert services be implemented. AV/Alert provides the following benefits to the customer:

- Immediate notification to Data General of any impending device failure by observing soft error rates on memory and peripherals.
- Recording of and notification to Data General of all system outages and the reason for them, including the identification of a failing FRU. This enables DGC to dispatch a field engineer with the correct part to fix the problem.
- Lifetime monitoring of both hardware and software reliability in customer situations. This enables us to better understand failure rates and failure modes, so that we can improve hardware and software reliability. It is a cornerstone of our commitment to improving product quality.

AV/Alert provides absolute security under the customer's control, and met the exacting security requirements of the US Army Reserve in the the recent RCAS bid.

For AV/Alert to be operational from the day of installation, you must have the customer install a telephone line and modem in the computer room. FE sets up AV/Alert and has the customer define passwords for access to the system by remote diagnostic engineers. The AV/Alert system never allows direct access to the system, it always calls back to a phone number that the customer and the field engineer enter into non-volatile RAM.

Ordering Upgrades

To quote and order an upgrade system, observe the following procedures to ensure maximum customer satisfaction.

1. Pre-site inspection

Conduct a pre-site inspection with your FE and SE to document the existing configuration. Enter the information on a CCIS form. To facilitate ongoing upgrade planning and coordination, record the name of the SE and FE on the CCIS. The special upgrade CCIS form for 6280 orders is available from CPD (Tim Mahan:DGC) or from the 6280 Helpdesk (see below).

2. Order internal cables on CCIS (if necessary)

The upgrade kit includes includes two new H.A.D.A. internal cables and additional bulkhead panels for all 20-slot upgrades. For 10-slot upgrades, you must upgrade all the internal cables for existing controllers. The cable model numbers are listed in table 5. Enter these model numbers on the CCIS form in the section provided.

3. Order updated memory on CCIS

Existing memory boards will need ECOs, but the cost of the ECOs is included in the upgrade. To simplify configuration testing, memory boards will be shipped with all systems, even if the customer already owns the correct memory configuration. To order updated memory boards to replace existing memory boards, specify them on the CCIS form in the space provided. FE will return the lower revision boards to CPD for rework.

4. Order additional memory on the quotation

To order additional memory boards, order them normally as line items on the quotation. Remember: memory boards must be paired as in Table 1. If the existing system has odd boards, say a 128MB board and a 64MB board, and the customer wishes to double the memory

configuration, order an additional 128MB and 64MB board on the quotation and replacement 128MB and 64MB boards on the CCIS, OR consult the memory upgrade models above and upgrade the boards to an appropriate size.

5. Order additional controllers and peripherals on the quotation

6. Calculate rack & power requirements

Fill out the rack space configuration for the existing configuration, and for the new configuration on pages 2 & 3 of the CCIS form. The upgrade configuration includes a G11211 cabinet.

7. Submit CCIS & Quote for advanced configuration checks.

We strongly recommend that you take advantage of support for pre-quotation checking. The 6280 product management team will verify your proposed configuration and pricing and give you a response by the next business day. Mail your CCIS and Quotation to **6280 Upgrades:IMG024**.

8. Ensure customer is on a software contract

The 6280 requires DG/UX 5.4.2. Customer will receive this revision only if they have a software contract that includes SSS.

9. Upgrade software license

10. Prepare for AV/Alert services

If the customer does not currently have AV/Alert service (also known as SMART), advise him/her of the need to order a telephone line and modem for remote diagnostic support. The line and modem must be installed before the upgrade can be installed.

<i>Board/option</i>	<i>+5V DC</i>	<i>+12V DC</i>	<i>-12V DC</i>
Max Current Available	250	22	6
CPU Complex	117.0	0.020	0.020
64MB memory	9.0	0	0
128MB memory	9.2	0	0
192MB memory	9.5	0	0
SCSI-2 controller (7421/2)	3.5	0	0
Dual-channel SCSI-2 (7430)	4.0	0	0
H.A.D.A. IOP	12.0	0	0
VLC	2.8	0.45	0
VDA/255	5.2	0	0.050
VTC	3.0	0.150	0

Table 9. Current requirements for AViiON 6280 boards (Amperes)

<i>Controller</i>	<i>Description</i>	<i>Internal Cable</i>
7405-V	LAN	005-039499
7425-V	VTC/255	005-039499
7416-V	VTRC	005-038653
7404-V	VSC/4	005-038517
7418-V	VDA/255	None required
7417-V	H.A.D.A. IOP	005-038546
7417A-V	DUAL PORT IOP	005-038546
7421-V	S-E SCSI (Brushfire)	005-038541
7422-V	D-E SCSI (Brushfire)	005-038541

Table 10. Internal cables to convert 10-slot controllers to 20-slot form

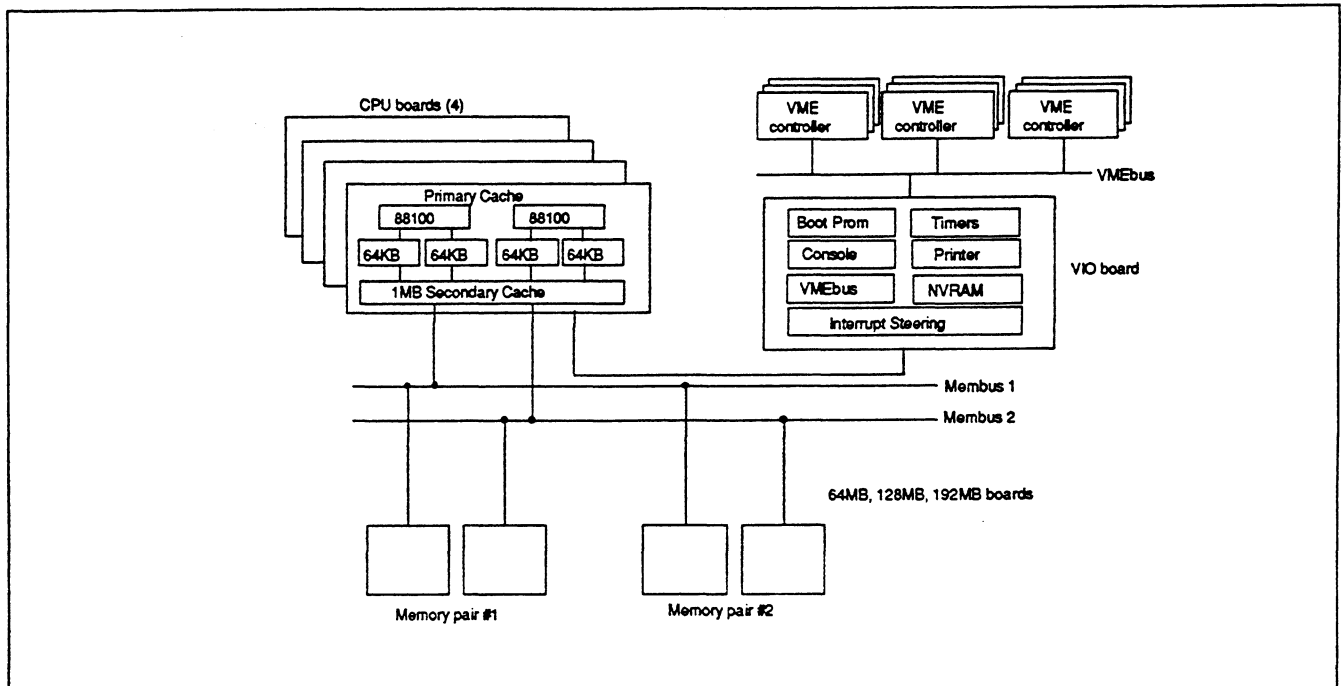


Figure 1. System architecture.

11. Ensure proper environment is ready prior to installation.

The system requires 240V power and certain amount of cooling. It is the customer's responsibility to ensure that these are provided prior to computer installation.

If the user count is being increased beyond the existing DG/UX user count, order a DG/UX upgrade. Ensure that the customer is aware of the need to upgrade other layered products, be they Data General or third-party products.

For Additional Information

For additional information on packaging, cables and specifications, refer to the AViiON 5200+/6200 Servers MAPS article. All power and space requirements are identical to those for 20-slot 6240 systems.

If you need help in configuring 6280 and AV8000-8 systems and can't find the information you need in MAPS, send a CEO message to "6280 Helpdesk:IMG024". We will respond within one business day to your questions.

Specifications

Power

Voltage Range	200v-240 VAC, +/-10%, 47-63Hz, single phase
Current Rating	12A (max) @ 200V
VA Rating	2,500 VA (max)
Input Watts	1,750 Watts (max)
Power Factor	.70 (typical)

BTU/Hour (Worst Case)

20-slot CPU chassis	5950
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Other

Same as other 62XX systems. Refer to AViiON 5200+/6200 Servers MAPS/PLUS (046-0011911-06)

AViiON 550 Workstations

Fact Sheet

The AV 550 workstation offers competitive price/ performance in a compact desktide package. It is designed to meet the requirements of 2-D graphic applications such as geographical information systems, mapping, and information management and retrieval. It's also an ideal software development platform for Open Enterprise applications.

- Support for Symmetrical Multi-Processing (SMP)
 - Single and dual CPU configurations available
 - Motorola 88110 40MHz microprocessors with 16KB on-chip cache (8KB data, 8KB instruction) and 256KB secondary cache per processor
- 256MB of ECC memory via industry standard SIMMs
 - 16MB, 64MB or 128MB increments supported
- Integrated SCSI-2, Ethernet, synchronous port, three asynchronous ports and one parallel port
- One I/O Option daughterboard slot with 8-bit color graphics, zero with 24-bit color graphics option
- Two 6U VME slots provide I/O expansion capacity
- Tightly-coupled graphics architecture
 - 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- 3-button optical/mechanical mouse
- PC/AT-101 compatible keyboard
- DG/UX 5.4 Release 3 or later provides full support for system features
- Attractive, efficient packaging for office environments with large disk configurations

<i>Item</i>	<i>Maximum</i>
CPU's	2
Memory	256MB
Disk	92GB
Ethernet LANS	4
SCSI Channels	3
Sync boards/ports	2/7

Table 1. Configuration maxima.

Product Description

System Packaging

The AV 550 is housed in a compact, desktide package. Two removable half height media bays (one 5.25" and one 3.5") support a variety of disk and tape options. The 5.25" bay is used for either a load device (CD-ROM or QIC tape) or for a non-load removeable media device such as an 8mm backup tape. The 3.5" bay can be used for a floppy diskette or DAT or for an additional hard disk. Three fixed half height media bays are located behind the front panel. These support all AViiON 3.5" SCSI disks. Connectors for system board, daughterboard and VMEbus I/O controllers are accessible from the rear of the chassis.

Table 2 details internal storage devices.

<i>Bay(s)</i>	<i>Qty.</i>	<i>Devices</i>
5.25" removable media bay	1	CD-ROM, QIC tape (load), 8mm tape
3.5" removable media bay	1	DAT, 1.44MB diskette, hard disk
3.5" fixed mass storage bays	3	hard disks

Table 2. Internal mass storage configurations.

System Board

The AV 550 system board integrates all the functions required for most workstation installations, saving customers the expense of additional I/O controllers. See Figure 1 for an illustration of the system board architecture. The board features:

- 40MHz 88110 CPU, 88410 cache controller and 256KB cache
- Connector for second 40MHz CPU complex
- Twelve connectors for industry-standard SIMMs
- Fast (10MB/sec), single-ended SCSI-2 interface
 - Operates at 5MB/s if external devices are attached
- 10Mbit/sec Ethernet interface (AUI connector)
- Three asynchronous RS-232 ports (DB-25F connectors)

- Synchronous port (DB-25F connector)
 - 64Kbps maximum throughput
 - Electrically compliant with RS-232C
 - Support for AViiON X.25 and IBM communications software
- Centronics-compatible parallel port (unidirectional)
- One I/O option daughterboard slot with the following available options (if 8-bit graphics is configured):
 - Ethernet
 - Dual channel single-ended or differential SCSI-2
- 24-bit graphics option
 - Uses space occupied by I/O option daughterboard slot
- VME interface
 - Non-block mode interface
 - Supports AViiON 6U communications controllers

Memory

The AV 550 Workstation supports 256MB of ECC memory via 4MB, 16MB, and 32MB SIMMs. All SIMMs are based on 80ns DRAMs.

The system board has twelve memory slots divided into three banks of four SIMMs each. Banks must be filled completely (that is, SIMMs must be added four at a time). Memory increments are 16MB (four 4MB SIMMs), 64MB (four 16MB SIMMs) and 128MB (four 32MB SIMMs). The 128MB increment (32MB SIMMs) may be installed only in the third bank and requires that the other two banks be already populated. Valid memory configurations are shown in Table 3.

Graphics

The graphics option boards provide high-performance, bit-mapped graphics with dedicated dual-ported display memory. A tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance. Key features of the graphics subsystem include

- 256 colors from a palette of 16.7 million
- Eight or twenty four color planes and two overlay planes
- Addressable frame buffer of 2048x1024 pixels
- Displayable resolution of 1280x1024 pixels
- Standard MIT distribution of X11 r5
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

The AV 550 uses the same 8-bit graphics engine as is used by the AV 500 and therefore graphics performance will be similar between the two products.

The AV 550 24-bit option uses three of the 8-bit graphics engines on a single card. No Z-buffer option is available.

<i>Bank 1 (Slots 1-4)</i>	<i>Bank 2 (Slots 5-8)</i>	<i>Bank 3 (Slots 9-12)</i>	<i>Total</i>
16MB	Empty	Empty	16MB
16MB	16MB	Empty	32MB
16MB	16MB	16MB	48MB
64MB	Empty	Empty	64MB
64MB	16MB	Empty	80MB
64MB	16MB	16MB	96MB
64MB	64MB	Empty	128MB
64MB	64MB	16MB	144MB
16MB	16MB	128MB	160MB
64MB	64MB	64MB	192MB
16MB	64MB	128MB	208MB
64MB	64MB	128MB	256MB

Table 3. AV 550 memory configurations.

I/O Option Daughterboards

The AV 550 supports Ethernet LAN controller or dual channel SCSI-2 controller (Host Bus Adapter) in 8-bit systems. No I/O option daughterboards may be configured in 24-bit systems.

The Ethernet daughterboard supports thin Ethernet, thick Ethernet, and 10Base-T via external transceivers. The peak transfer rate is 10Mbits/sec.

The SCSI-2 daughterboard supports two channels, which can be configured independently as single-ended or differential.

- External *differential* SCSI-2 connections are capable of fast (10MHz), wide (16-bit) operation attaining 20MB per second throughput.
- Fast, narrow (8-bit) differential operation at 10MB per second throughput is configurable by using a converter cable provided with the optional SCSI board.

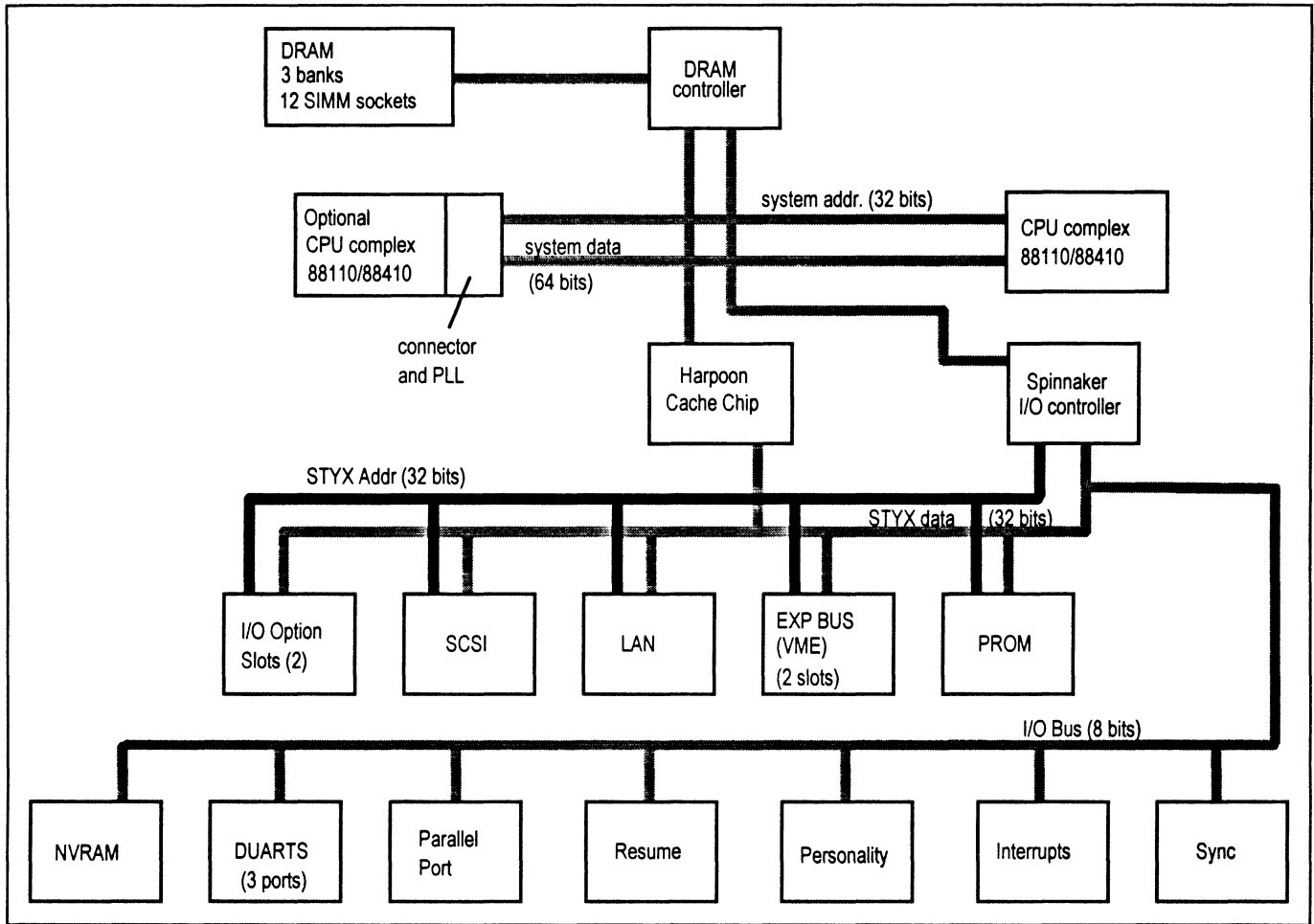


Figure 1. AV 550 system board architecture.

- Single-ended external SCSI-2 channels available on the optional SCSI-2 board are 5MHz, narrow (8-bit) only (5MB/sec).

Data General's implementation of SCSI-2 does not currently support addressing beyond eight devices.

VMEbus

Two 6U VME slots are available for I/O communications controllers. This implementation complies with revision C.1 of the VME specification. The C.1 specification is the result of the IEEE P1014 Standard Committee and the IEC 47b Standard Committee.

The AV 550 VME does not support block-mode (256byte block) transfers. This feature is not required for most communications controllers.

Supported devices include (all max. 2 unless otherwise noted):

- VLCi Ethernet controller
- VSC/3i Synchronous controller
- VFC FDDI Controller (max. 1)
- VTRC Token Ring controller
- VTC terminal controller
- VDA/255 asynchronous host adapter
- VAC/16 asynchronous multiplexor

The 7430-K SCSI-2 controller is not supported since it requires a VME bus which supports block mode. The Model 7435 I/O Option Dual Channel SCSI-2 Controller should be used to support external SCSI peripherals.

DG/UX

The AV 550 is supported by DG/UX Revision 5.4.3 or higher. Earlier releases are not supported. Binary compatibility with 88100 AViiON workstations requires that code be compiled with DG/UX Revision 5.4 or higher. Any ap-

plications compiled with DG/UX 4.3.4 or earlier must be recompiled with 5.4 to run on AViiON 88110 workstations.

DG/UX is not bundled with the AV 550. A license for the appropriate user count should be ordered as a separate line item. If the license is on the system release, DG/UX will be pre-loaded on the disk at the factory.

Configurations/Ordering

This section contains information on models, supported devices, and configurations on the AV 550 workstation. *This information is summary in nature and subject to change. The AViiON Product/Price catalog and electronic quote systems must always be used to verify actual configurations.*

Minimum Workstation

The Model G70494 base AV 550 workstation includes 16MB of memory, 520MB disk, 8-bit color graphics daughter card, 17" color monitor, keyboard, and 3-button optical/mechanical mouse in a deskside package. Options are available to substitute 24-bit color graphics, 19" color monitor, larger memory (for example, 64MB for 16MB), or larger disks (for example, 2GB for 520MB). Add-on CPU, memory, mass storage, and I/O controller options are also available.

All AV 550 workstations ordered with DG/UX have DG/UX installed on the disk. Customers are strongly encouraged to order media and a load device, in the event there is a disk malfunction and the operating system must be reloaded.

CPU Configurations

The first processor resides on the system board. A second processor may be added via a user-installable daughtercard (CPU complex).

Graphics Configurations

The AV 550 base workstation includes 8-bit color graphics and 17" color monitor. A 19" color monitor may be substituted for the 17" color monitor via a replacement option. Twenty-four bit color graphics may be substituted for the eight bit color graphics via a replacement option. The 24-bit option uses both available daughter board slots.

Model	Description
CPU	
7033	Second CPU Complex
Upgrades	
UW558GA	AV5500 to AV550 8-bit upgrade (graphics, monitor, kybd, mouse)
UW5524GA	AV5500 to AV550 24-bit upgrade
Graphics	
R7326	Replace 8-bit with 24-bit graphics
R7302	Replace 17" color monitor with 19"
Memory	
7034	16MB memory option
7035	64MB memory option
7043	128MB memory option (only valid in Bank 3; Banks 1 and 2 must both be populated with either 16MB or 64MB memory options)
R7327	Replace 16MB memory with 64MB memory
I/O Cards	
7435	Dual SCSI-2 channel (fast/wide) daughterboard
7436	Ethernet daughterboard
Mass Storage	
GR7306	Replace internal 520MB disk with 1GB
GR7307	Replace internal 520MB disk with 2GB
61000-SL	520MB 3.5" disk add-in
G6802-L	1GB 3.5" disk add-in
G6841-L	2GB 3.5" disk add-in
G6629-L	CD-ROM 5.25" add-in
G6760-L	10GB 8mm 5.25" tape add-in
G6677-L	525MB QIC tape 5.25" add-in
G6762-L	2GB 4mm DAT 3.5" tape add-in
G6880-L	1.44MB floppy 3.5" diskette add-in

Table 4. Option Models for AV 550.

Memory

Twelve SIMM slots are available on the system board—divided into three 4-slot banks. A bank must be filled with the same capacity SIMMs in each slot.

Available memory increments are 16MB (four 4MB SIMMs), 64MB (four 16MB SIMMs), and 128MB (four 32MB SIMMs). The 16MB and 64MB options may be used in any bank. The 128MB option may only be used in the third bank. For a 128MB module to be configured in Bank 3, Banks 1 and 2 must be filled with other memory. See Table 3 for sample configurations. Base workstations have 16MB of memory. A substitution option is available to replace the 16MB with 64MB.

Mass Storage

AV 550 workstations support mass storage internally in the CPU chassis or externally in a standalone office chassis.

All mass storage devices are connected to the system via SCSI-2 channels. Both single-ended and differential channels are available — up to three channels total. The SCSI-2 channels available are:

- A standard SCSI-2 interface on the system board connects to the internal device bays in the AV 550 chassis and to external devices. This SCSI-2 channel is a single-ended, fast (10MHz), narrow (8-bit) channel capable of 10MB/s throughput. *If external devices are attached to this single-ended bus, all devices must operate at 5MHz.* The maximum bus length (including 3.75 ft. of internal cable) is 19.6 ft. (6 meters).
- An optional SCSI-2 daughterboard may be added in the I/O option slots on the system board (max. 1 in 8-bit version; no I/O slots are available in the 24-bit version). Each daughterboard provides two external SCSI-2 channels—configurable individually as single-ended or differential. Differential channels may be configured for 5MHz or 10MHz operation. The bus *must* be configured for 5MHz operation if external single-ended devices are used.

With the differential channel configured, a fast (10MHz), narrow or wide (8-bit or 16-bit) interface provides throughput up to 20MB/s (using a wide, 16-bit data path). Use of the narrow/wide capability of the differential interface is determined by the device being attached (the tape array and currently shipping disk array, for example, has the capability for wide data transfers) and the types of interface cable between the AV 550 and the external device. The maximum differential SCSI bus length is 25 meters (82 feet).

A 2.5 ft. cable is included with the SCSI-2 I/O option daughtercard. This provides termination of eight data lines on the 16-bit interface for connection to 8-bit devices. This 2.5 ft. cable length must be added to the total SCSI bus length when checking against the bus limit. If 16-bit SCSI devices are used, then the 2.5 ft. cable is not used.

The AV 550 can be configured internally with a single 5.25" QIC tape, CD-ROM, or 8mm cartridge removeable media device. All other internal mass storage devices are 3.5" only. Table 5 lists the mass storage devices supported by the AV5500.

Asynchronous Connections

Three asynchronous RS232 connections are on the system board. All three ports support signal rates up to 19,200 baud. The second and third ports also support modem control.

Additional asynchronous connections are provided via

- VAC/16 VMEbus asynchronous multiplexor (Model 7411-L)
- VDA/255 VMEbus host adapter (Model 7424-L includes the VDA/255 and two 7419 16-line cluster boxes)
- Ethernet terminal servers (with or without VTC VMEbus Terminal Controller)

Synchronous Connections

The AV 550 has an integrated synchronous controller providing a single 64Kbps port. It supports AViiON X.25 and IBM communications products over RS-232C. Additional ports are available via the VSC/3i 3-port VME synchronous controller (maximum two per system).

LAN Interfaces

The AV 550 can support up to four Ethernet LAN interfaces:

- Integrated Ethernet
- Ethernet I/O option daughtercard (max. 1)
- VLCi VMEbus Ethernet LAN Controller (max. 2)

	<i>Interface</i>	<i>Configuration</i>	<i>Devices Supported</i>
Internal	Single-ended	10MHz, 8-bit	CD-ROM (G6629-L), 525MB QIC (G6796-L), 5GB 4mm DAT (6762-L in 3.5"), 520MB (61000-SL), 1GB (G6802-L; R7306 to replace 520MB) and 2GB (G6841-L; R7307 to replace 520MB) disks, 1.44MB diskette (G6880-L in 3.5")
QIC Brick	Single-ended	5Mhz, 8-bit	525MB QIC tape (G6691)
CD Brick	Single-ended	5MHz, 8-bit	CD-ROM (G6690)
PHU	Single-ended	5MHz, 8-bit	CD-ROM, 525MB QIC tape, DAT, 520MB, 1GB and 2GB disks; 10GB 8mm cartridge tape, 1.44MB diskette <i>(332MB, 662MB, 1GB, 1.4GB disks; 5.25" diskette; 2GB 8mm cartridge tape; 150MB QIC tape for field upgrades only. Not supported for shipment from factory.)</i>
CSS2, CSS3	Single-ended	5MHz, 8-bit	Same as PHU
CLARiiON Disk Array	Differential	10MHz, 8-bit	520MB disk, 1GB disk, 2GB disk <i>(Requires 7435 Dual SCSI-2 interface)</i>
CLARiiON Tape Array	Differential	10MHz, 16-bit	<i>(Requires 7435 Dual SCSI-2 interface)</i>
1600bpi tape	Single-ended	5MHz, 8-bit	
6250bpi tape	Single-ended	5MHz, 8-bit	
OPSTAR	Single-ended	5MHz, 8-bit	
Note: Model G6613L (WORM Optical Jukebox) cannot be configured on integrated SCSI.			

Table 5. AV 550 Mass Storage Support

All three types of controllers provide an AUI interface for a drop cable and external transceiver. Thick Ethernet, Thin Ethernet and 10Base-T are all supported via the appropriate transceivers.

Additional VMEbus LAN options are:

- VTRC Token Ring controller (max. 2)
- VFC FDDI controller (max. 1)

Printers

Parallel printers are connected to the system via

- Integrated Centronics parallel port
- VDC/8p Centronics parallel port (requires VDA/255 Host Adapter)

The VDC/8p is supported for installed base customers using VDAs and VDCs. Ethernet is the preferred interface for additional printers at new installations. For higher performance and reliability, many printers have direct Ethernet connections. If not, DG/Direct sells an Ethernet print server that provides a single parallel port.

What is Not Supported on AV550 Workstations

The following products that have been supported on AV4xx/5xx class workstations are not qualified for use on AV 550 workstations. If customers do configure these

products on AV 550 workstations, Data General will not provide support for any problems encountered.

- VSC/3—three-line synch controller
- VDA/128—128-line terminal cluster controller
- VLC—Model 7405-K Ethernet controller
- 7430-K—VSA SCSI-2 controller (incompatible with non-block mode bus)
- Model 7423 AV 4600 Series SCSI/LAN option (incompatible interface)

Power

Power consumption for all configurations should be checked against the power supply output—particularly if third-party devices will be added to the system.

Cabling

Refer to the AViiON Product/Price catalog and to the electronic quote systems for cabling information. Since the AV 550 is based on the AV 5500 chassis, bulkhead connections are common between the two systems.

Upgrades

System upgrades are available through the Upgrades Marketing Group in the Continuing Products Division. If you have any questions regarding upgrades, call (in the USA) 508-870-1400 to speak to a CPD Marketing Specialist.

Documentation

Table 6 lists AV 550 document numbers. The latest system capacities, performance, etc. are available in the AViiON Family Chart and the AViiON Sales Guide.

<i>Document</i>	<i>Number</i>
AV 550 Product Brief	012-004370
Installing, Expanding, and Maintaining AViiON 5500 and 550 Series Computers	014-002250
Getting Started: A Quick Guide to Setting Up AViiON 550 and 5500 Series Computers	014-002252
Operating Your AViiON 550 and 5500 Series Computers	014-002249

Table 6. AV 550 document numbers.

Warranty

AV 550 systems come with a one year hardware warranty for all components shipped with the system. Toll-free telephone service is provided to help customers identify an inoperable part and the replacement part is shipped overnight. The customer may choose to install the part either with telephone assistance, or request next-day dispatch of a field engineer to complete the installation.

Hardware Support Services

The policies described below are North American service policies. Coverage and policies vary from country to country.

Data General Customer Service Division supports AViiON workstations with state-of-the-art service technology. Data General offers several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

On-Call Service with a four-hour response goal, allows the customer to select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include

- **Multi-Year Plus** offers discounts of 10% for three year agreements, 12% for four year, and 15% for five year.
- **Extended Coverage** provides service up to seven days a week, 24 hours per day.
- **Enhanced Response** delivers two-hour response for installations within 50 miles of a Data General Service Center.
- **Basic Response** is a lower cost service with response generally occurring within 24 hours.

- **Multi-Device Deferred** offers standard discounts up to 40% to customers with large populations of PCs, workstations, terminals, and desktop printers, and can defer service until a specified number of devices require an on-site call.

On-site Select Service is also available. Toll-free telephone support is provided to help customers identify the inoperable part. The replacement part is shipped overnight. The customer may choose to install it either with telephone assistance, or request next-day dispatch of a field engineer to complete the installation.

Pre-payment discounts for terms as short as six months are also available up to 20% for cancelable pre-payment terms.

Installation Services

The services described below are offered for North America. Available service offerings vary from country to country.

The AV 550 is positioned as customer maintainable/installable. This means that an end user can unpack the basic system, attach all required cables, printers, terminals, etc. and bring up DG/UX without the use of any special tools or test equipment and without fear of safety issues (such as exposed high voltage areas).

We strongly recommend, however, that most customers take advantage of AV 550 Installation Services. A variety of service levels are offered to help ensure that your customer's AV 550 gets installed smoothly and up and running quickly. Service offerings range from basic hardware installation to custom services which tailor the hardware and software to a customer's specific operating environment.

Specifications

Processor

40MHz Motorola 88110

.65 micron HCMOS, superscalar architecture
16KB on chip cache, 8KB per instruction and data memory ports
ANSI/IEEE Standard 754-1985 floating point unit
256KB two-way set associative cache

88410 Memory Management Unit

Memory (added in groups of four)

4MB SIMM
16MB SIMM
32MB SIMM

1Mx40, 80ns 4Mbit DRAMs
4Mx40, 80ns 16Mbit DRAMs
Dual-side 4Mx40, 80ns 16Mbit DRAMs

SCSI Interface

Integrated fast SCSI-2

Single-ended, 10MB/s, NCR 53C710 controller
5MB/s if external devices are attached

MAPS/PLUS**Hardware****AViiON 550 Workstations**

February 1994

LAN Interface		Physical	
Integrated Ethernet	10Mbits/sec, AUI connector	Dimensions Chassis	Height 21.5" (54.6 cm)Width 12" (30.5 cm)Depth 18" (45.7 cm)
Asynchronous Ports		Weight	30 kg, 61 lbs. maximum
Three RS232C	19.2Kbps each, DB-25F connectors	Dimensions: 19" monitor	17.8" (45.2 cm) H 18.5" (47.1 cm) W 19.4" (49.4 mm) D
Parallel Port	Centronics compatible	Dimensions: 17" monitor	16.8" (42.5 cm) H 16.3" (41.3 cm) W 17.1" (43.5 cm) D
Synchronous Port		Weight 17" monitor	19 KG (41 lbs) maximum
1 RS232C	To 64Kbps, DB-25F	Weight 19" monitor	28 KG (62 lbs.) maximum
VMEbus	2 6U slotsMotorola VMEbus C.IIEEE P1014 Draft 1.2	Agency Approvals	FCC A VDE A UL 1950 VCCI Class 1 CISPR22/EN55022 Class A CSA 22.2 #950
I/O Option Slots	Two slots		
Devices supported:			
Fast/wide SCSI-2 daughterboard (max. 2)	Dual channel, single-ended or differential, narrow or wide, 20MB/s, NCR 53C720 controller		
Optional Ethernet Daughtercard (max. 2)	10Mbits/sec, AUI connector		
8- or 24-bit color graphics daugh- ter cards	8-bit takes one slot 24-bit takes two slots Color Custom graphics proces- sor		
Graphics Processor	8 or 24 color planes 2 overlay planes 1280 x 1024 pixel resolution 256 active colors from palette of 16.7 million Hardware cursor		
Monitors			
Pixel aspect ratio	1:1		
Refresh Rate	70 Hz, flicker-free		
Pixel Rate	125 MHz		
Controls	Power on/off, brightness, con- trast, degauss		
Monitor Format	17" or 19" landscape		
Displayable Res.	1280x1024		
User Interface			
Keyboard			
Style:	101/102-key PC-AT com- patible		
Available versions:	French, German, Italian, Japa- nese, Spanish, Swedish, UK, US		
Mouse	3-button optical/mechanical		
AC Power			
AC Voltage input	100-120V 220-240V		
AC frequency input	47-63Hz		
AC draw (amps)	10A @ 100/120V5A @ 220/240V		
KVA	935VA		
Maximum output	395W		
Temperature			
Operating temp. with mass storage	10-38°C		
Non-operating temp.	-40 - 65°C		
Max. rate of change per hr.	10°C per hour		
Relative Humidity			
Operating rel. humidity	20% to 80% (non-condensing)		
Non-operating rel. humidity	10% to 90% (non-condensing)		
Rate of change per hour	20% per hour		
Maximum Heat Dissipation	2080 BTU/hr.		
Altitude			
Operating	-305 to 2438m -1000 to 8000 ft.		
Acoustics			
Operating	6.0 bels, 50 dBA typical		

AViiON 450 Workstations

Fact Sheet

The AV 450 workstation offers competitive price/performance in a compact desktop package. It is designed to meet the requirements of 2-D graphic applications such as geographical information systems, mapping, and information management and retrieval. It's also an ideal software development platform for Open Enterprise applications.

- Single Motorola 88110 40MHz microprocessor with 16KB on-chip cache (8KB data, 8KB instruction)
- 256MB of ECC memory via industry standard SIMMs
 - 16MB, 32MB, 64MB or 128MB increments supported
- Integrated SCSI-2, Ethernet, synchronous port, three asynchronous ports and one parallel port
- Tightly-coupled 8-bit graphics architecture
- 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance
- 3-button optical/mechanical mouse
- PC/AT-101 compatible keyboard
- DG/UX 5.4 Release 3 or later provides full support for system features
- Attractive, space-efficient desktop packaging for office environments

Item	Maximum
CPUs	1
Memory	256MB
Disk	12GB
Ethernet LANs	1
SCSI Channels	1
Sync ports	1

Table 1. Configuration maxima.

Product Description

System Packaging

The AV 450 is housed in a compact, desktop package. Two half height media bays (one 5.25" and one 3.5") support a variety of disk and tape options. The 5.25" bay is used for

either a load device (CD-ROM or QIC tape) or for a non-load removeable media device such as a floppy diskette, 8mm backup tape, or a DAT. It can also be used for an add-on hard disk. The 3.5" bay is used for the base 3.5" SCSI hard disk. Connectors for the system board controllers are accessible from the rear of the chassis.

Bay(s)	Qty.	Devices
5.25" removeable media bay	1	CD-ROM, QIC tape (load), DAT, 8mm tape, 1.44MB diskette, 3.5" disk (add-on)
3.5" media bay	1	3.5" disk (base)

Table 2. Internal mass storage configurations.

System Board

The AV 450 system board integrates all the functions required for most workstation installations, saving customers the expense of additional I/O controllers. The board features:

- 40MHz Motorola 88110 CPU
- Eight connectors for industry-standard SIMMs
- Fast (10MB/sec), single-ended SCSI-2 interface
 - Operates at 5MB/s if external devices are attached
- 10Mbit/sec Ethernet interface (AUI connector)
- Three asynchronous RS-232 ports (DB-25F connectors)
- Synchronous port (DB-25F connector)
 - 64Kbps maximum throughput
 - Electrically compliant with RS-232C
 - Support for AViiON X.25 and IBM communications software
- Centronics-compatible parallel port (unidirectional)

Memory

The AV 450 Workstation supports 256MB of ECC memory via 4MB, 8MB, 16MB, and 32MB SIMMs. All SIMMs are based on 80ns DRAMs.

The system board has eight memory slots divided into two banks of four SIMMs each. Banks must be filled completely (that is, SIMMs must be added four at a time). Memory increments are 16MB (four 4MB SIMMs), 32MB (four 8MB SIMMs), 64MB (four 16MB SIMMs) and 128MB (four 32MB SIMMs).

AV 450 memory configurations differ from the AV 5500 and AV 550 in two major respects:

- Two banks on AV 450/4500 vs. three on AV 550/5500
- 32MB module (8MB SIMMs) is **not** supported on the AV 550/5500

Sample memory configurations are shown in Table 3. Note that, in some cases, there may be a tradeoff between price and leaving a bank open for future expansion.

<i>Bank 1 (Slots 1-4)</i>	<i>Bank 2 (Slots 5-8)</i>	<i>Total</i>
16MB	Empty	16MB
32MB	Empty	32MB
32MB	16MB	48MB
32MB	32MB	64MB
64MB	Empty	64MB
32MB	64MB	96MB
128MB	Empty	128MB
128MB	32MB	160MB
128MB	64MB	192MB
128MB	128MB	256MB

Table 3. Sample memory configurations.

Graphics

The graphics board provides high-performance, bit-mapped graphics with dedicated dual-ported display memory. A tightly-coupled graphics architecture employs a 32-bit wide bus for optimal bit-mapped graphics and multi-windowing performance. Key features of the graphics subsystem include:

- 256 colors from a palette of 16.7 million
- Eight color planes and two overlay planes
- Addressable frame buffer of 2048x1024 pixels
- Displayable resolution of 1280x1024 pixels
- Standard MIT distribution of X11 r5
- X Server, Xlib, X Toolkit, X Clients
- Support for OSF/Motif

The AV 450 uses the same 8-bit graphics engine as is used by the AV 500 and therefore graphics performance will be similar between the two products.

The AV 450 graphics board is the same as the 8-bit graphics option on the AV 550 and plugs into the I/O daughtercard slot on an AV 4500 (making it into an AV 450).

DG/UX

The AV 450 is supported by DG/UX Revision 5.4.3 or higher. Earlier releases are not supported. Binary compatibility with 88100 AViiON workstations requires that code be compiled with DG/UX Revision 5.4 or higher. Any applications compiled with DG/UX 4.3.4 or earlier must be recompiled with 5.4 to run on AViiON 88110 workstations.

DG/UX is not bundled with the AV 450. A license for the appropriate user count should be ordered as a separate line item. If the license is on the system release, DG/UX will be pre-loaded on the disk at the factory.

Configurations/Ordering

This section contains information on models, supported devices, and configurations on the AV 450 workstation. This information is summary in nature and subject to change. The AViiON Product/Price catalog and electronic quote systems must always be used to verify actual configurations.

Minimum Workstation

The Model G70616 base AV 450 workstation includes 16MB of memory, 520MB disk, 8-bit color graphics daughter card, 17" color monitor, keyboard, and a 3-button optical/mechanical mouse in a desktop package. Options are available to substitute a 19" color monitor, larger memory (for example, 64MB for 16MB), or larger disks (for example, 2GB for 520MB). Add-on memory and mass storage options are also available.

All AV 450 workstations ordered with DG/UX have DG/UX installed on the disk. Customers are strongly encouraged to order media and a load device, in the event there is a disk malfunction and the operating system must be reloaded.

Memory

Eight SIMM slots are available on the system board—divided into two 4-slot banks. A bank must be filled with the same capacity SIMMs in each slot.

Available memory increments are 16MB (four 4MB SIMMs), 32MB (four 8MB SIMMs), 64MB (four 16MB SIMMs), and 128MB (four 32MB SIMMs). See Table 3 for sample configurations. Base workstations have 16MB of memory. Substitution options are available to replace the 16MB with 32MB, 64MB, or 128MB.

In general, AV 450 memory can be mixed and matched. Two rules must be followed, however:

- Bank 1 must be populated before bank 2
- Double-sided SIMMs (8MB and 32MB SIMMs making up 32MB and 128MB memory modules) cannot be

configured in Bank 2 unless Bank 1 also contains double-sided SIMMs. This does not present a restriction but may involve moving memory in some upgrade situations.

Mass Storage

AV 450 workstations support mass storage internally in the CPU chassis or externally in a standalone office chassis.

All mass storage devices are connected to the system via the SCSI-2 controller on the system board which connects to the internal device bays in the AV 450 chassis and to external devices. This SCSI-2 channel is a single-ended, fast (10MHz), narrow (8-bit) channel capable of 10MB/s throughput. If external devices are attached to this single-ended bus, all devices must operate at 5MHz. The maximum bus length (including 3.75 ft. of internal cable) is 19.6 ft. (6 meters).

The 3.5" bay on the AV 450 comes standard with a 520MB 3.5" SCSI disk. Replacement model numbers may be used to substitute higher capacity disks (1GB or 2GB) for this standard disks.

A single 5.25" bay which can accommodate removeable or fixed media devices exists to add additional mass storage internally. This bay may be used for 5.25" devices such as a QIC tape, CD-ROM, or 8mm cartridge removeable media device using a -L suffix as on an AV 5500 or AV 8500. 3.5" devices can also be added to this slot using the model numbers in Table 4.

Asynchronous Connections

Three asynchronous RS232 connections are on the system board. All three ports support signal rates up to 19,200 baud. The second and third ports also support modem control.

Additional asynchronous connections are provided via Ethernet-based terminal servers connected to the AV 450's internal Ethernet LAN controller.

Synchronous Connections

The AV 450 has an integrated synchronous controller providing a single 64Kbps port. It supports AViiON X.25 and IBM communications products over RS-232C.

LAN Interfaces

The AV 450 supports a single Ethernet LAN interface via the integrated Ethernet LAN controller.

The integrated controller provides an AUI interface for a drop cable and external transceiver. Thick Ethernet, Thin

Ethernet and 10Base-T are all supported via the appropriate transceivers.

Printers

Parallel printers are connected to the system via an integrated Centronics parallel port.

For higher performance and reliability, many printers have direct Ethernet connections. If not, DG/Direct sells an Ethernet print server that provides a single parallel port.

<i>Model</i>	<i>Description</i>
Graphics	
R7302	Replace 17" color monitor with 19"
Memory	
7034	16MB memory module
7048	32MB memory module
7035	64MB memory module
7043	128MB memory module
R7325	Replace 16MB with 32MB
R7327	Replace 16MB with 64MB
R7328	Replace 16MB with 128MB
Mass Storage	
GR7306	Replace internal 520MB disk w/ 1GB
GR7307	Replace internal 520MB disk w/ 2GB
6880-LA	3.5" 1.44MB diskette - 5.25" slot
6762-LA	3.5" 2GB 4mm DAT - 5.25" slot
61000-SLA	520MB add-on disk - 5.25" slot
6802-SLA	1GB add-on disk - 5.25" slot
6841-SLA	2GB add-on disk - 5.25" slot
G6629-L	CD-ROM - 5.25" slot
G6677-L	525MB QIC tape - 5.25" slot
G6760-L	8mm cartridge tape - 5.25" slot
Miscellaneous	
7625	Floor stand for vertical mounting

Table 4. Option models for AV 450.

What is Not Supported on AV450 Workstations

The AV 450 is designed as a low-cost workstation and comes standard with integrated controllers and ports to meet a wide range of entry-level requirements. The following features of higher-end workstations such as the AV 550 are not supported, however:

- 24-bit option
- VME Bus
- I/O controller daughterboards (Styx bus)
- Second CPU option
- Secondary cache

Vertical Configurations

As shipped, the AV 450 is designed to be set horizontally on a desk or other work surface, most commonly with the monitor resting on top. The AV 450 can also be set vertically on the floor. In order to do so, however, the Model 7625 Floor Stand **must** be ordered since otherwise a bump over the fan will prevent the workstation from sitting level and airflow will be blocked.

Cabling

Refer to the AViiON Product/Price catalog and to the electronic quote systems for cabling information. Since the AV 450 is based on the AV 4500 chassis, bulkhead connections are common between the two systems and will typically be the same as the AV 550 and AV 5500 as well.

Upgrades

System upgrades are available through the Upgrades Marketing Group in the Continuing Products Division. If you have any questions regarding upgrades, call (in the USA) 508-870-1400 to speak to a CPD Marketing Specialist.

Documentation

Table 5 lists AV 450 document numbers. The latest system capacities, performance, etc. are available in the AViiON Family Chart and the AViiON Sales Guide.

<i>Document</i>	<i>Number</i>
Installing, Expanding and Maintaining AViiON 4500 and 450 Series Systems	014-002312
Getting Started: A Quick Guide to Setting Up AViiON 4500 and 450 Series Systems	014-002314
Operating AViiON 4500 and 450 Series Systems	014-002313

Table 5. AV 450 documentation numbers.

Warranty

AV 450 workstations come with a one year hardware warranty for all components shipped with the system. Toll-free telephone service is provided to help customers identify an inoperable part and the replacement part is shipped overnight. The customer may choose to install the part either with telephone assistance, or request next-day dispatch of a field engineer to complete the installation.

Hardware Support Services

The policies described below are North American service policies. Coverage and policies vary from country to country.

Data General Customer Service Division supports AViiON workstations with state-of-the-art service technology. Data General offers several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

- **On-Call Service** with a four-hour response goal, allows the customer to select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include
- **Multi-Year Plus** offers discounts of 10% for three year agreements, 12% for four year, and 15% for five year.
- **Extended Coverage** provides service up to seven days a week, 24 hours per day.
- **Enhanced Response** delivers two-hour response for installations within 50 miles of a Data General Service Center.
- **Basic Response** is a lower cost service with response generally occurring within 24 hours.
- **Multi-Device Deferred** offers standard discounts up to 40% to customers with large populations of PCs, workstations, terminals, and desktop printers, and can defer service until a specified number of devices require an on-site call.
- **On-site Select Service** is also available. Toll-free telephone support is provided to help customers identify the inoperable part. The replacement part is shipped overnight. The customer may choose to install it either with telephone assistance, or request next-day dispatch of a field engineer to complete the installation.

Pre-payment discounts for terms as short as one year are also available up to 20% for non-cancelable pre-payment terms.

Installation Services

Note that available service offerings vary from country to country.

The AV 450 is positioned as customer maintainable/installable. This means that an end user can unpack the basic system, attach all required cables, printers, terminals, etc. and bring up DG/UX without the use of any special tools or test equipment and without fear of safety issues (such as exposed high voltage areas).

We strongly recommend, however, that most customers take advantage of AV 450 installation services. A variety of service levels are offered to help ensure that your customer's AV 450 gets installed smoothly and up and running quickly. Service offerings range from basic hardware installation to custom services which tailor the hardware and software to a customer's specific operating environment.

Specifications

Processor	
40MHz Motorola 88110	.65 micron HCMOS, superscalar architecture 16KB on chip cache, 8KB per instruction and data memory ports ANSI/IEEE Standard 754-1985 floating point unit
Memory (added in groups of four)	
4MB SIMM	1Mx40, 80ns 4Mbit DRAMS
8MB SIMM	Dual-side 1Mx40, 80ns 4Mbit DRAMS
16MB SIMM	4Mx40, 80ns 16Mbit DRAMS
32MB SIMM	Dual-side 4Mx40, 80ns 16Mbit DRAMS
SCSI Interface	
Integrated fast SCSI-2	Single-ended, 10MB/s, NCR 53C710 controller 5MB/s if external devices are attached
LAN Interface	
Integrated Ethernet	10Mbits/sec, AUI connector
Asynchronous Ports	
Three RS232C	19.2Kbps each, DB-25F connectors
Parallel Port	
	Centronics compatible (unidirectional)
Synchronous Port	
1 RS232C	To 64Kbps, DB-25F
Graphics Processor	
	Color Custom graphics processor 8 color planes, 2 overlay planes 1280 x 1024 pixel resolution 256 active colors from palette of 16.7 million Hardware cursor

Monitors

Pixel aspect ratio	1:1
Refresh Rate	70 Hz, flicker-free
Pixel Rate	125 MHz
Controls	Power on/off, brightness, contrast, degauss
Monitor Format	17" or 19" landscape
Displayable Res.	1280x1024

User Interface

Keyboard

Style:	101/102-key PC-AT compatible
Available versions:	French, German, Italian, Japanese, Spanish, Swedish, UK, US
Mouse	3-button optical/mechanical

AC Power

AC Voltage input	100-240VAC; -10%,+15%, single phase input
AC frequency input	47-63Hz
AC draw (amps)	5.0A max @100V input
Apparent Power	500 VA max
Input Power	300W
Inrush Current	100 Apk max for 1/2 line cycle
AC Inlet	C 22 Appliance Coupler

Temperature

Operating w/ mass storage	10-38°C
Non-operating	-40 - 65°C
Max. rate of change per hr.	10°C per hour

Relative Humidity

Operating rel. humidity	20% to 80% (non-condensing)
Non-operating rel. humidity	10% to 90% (non-condensing)
Rate of change per hour	20% per hour

Maximum Heat Dissipation

1024 BTU/hr.

Altitude

Operating	-305 to 2438m -1000 to 8000 ft.
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Acoustics

Operating	6.0 bels, 50 dBA typical
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Physical

Dimensions Chassis	Height 4.25" (10.8 cm) Width 16" (40.6 cm) Depth 17.5" (44.5 cm)
Weight Chassis	28 lbs. (13 kg) maximum
Dimensions: 19" monitor	17.8" (45.2 cm) H 18.5" (47.1 cm) W 19.4" (49.4 mm) D
Dimensions: 17" monitor	16.8" (42.5 cm) H 16.3" (41.3 cm) W 17.1" (43.5 cm) D

Weight 17" monitor	19 KG (41 lbs) maximum
Weight 19" monitor	28 KG (62 lbs.) maximum

Agency Approvals

FCC A, VDE A, UL 1950, VCCI Class 1, CISPR22/EN55022 Class A, CSA 22.2 #950

AViiON 4500 Series Servers

Fact Sheet

AV 4500 systems offer competitive price/performance in a compact desktop package. Primarily targeted at user communities of up to 32 users, the AV 4500 provides VARs and end-users with a highly integrated entry-level system capable of addressing a wide range of application needs.

- Single Motorola 88110 40MHz microprocessor with 16KB on-chip cache (8KB data, 8KB instruction)
- 256MB of ECC memory via industry standard SIMMs
 - 16MB, 32MB, 64MB or 128MB increments supported
- Integrated SCSI-2, Ethernet, synchronous port, three asynchronous ports and one parallel port
- One Styx I/O daughterboard slot (compatible with AV 5500/8500/9500 daughterboards)
 - Fast/wide differential or single-ended SCSI-2 for external mass storage expansion such as CLARiiON
 - Add-on Ethernet
- Special network packages available to connect asynchronous devices through a TermServer
- DG/UX 5.4 Release 3 or later provides full support for system features
- Attractive, space-efficient desktop packaging for office environments

Item	Maximum
CPUs	1
Memory	256MB
Disk	92GB
Ethernet LANs	2
SCSI Channels	3
Sync ports	1

Table 1. Configuration maxima.

Product Description

System Packaging

The AV 4500 is housed in a compact, desktop package. Two half height media bays (one 5.25" and one 3.5") support a variety of disk and tape options. The 5.25" bay is typically

used for a load device (CD-ROM or QIC tape), but can also be used for an add-on hard disk or tape if the load device is moved to a standalone desktop chassis. The 3.5" bay is used for the AViiON 3.5" SCSI hard disk which comes standard with the base system. Connectors for the system board controllers are accessible from the rear of the chassis.

Table 2 details internal storage devices.

Bay(s)	Qty	Devices
5.25" removable media bay	1	CD-ROM, QIC tape (load), 3.5" disk, 8mm tape, or 4mm tape (add-on)*
3.5" media bay	1	3.5" disk (base)
*add-on ONLY if standard internal load device is replaced with a load device in a desktop chassis		

Table 2. Internal mass storage configurations.

System Board

The AV 4500 system board integrates all the functions required for most system installations, saving customers the expense of additional I/O controllers. The board features:

- 40MHz 88110 CPU
- Eight connectors for industry-standard SIMMs
- Fast (10MB/sec), single-ended SCSI-2 interface
 - Operates at 5MB/sec if external devices are attached
- 10Mbit/sec Ethernet interface (AUI connector)
- Three asynchronous RS-232 ports (DB-25F connectors) used for
 - Console port
 - AV/Alert service support (port supports modem control)
 - UPS or customer use (port supports modem control)
- Synchronous port (DB-25F connector)
 - 64Kbps maximum throughput
 - Electrically compliant with RS-232C
 - Support for AViiON X.25 and IBM communications software
- Centronics-compatible parallel port (unidirectional)

- One Styx I/O daughterboard slot with the following options:
 - Ethernet
 - Dual channel single-ended or differential SCSI-2

Memory

The AV 4500 Series supports 256MB of ECC memory via 4MB, 8MB, 16MB, and 32MB SIMMs. All SIMMs are based on 80ns DRAMs.

The system board has eight memory slots divided into two banks of four SIMMs each. Banks must be filled completely (that is, SIMMs must be added four at a time). Memory increments are 16MB (four 4MB SIMMs), 32MB (four 8MB SIMMs), 64MB (four 16MB SIMMs) and 128MB (four 32MB SIMMs).

<i>Bank 1 (Slots 1-4)</i>	<i>Bank 2 (Slots 5-8)</i>	<i>Total</i>
16MB	Empty	16MB
32MB	Empty	32MB
32MB	16MB	48MB
32MB	32MB	64MB
64MB	Empty	64MB
32MB	64MB	96MB
128MB	Empty	128MB
128MB	32MB	160MB
128MB	64MB	192MB
128MB	128MB	256MB

Table 3. Sample memory configurations.

AV 4500 memory configurations differ from the AV 5500 and AV 550 in two major respects:

- Two banks on AV 450/4500 vs. three on AV 550/5500
- 32MB module (8MB SIMMs) is **not** supported on the AV 550/5500

Sample memory configurations are shown in Table 3. Note that, in some cases, there may be a tradeoff between price and leaving a bank open for future expansion.

I/O Option Daughterboards

The AV 4500 supports an Ethernet LAN controller or dual channel SCSI-2 controller (Host Bus Adapter).

The Ethernet daughterboard supports thin Ethernet, thick Ethernet, and 10Base-T via external transceivers. The peak transfer rate is 10Mbits/sec.

The SCSI-2 daughterboard supports two channels, which can be configured independently as single-ended or differential.

- External differential SCSI-2 connections are capable of fast (10MHz), wide (16-bit) operation attaining 20MB per second throughput.
- Fast, narrow (8-bit) differential operation at 10MB per second throughput is configurable by using a converter cable provided with the optional SCSI board.
- Single-ended external SCSI-2 channels available on the optional SCSI-2 board are 5MHz, narrow (8-bit) only (5MB/sec).

<i>Model</i>	<i>Description</i>
Memory	
7034	16MB memory module
7048	32MB memory module
7035	64MB memory module
7043	128MB memory module
R7325	Replace 16MB with 32MB
R7327	Replace 16MB with 64MB
R7328	Replace 16MB with 128MB
Mass Storage (replacements)	
GR7306	Replace internal 520MB disk w/ 1GB
GR7307	Replace internal 520MB disk w/ 2GB
GR7317	Replace internal CD-ROM with internal 320/525MB QIC tape
R7329	Replace internal CD-ROM with CD-ROM in desktop housing
R7330	Replace internal CD-ROM with QIC tape in desktop housing
Mass Storage (add-on for 5.25" slot)	
61000-SLA	520MB add-on disk - 5.25" slot
6802-SLA	1GB add-on disk - 5.25" slot
6841-SLA	2GB add-on disk - 5.25" slot
6760-L	8mm cartridge tape add-on (5.25" slot)
6880-LA	3.5" 1.44MB diskette (5.25" slot)
6762-LA	3.5" 2GB DAT (5.25" slot)
G6629-L	CD-ROM add-in
G6677-L	525MB QIC add-in
The above add-on mass storage models require that the internal CD-ROM be replaced externally using R7329 or R7330.	
Asynchronous Connections	
A40782	16-user network async package
A40783	32-user network async package
I/O Daughterboards	
7435	Fast/wide dual channel SCSI-2
7436	Ethernet LAN add-on daughtercard

Table 4. Option models for AV 4500.

Data General's implementation of SCSI-2 does not currently support addressing beyond eight devices.

High Availability Configurations

The AV 4500 is an important component of the AViiON high availability story. It stands out from competitors' offerings because of its:

- Support for CLARiiON fault-tolerant disk and tape subsystems
- AV/Alert machine-initiated diagnostics
- Operator or machine-initiated failover to a second system
- DG/UX support for on-line storage management, I/O management, and fast file recovery

CLARiiONs use a differential SCSI interface. On an AV 4500, *CLARiiON support requires the Model 7435 I/O Option Dual Channel SCSI-2 Controller (Host Bus Adapter)*.

Maximum availability for low-end systems is achieved by attaching two low-cost systems to a highly reliable storage source such as CLARiiON or mirrored disks. This is often less expensive than building redundant features into a single system.

Automated failover is supported by DG/UX. The application must also be able to recover from failed transactions. For more information on this capability, see *Selling Peace of Mind, the AViiON High Availability Sales Guide*.

DG/UX

The AV 4500 is supported by DG/UX Revision 5.4.3 or higher. Earlier releases are not supported. Binary compatibility with 88100 AViiON workstations requires that code be compiled with DG/UX Revision 5.4 or higher. Any applications compiled with DG/UX 4.3.4 or earlier must be recompiled with 5.4 to run on AViiON 88110 workstations.

DG/UX is not bundled with the AV 4500. A license for the appropriate user count should be ordered as a separate line item. If the license is on the system release, DG/UX will be pre-loaded on the disk at the factory.

Configurations

This section contains information on models, supported devices, and configurations on the AV 4500. This information is summary in nature and subject to change. The AViiON Product/Price catalog and electronic quote systems must always be used to verify actual configurations.

Minimum System

The Model G70617 base AV 4500 system includes 16MB of memory, 520MB disk, and CD-ROM in a desktop package. Options are available to substitute larger memory (for example, 64MB for 16MB), larger disks (for example, 2GB for 520MB), and to substitute the internal CD-ROM for either an internal QIC tape or an external CD-ROM or external QIC tape. Add-on memory and mass storage options are also available.

All AV 4500 systems ordered with DG/UX have DG/UX installed on the disk. Customers are strongly encouraged to order media, in the event there is a disk malfunction and the operating system must be reloaded.

Memory

Eight SIMM slots are available on the system board—divided into two 4-slot banks. A bank must be filled with the same capacity SIMMs in each slot.

Available memory increments are 16MB (four 4MB SIMMs), 32MB (four 8MB SIMMs), 64MB (four 16MB SIMMs), and 128MB (four 32MB SIMMs). See Table 3 for sample configurations. Base workstations have 16MB of memory. Substitution options are available to replace the 16MB with 32MB, 64MB, or 128MB.

In general, AV 4500 memory can be mixed and matched. Two rules must be followed, however:

- Bank 1 must be populated before bank 2
- Double-sided SIMMs (8MB and 32MB SIMMs making up 32MB and 128MB memory modules) cannot be configured in Bank 2 unless Bank 1 also contains double-sided SIMMs. This does not present a restriction but may involve moving memory in some upgrade situations.

Mass Storage

AV 4500 systems support mass storage internally in the CPU chassis or externally in a standalone office chassis.

All mass storage devices are connected to the system via SCSI-2 channels. Both single-ended and differential channels are available with up to three channels total. The SCSI-2 channels available are:

- A standard SCSI-2 interface on the system board connects to the internal device bays in the AV 4500 chassis and to external devices. This SCSI-2 channel is a single-ended, fast (10MHz), narrow (8-bit) channel capable of 10MB/s throughput. *If external devices are attached to this single-ended bus, all devices must*

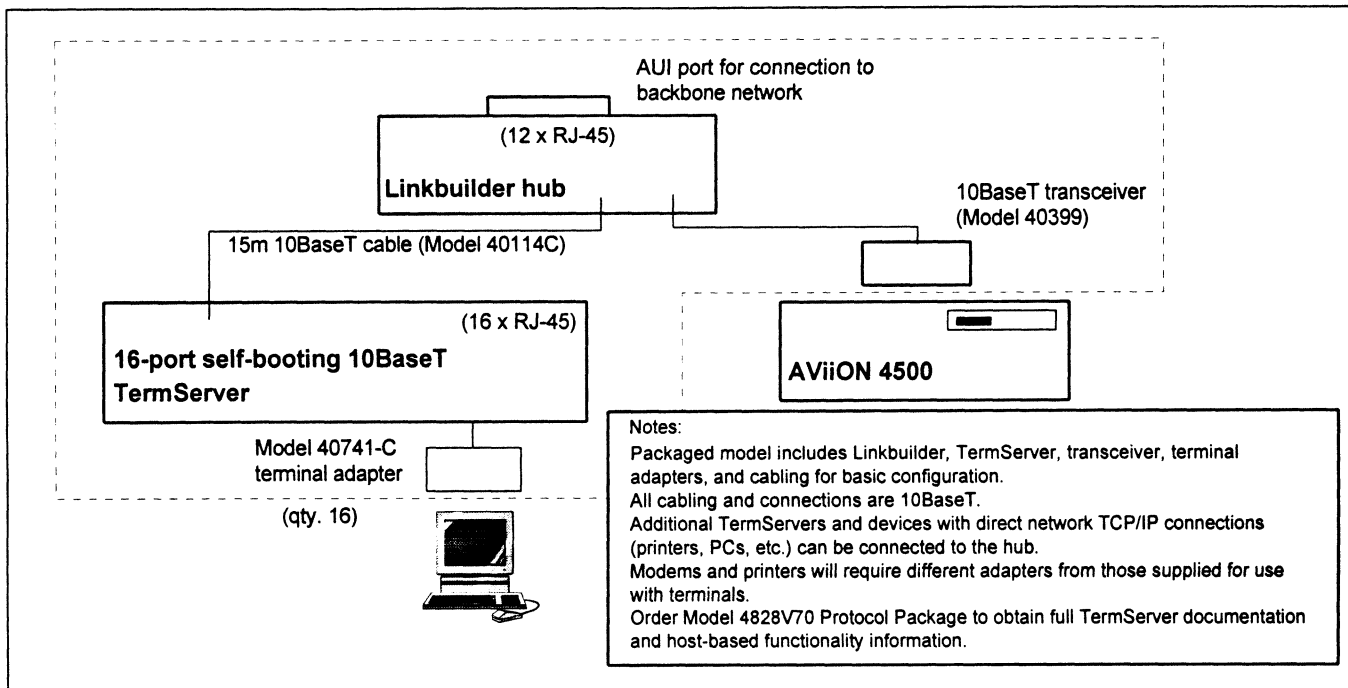


Figure 1. Sixteen-user network async package for AV 4500.

operate at 5MHz. The maximum bus length (including 3.75 ft. of internal cable) is 19.6 ft. (6 meters).

- An optional SCSI-2 daughterboard may be added using the I/O option slot on the system board. The daughterboard provides two external SCSI-2 channels configurable individually as single-ended or differential. Differential channels may be configured for 5MHz or 10MHz operation. The bus *must* be configured for 5MHz operation if external single-ended devices are used.
- With the differential channel configured, a fast (10MHz), narrow or wide (8-bit or 16-bit) interface provides throughput up to 20MB/s (using a wide, 16-bit data path). Use of the narrow/wide capability of the differential interface is determined by the device being attached (the tape array and currently shipping disk array, for example, have the capability for wide data transfers) and the types of interface cable between the AV 4500 and the external device. The maximum differential SCSI bus length is 25 meters (82 feet).
- A 2.5 ft. cable is included with the SCSI-2 I/O option daughtercard. This provides termination of eight data lines on the 16-bit interface for connection to 8-bit devices. This 2.5 ft. cable length must be added to the total SCSI bus length when checking against the bus limit. If 16-bit SCSI devices are used, then the 2.5 ft. cable is not used.

The 3.5" bay on the AV 4500 comes standard with a 520MB 3.5" SCSI disk. Replacement model numbers may be used to substitute higher capacity disks (1GB or 2GB) for this standard disk.

A second 3.5" disk can be added to the AV 4500 **only if** a replacement model number is ordered at the time of system purchase to move the internal CD-ROM into an external desktop housing ("brick") or to substitute it for an external QIC tape in a similar desktop housing. Absent ordering one of these replacement models, all mass storage expansion must be performed using a PHU or CSS/DC.

Asynchronous Connections

Three asynchronous RS232 connections are on the system board. All three ports support signal rates up to 19,200 baud. The second and third ports also support modem control.

Additional asynchronous connections are provided via Ethernet-based terminal servers connected to the AV 4500's internal Ethernet LAN controller or the Ethernet controller on an I/O daughterboard. **Besides the three ports on the system board, Terminal Servers are the only way to connect asynchronous ports to an AV 4500.**

In order to make ordering basic Terminal Server packages as simple as possible, two special models have been created

which provide everything you need for a "vanilla" Terminal Server configuration with 16 or 32 terminal seats.

Figure 1 shows a schematic of the basic layout of the 16-user package. Table 5 lists the models and quantities for both the 16- and 32-user packages.

The following notes apply to both packages:

- The models listed in Table 5 were valid as of the writing of this article. Data General reserves the right to change these component models as required to accommodate changes made by our suppliers or for any other reason. Such changes would typically not affect the functionality of the package as a whole.
- These specially discounted packages may only be purchased at the time of the initial AV 4500 system purchase and are limited to one per system.
- The basic packages contain all the components required to connect 16 or 32 terminals to an AViiON 4500. Different adapters are required to connect modems or serial printers. For needs which go beyond the basic, we **strongly** recommend the purchase of the Model 4828V70 Protocol Package which provides full TermServer documentation together with host-based functionality such as the ability to boot from the host system and to store TermServer configurations on the host. Synchronous Connections

The AV 4500 has an integrated synchronous controller providing a single 64Kbps port. It supports AViiON X.25 and IBM communications products over RS-232C.

<i>Model</i>	<i>Description</i>	<i>Qty 16-user</i>	<i>Qty 32-user</i>
40339	Linkbuilder hub	1	1
40399	Tranceiver for AViiON	1	1
4832T	16-port self-booting TermServer (10BaseT)	1	2
40741-C	Terminal Adapter	16	32
40114C	15M 10BaseT Cables	18	35

Table 5. Network async package components.

LAN Interfaces

The AV 4500 supports a Ethernet LAN interface via the integrated Ethernet LAN controller. A second interface can be added using the Ethernet I/O option daughtercard.

Both controllers provide an AUI interface for a drop cable and external transceiver. Thick Ethernet, Thin Ethernet and 10Base-T are all supported via the appropriate transceivers.

Printers

Parallel printers are connected to the system via an integrated Centronics parallel port.

For higher performance and reliability, many printers have direct Ethernet connections. If not, DG/Direct sells an Ethernet print server that provides a single parallel port.

What is Not Supported on AV4500 Systems

The AV 4500 is designed as a low-cost system and comes standard with integrated controllers and ports to meet a wide range of entry-level requirements. The following features of higher-end systems such as the AV 5500 are **not** supported, however:

- VME Bus
- Second CPU option
- Secondary cache

Vertical Configurations

The AV 4500 is designed to be set horizontally on a desk or other work surface. To accommodate customers who would rather place the system vertically on the floor, all systems ship with a Model 7625 Floor Stand. This stand **must** be used for vertical mounting since otherwise a bump over the fan will prevent the system from sitting level and airflow will be blocked.

Cabling

Refer to the AViiON Product/Price catalog and to the electronic quote systems for cabling information. Typically bulkhead connections will be common between the AV 4500 and the AV 5500.

Upgrades

System upgrades are available through the Upgrades Marketing Group in the Continuing Products Division. If you have any questions regarding upgrades, call (in the USA) 508-870-1400 to speak to a CPD Marketing Specialist.

Documentation

Table 6 lists AV 4500 document numbers. The latest system capacities, performance, etc. are available in the AViiON Family Chart and the AViiON Sales Guide.

<i>Document</i>	<i>Number</i>
Installing, Expanding and Maintaining AViiON 4500 and 450 Series Systems	014-002312
Getting Started: A Quick Guide to Setting Up AViiON 4500 and 450 Series Systems	014-002314
Operating AViiON 4500 and 450 Series Systems	014-002313

Table 6. AV 4500 documentation numbers.

Warranty

AV 4500 systems come with a one year hardware warranty for all components shipped with the system. This warranty covers all parts and labor on-site with a 48 hour service response time.

During the first year warranty period, customers may upgrade to a four hour response by paying 40% of the 2nd year monthly charge for each of the 12 months during the first year warranty period.

Hardware Support Services

The policies described below are North American service policies. Coverage and policies vary from country to country.

Data General Customer Service Division supports AViiON systems with state-of-the-art service technology. Data General offers several types of service programs that include a full array of options designed to satisfy users' uptime requirements.

On-Call Service with a four-hour response goal, allows the customer to select coverage periods and varied options that meet specific application needs. Contracted on-site repair includes unlimited parts, labor, and travel for a budgeted monthly fee. Options include

- **Multi-Year Plus** offers discounts of 10% for 3 year agreements, 12% for four year, and 15% for five year.
- **Extended Coverage** provides service up to seven days a week, 24 hours per day.
- **Enhanced Response** delivers two-hour response for installations within 50 miles of a Data General Service Center.
- **Basic Response** is a lower cost service with response generally occurring within 24 hours.

On-site Select Service is also available. Toll-free telephone support is provided to help customers identify the inoperable part. The replacement part is shipped overnight. The customer may choose to install it either with telephone

assistance, or request next-day dispatch of a field engineer to complete the installation.

Pre-payment discounts for terms as short as one year are also available up to 20% for cancellable pre-payment terms.

Installation Services

Note that available service offerings vary from country to country.

The AV 4500 is positioned as customer maintainable/installable. This means that an end user can unpack the basic system, attach all required cables, printers, terminals, etc. and bring up DG/UX without the use of any special tools or test equipment and without fear of safety issues (such as exposed high voltage areas).

We strongly recommend, however, that most customers take advantage of AV 4500 installation services. A variety of service levels are offered to help ensure that your customer's AV 4500 gets installed smoothly and up and running quickly. Service offerings range from basic hardware installation to custom services which tailor the hardware and software to a customer's specific operating environment.

Specifications

Processor

40MHz Motorola 88110	.65 micron HCMOS, superscalar architecture 16KB on chip cache, 8KB per instruction and data memory ports ANSI/IEEE Standard 754-1985 floating point unit
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Memory (added in groups of four)

4MB SIMM	1Mx40, 80ns 4Mbit DRAMS
8MB SIMM	Dual-side 1Mx40, 80ns 4Mbit DRAMS
16MB SIMM	4Mx40, 80ns 16Mbit DRAMS
32MB SIMM	Dual-side 4Mx40, 80ns 16Mbit DRAMS

SCSI Interface

Integrated fast SCSI-2	Single-ended, 10MB/s, NCR 53C710 controller 5MB/s if external devices are attached
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LAN Interface

Integrated Ethernet	10Mbits/sec, AUI connector
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Asynchronous Ports

Three RS232C	19.2Kbps each, DB-25F
Port 1	System Console
Port 2	AV/Alert
Port 3	Available for UPS, modem, etc.

Parallel Port	Centronics compatible (unidirectional)	Maximum Heat Dissipation	1024 BTU/hr.
Synchronous Port		Altitude	
1 RS232C	To 64Kbps, DB-25F	Operating	-305 to 2438m -1000 to 8000 ft.
I/O Option Slot	One slot	Acoustics	
Devices supported:		Operating	6.0 bels, 50 dBA typical
SCSI-2 daughterboard	Dual channel, single-ended or differential, narrow or wide, 20 MB/s, NCR 53C720 controller	Physical	
Ethernet daughterboard	10 Mbits/s, AUI connector	Dimensions Chassis	Height 4.25" (10.8 cm) Width 16" (40.6 cm) Depth 17.5" (44.5 cm)
AC Power		Weight Chassis	28 lbs. (13 kg) maximum
AC Voltage input	100-240VAC; -10%,+15%, single phase input		
AC frequency input	47-63Hz		
AC draw (amps)	5.0A max @100V input		
Apparent Power	500 VA max		
Input Power	300W		
Inrush Current	100 Apk max for 1/2 line cycle		
AC Inlet	C 22 Appliance Coupler		
Temperature			
Operating temp. with mass storage	10-38°C		
Non-operating temp.	-40 - 65°C		
Max. rate of change per hr.	10°C per hour		
Relative Humidity			
Operating rel. humidity	20% to 80% (non-condensing)		
Non-operating rel. humidity	10% to 90% (non-condensing)		
Rate of change per hour	20% per hour		

