

DOMAIN

Product Family Overview



apollo





### Welcome to the Apollo DOMAIN

Apollo, the premier high technology workstation company, provides the DOMAIN® System, a complete and compatible family of products: a fully integrated, network-based environment of interactive, high-performance 32-bit computers dedicated to the individual technical professional.

The DOMAIN System consists of individual 32-bit workstations offering integrated bit-mapped graphics and super-mini computational power linked with a local area network. The DOMAIN System gives the user predictable response, a family of compatible products, transparent information and resource sharing, interconnectivity to other computing environments, and a high-productivity user interface.

The DOMAIN System provides two powerful operating environments, high level programming languages, a growing library of program development and professional productivity tools, a large selection of third party software, and access to a variety of communication gateways and peripheral resources.

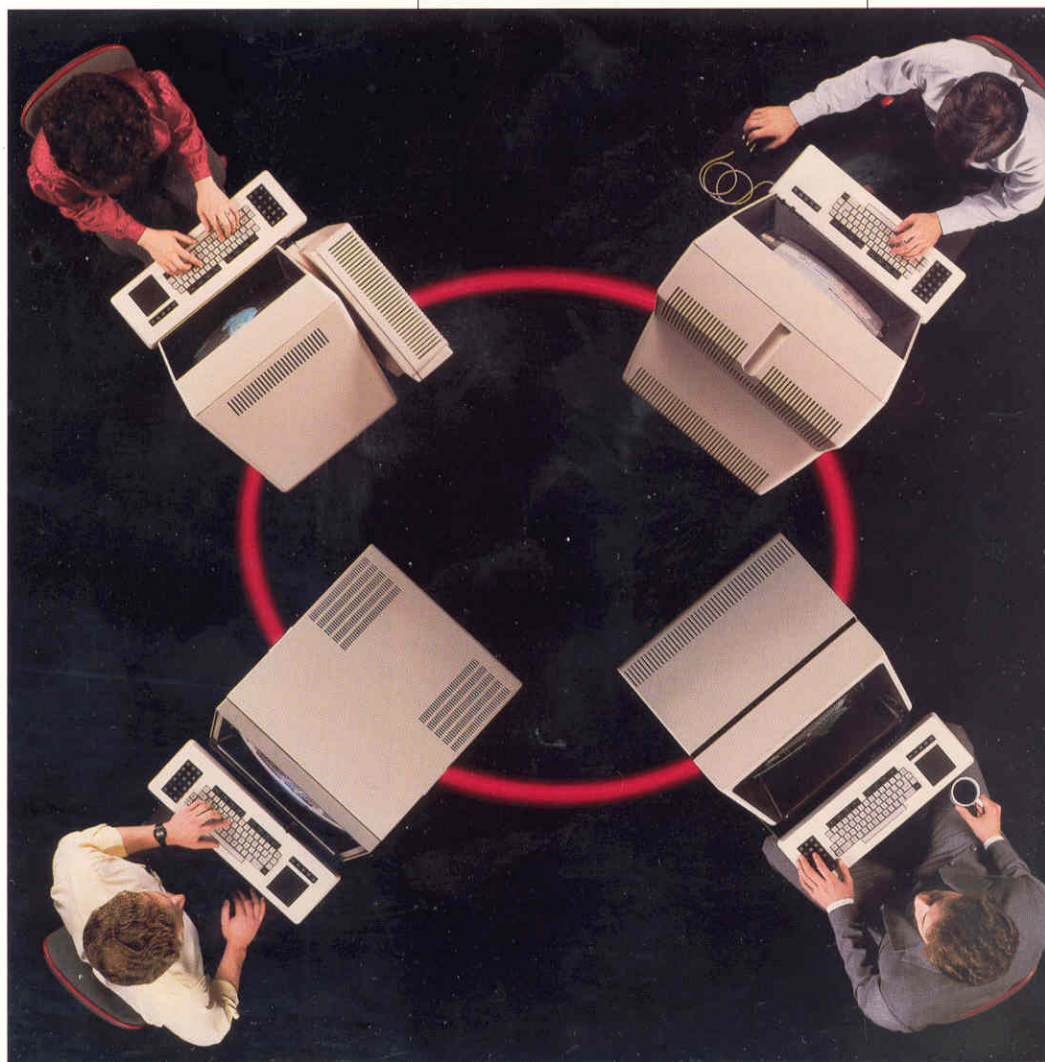
### Depend on DOMAIN

DOMAIN means productivity in a growing list of application areas:

- Electronic Computer Aided Design (ECAD)
- Mechanical Computer Aided Design (MCAD)
- Computer Aided Manufacturing (CAM)
- Computer Aided Software Engineering (CASE)

- Technical Publishing
- Architectural Engineering/Construction (AEC)
- Artificial Intelligence (AI)
- Structural and Finite Element Analysis
- Financial Modeling, Simulation, and Statistical Analysis
- Computer Science and Research

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DOMAIN  
System links  
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DOMAIN Workstations offer a flexible, integrated computing environment, providing users access to an extraordinary range of capabilities including:

- High resolution graphics, integrated for maximum performance
- High-speed local area network architecture
- Individually dedicated workstations
- Complete and compatible product family
- High system availability and ease of maintenance

The DOMAIN System provides productivity-minded organizations with these benefits:

- Compatible growth path, providing long-term investment protection
- DOMAIN architecture offering information and resource sharing
- Predictable performance
- High productivity user environment
- Interconnectivity with other DOMAIN Systems and with other system and networking environments

**D**OMAIN is a landmark in the evolution of computer workstations

### Record of Leadership in Emerging Technologies

The DOMAIN concept is the successor technology to time-sharing and a landmark in the evolution of high performance computer workstations. In the 1970s timesharing and dedicated minicomputers emerged as alternatives to the centralized batch-processing mainframe computers of the 1960s.

Now, the DOMAIN System incorporates the strengths of both, without the disadvantages of either. The DOMAIN Product Family offers the economy of shared resources and the sophisticated computational power needed to support today's demanding applications, plus the potential for an unprecedented level of communication among users.





The DOMAIN computing environment provides each user with dedicated processing power and an extraordinary range of graphics capabilities. Data, storage, and communication facilities are shared across a local area network. This cost-effective concept of dedicated processing offers a substantial increase in productivity over earlier technologies because users are not competing for the compute power of a single central processor.

Moreover, the DOMAIN System incorporates state-of-the-art technology rapidly into its expanding product family, while maintaining compatibility within the product line to protect the investment of users.

#### **A Complete and Compatible Product Family**

The DN660 can handle applications that require color graphics, offering a palette of sixteen million colors, while the DN460 can accommodate monochrome graphics applications. The DN660 and DN460 provide integrated floating point resulting

in the highest available performance for such demanding applications as molecular modeling and solids visualization.

The DN550 is a handsome as well as cost-effective addition to the DOMAIN Product Family. The DN550 provides mid-range supermini performance, with high-end color graphics capabilities. Not only can users execute computer-aided design, computer-aided software engineering, and computer-aided instruction applications much faster, but they can also now perform IC and PC design with this low-cost color workstation.

The low-cost DOMAIN 300-series includes the DN320 with floating point processor, ideal for computationally intensive applications such as circuit design and pre- and post-finite element analysis. The DN300 is well suited to software engineering, technical illustration and drafting applications.

In addition to workstations, Apollo offers two "server processors" that act as network-wide resources. The DSP80A is a low-cost, 32-bit processor used to relieve the workstations from peripherals and communications control. The DSP160, with integral floating point support, provides accelerated calculation and computation resources for users of the network.

Each DOMAIN computational and server node is equipped with a local area network connector. This provides economical and transparent access to all DOMAIN resources, information sharing, and gateway communications facilities.

#### **Raw Computing Power: Setting Industry Standards**

Each DOMAIN user has at his or her command a dedicated computer whose functionality is comparable to that of a traditional mainframe. Each DOMAIN node includes a state-of-the-art, 32-bit processor; from 1 to 4 megabytes of main memory, with error checking and correction (ECC) available on some models; optional dedicated high-speed disk drives, lineprinters, and other peripherals; and a network-wide virtual memory operating system. Each workstation lets the user run up to 24 concurrent processes, each process able to address up to 256 megabytes of virtual memory.

**T**ext and graphics can be displayed at the same time



### High Resolution Graphics

Each DOMAIN Workstation offers advanced, closely-integrated graphics capabilities including high-resolution monochromatic or color bit-mapped displays. A dedicated graphics processor and bit-block transfers that provide area fills

and vector generation maximize graphics throughput. The display management software lets the user present a practically unlimited number of views on the screen simultaneously, and to "shuffle" them as if they were pieces of paper on a desktop, and a graphics touchpad or a mouse that puts control of the display screen literally at the user's fingertips.

Each of the DOMAIN bit-mapped, raster-scan displays incorporates an independent RAM memory: 128 kilobytes for the monochromatic displays and one megabyte or optional two megabytes for the color display. The contents of RAM memory are directly mapped onto a high resolution screen for detailed presentation of both character fonts and graphic images.

Technical Professional	Type of Companies	Applications
Product Design Engineer, Mechanical Engineer	Manufacturing Firms	2-D and 3-D Wireframe, Solids Modeling, and Finite Element Analysis
Logic Designer, Hardware Designer, IC Designer, PC Designer, Electrical Engineer	Electronics and Manufacturing Firms	Schematic Capture, Circuit Simulation, IC Design, PC Design, and Layout
Civil Engineer, Structural Engineer, Architect, Draftsman	Architectural, Engineering, and Consulting Firms	Architectural and Structural Drawings, Mapping, and Product Management
Programmer, Systems Analyst, Computer Scientist, Software Engineer	Computers, Electronics and Manufacturing Firms	Software Development, CAI, and Research
Geophysicist, Petroleum Engineer, Geologist	Energy-related and Consulting Firms	Image Analysis, Reservoir Simulation, and Mapping
Graphic Artist, Technical Writer	Computer, Manufacturing and Printing Firms	Technical Publication and Illustration, Text Processing, and Book Design

### Virtual Memory Across the Network

The DOMAIN network is a token-passing, base-band, high-speed local bus. It's a highly flexible communication channel, over which text, graphic images, mass storage and output resources, and gateways to external environments are made available almost instantly to the entire user community.

Each DOMAIN node has direct access to data and devices anywhere in the system; communication is at 12 megabits per second, the speed you'd expect for operations over an internal channel.

### Demand-Paged

DOMAIN extends the traditional concept of information and resource sharing across a community of systems linked together by a demand-paging local area network.

**DOMAIN** offers solutions for the technical professional

When a user requests information, DOMAIN presents it as needed regardless of its physical location within the network. DOMAIN provides this highly responsive service through its unique ability to transparently demand-page to the local memory and disk of each node in the network. Network-wide demand paging ensures consistently high throughput and rapid response for all DOMAIN users.

Because data is sent a page at a time, no single user can tie up the network for long periods with bulk transmissions. There are no long delays while an entire file is moved; processing can start immediately. At the same time, data is sent in sufficiently large blocks so that the number of data transfers is relatively low. And, of course, each page of data is transmitted at twelve million bits per second, so throughput is high and response rapid.

#### **Fast Dependable System Response**

Predictable response is critical to productivity. In timesharing systems, users can find themselves frustrated by delays whenever the central computer is heavily loaded. A small peak in computing demand can radically

degrade the performance of a dedicated minicomputer.

In the DOMAIN System, adding another node (itself a dedicated computer system) actually expands total system capability, and response remains fast, consistent, and predictable.

#### **Apollo Understands the Problem**

You have already automated individual tasks. Every clerk and secretary has a terminal on his

or her desk. Your very smart software engineers are linked to an overloaded (and rapidly fading) timesharing system by dumb terminals. Your hardware engineers are tied to a separate but equal timesharing system. The two systems are not on speaking terms.



The technical publications department is writing manuals for the eighties using equipment left over from the seventies. The CAD system that your drafting department uses has seen better (and more productive) days. Your managers are trying to sell their innovative ideas using a presentation graphics system that consists of a black marker and a sheet of plastic. Manufacturing's inventory control and production databases are entities unto themselves....

In short, you have a shop full of highly trained, highly paid technical professionals that can't communicate with one another.

### The DOMAIN Solution

What your company needs is to move from the automation of individual tasks to the automation of the entire product development process. The DOMAIN System provides a fully integrated, network-based environment of interactive, high-performance 32-bit workstations dedicated to your individual technical professionals.

DOMAIN systems change the way your technical professionals interact: group information and resource sharing will become a way of life.

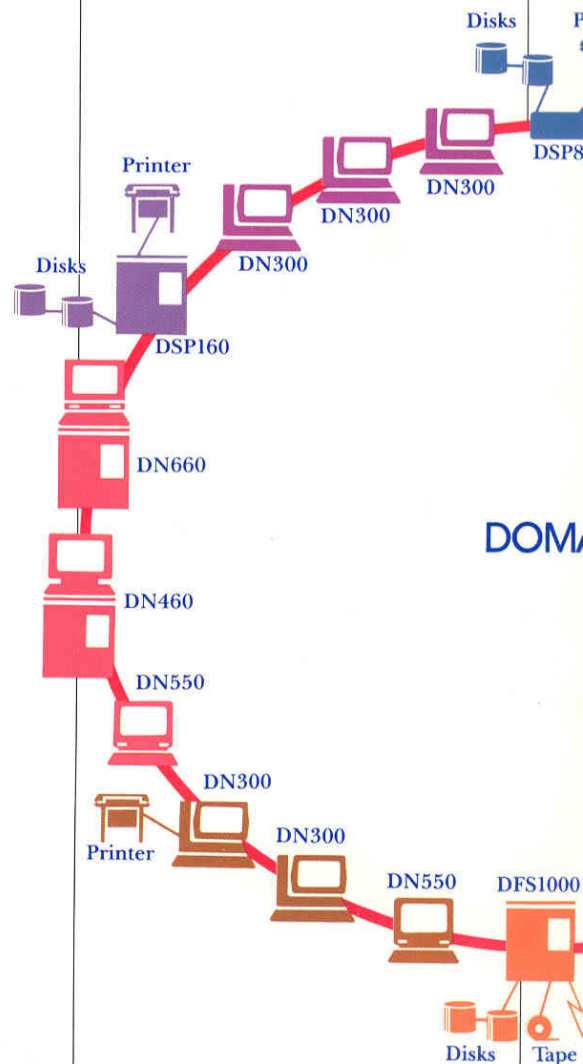
When you equip each of your technical professionals with a cost-effective DOMAIN high-productivity workstation, individual efficiency increases, which, in turn, increases group productivity. This increase in individual efficiency and group productivity results in greater EFFECTIVITY. And effective groups get their products to market faster.

**DOMAIN Means Productivity**  
The DOMAIN System enables you to move from task automation to the automation of your entire product development cycle.

Here's how the DOMAIN System can increase the productivity of your organization in each phase of the product development cycle:

### Productivity Network

- Electrical/Electronic Engineering
- Architectural/Engineering/Construction
- Mechanical Engineering
- Design and Drafting
- Peripheral Server
- Post-Processing
- Solids Modeling
- Communications Gateway
- File Server
- Presentation Graphics
- Technical Publications
- Design Analysis
- Computation Server
- Computer Aided Software Engineering



**T**he DOMAIN System increases productivity in a growing number of application areas.

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- Concept—Product Specification, Presentation Graphics
- Design and Analysis—Drafting, Software Engineering, Solids Modeling, Design Analysis
- Layout—Drafting, Routing
- Document—Technical Publications and Documentation
- Test—Design Simulation
- Manufacture—Mechanical Engineering, Documentation, Manufacturing Planning

- Ship to Market—Inventory Control, Distributed Database Management, Scheduling

### Third Party Software— Second to None

An extensive selection of software packages converted for use on the DOMAIN System is available through Apollo's Third Party Software Supplier Program. The program is designed to attract leading third party software vendors whose products provide complete solutions for Apollo customers. Almost three hundred packages are currently available in the areas of finite element analysis, CAD/CAM modeling, logic simulation, statistical analysis, and many others. The CATALOG OF APPLICATIONS FOR THE DOMAIN contains specific information about most of the available software packages.

### Built for Sharing

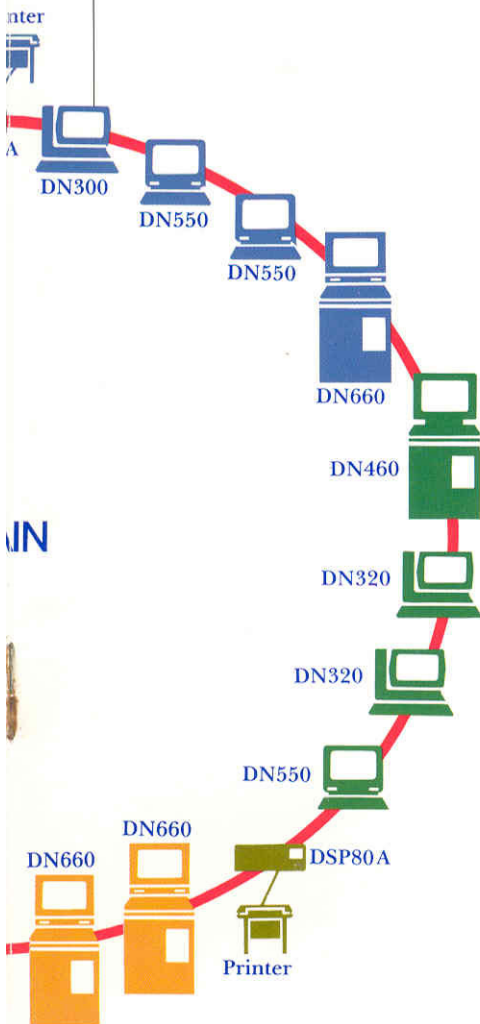
DOMAIN is built from the ground up for sharing. DOMAIN takes the concept of a virtual memory operating system and extends it across a local area network. DOMAIN supports two operating environments: AEGIS and AUX, the Apollo implementation of the UNIX™ operating system.

AEGIS is a unique design component of DOMAIN architecture with its ability to distribute the demand-paging process around the network.

The operating system treats each element in the system environment (programs, data, files, records, peripherals, etc.) as a unique object. This object orientation lets AEGIS support a large number of concurrent processes.

The DOMAIN System also supports AUX, Apollo's implementation of UNIX software, which runs as an autonomous operating environment in one or more of the available user processes. Users can run both operating systems concurrently and move from the AEGIS to the AUX environment at will.

Apollo's AUX enhancement of the UNIX operating system provides all of the latest features from both Bell Labs and Berkeley. AUX operates across the DOMAIN network so that the user community has easy access to information located elsewhere, at a rate comparable to a local disk.



DOMAIN WORKSTATIONS	DN660	DN460	DN550	DN320	DN300
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<b>Central Processor</b>					
32-bit VLSI processor			■	■	■
Floating point support	■	■	■	■	
32-bit, bit-slice processor 4 Kb bipolar instruction	■	■			
Cache memory	■	■			
16 Kb bipolar data cache memory	■	■			
<b>Main Memory Supported</b>					
1 to 3 Mb			■		■
1.5 to 3 Mb				■	
1 to 4 Mb ECC	■	■			
<b>Virtual Address Space</b>					
24 concurrent processes ; 16 Mb per process			■	■	■
24 concurrent processes; 256 Mb per process	■	■			
<b>Display Units</b>					
12 Mbit/sec bit-blt, 17-in., 1024 × 800, monochro- matic display				■	■
32 Mbit/sec bit-blt, 19-in., 1024 × 800, pixel mono- chromatic display		■			
320 Mbit/sec bit-blt, 19-in., 1024 × 1024, pixel color display, bit-slice graphics	■				
320 Mbit/sec bit-blt, 19-in., 1024 × 800 pixel color display bit-slice graphics processor			■		
<b>Node-Based Peripheral Support</b>					
34, 70 Mb Winchester disks				■	■
50 Mb Winchester disk			■		
80, 167 Mb Winchester disks	■	■			
300 Mb storage module disk	■	■	■		
500 Mb Winchester disk	■	■	■		
1.2 Mb diskette	■	■		■	■
1600 bpi, 9-track tape drive	■	■	■		
4-slot IEEE 796 MULTIBUS™ adaptor			■		
5-slot IEEE-796 MULTIBUS adaptor	■	■			
8-bit printer/plotter interface	■	■			
45 Mb streaming tape			■		

### Powerful Software Support Tools

The DOMAIN System provides a high-productivity programming environment.

#### Multiple Window Display

The bit-mapped display supports multiple windows, which can be presented side by side or overlaid in whole or in part.

The Display Manager lets the user bring any window into full screen view instantly. This windowing capability lets the operating system support multiple command environments simultaneously.

Separate windows provide "virtual terminals" connected to multiple programs and data. Because there is no need to wait for one program's completion before starting to work with another, it's possible to move from one window (and one programming context) to another. This new mode of concurrent interaction increases productivity in the software development and debugging cycle, as well as in design applications.

### DOMAIN Language System

The DOMAIN Language System is a common environment that includes the FORTRAN, Pascal, C, and LISP programming languages, plus tools to assist the software professional. The high degree of commonality among the compilers and tools lets programmers write different portions of large programs in the most appropriate language, then combine them into a single application. This commonality also improves Language System reliability, since fewer software components are affected in its maintenance and extension.

### Standardized Software Tools

■ DPSS (DOMAIN Professional Support Services) provides a set of integrated tools (MAIL, CALC, and DOCUMENT) that can substantially increase productivity. DPSS lets users perform scientific and engineering functions as well as routine office chores from the same workstation.

■ D3M (DOMAIN Distributed Data Management System) distributes a database management system across the network environment. A full-function, CODASYL-compliant database

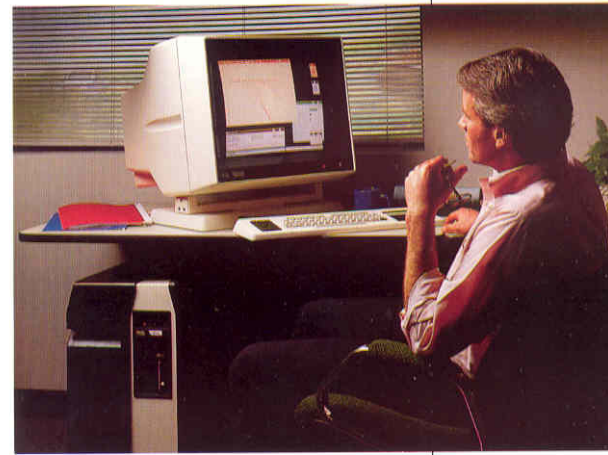
manager, D3M includes relational query language and formatting packages.

■ DSEE (DOMAIN Software Engineering Environment) lets software engineers better manage large software development projects. This set of four software modules is unique in the way it lets a team of users manage the complex task of bringing a product to market by facilitating software history and configuration management.

■ GMR (Graphics Metafile Resource) is a high-level approach to graphics that provides both graphics database and advanced graphics routines. By storing graphic entities in a special file, called a Graphics Metafile, GMR off-loads the bulk of the work for graphics application development, and provides fast, interactive throughput.

■ DOMAIN Core Graphics is a software package that helps programmers create portable graphics applications quickly and easily. Industry acceptance of SIGGRAPH's proposed Core standard means that many applications written on other systems can use DOMAIN Core and run with little or no modification on any DOMAIN workstation.

■ DEBUG, the DOMAIN System's high-level language debugging system, permits interactive testing and verification using the variables, parameters, statement labels, and other symbols defined in a program.



### DOMAIN Gateway Communication

The need for communicating with large host systems is supported by communications products that are an integral part of the DOMAIN System architecture. The DOMAIN System supports a wide selection of options for communications beyond the DOMAIN network:

■ RS-232C ports and terminal emulation

■ File transfer among DOMAIN networks and remote virtual terminals, and virtual circuit services based on X.25 and related protocols

■ ETHERNET<sup>®</sup> using the TCP/IP protocol for file transfer and remote login

■ Mainframe file transfer and remote job entry using HASP, 2780, and 3780 protocols; operates as a shared communications gateway server

■ VT100 Terminal Emulation support through RS-232C ports and the DOMAIN ETHERNET Gateway

■ Other communication interconnect services available through third party network builders

### **A Distinguished Family of Workstations**

The DOMAIN System offers a complete family of workstations. A single-node DOMAIN System provides all the essential performance characteristics of any DOMAIN System. Yet a single DOMAIN workstation can be purchased for a fraction of the cost of a mainframe—at a cost much more in line with that of a traditional small minicomputer.

#### **DN660**

The DN660 workstation combines a bipolar bit-slice 32-bit processor with an integral hardware floating point unit, offering high-end supermini computational performance. The dedicated graphics processor, along with bit-block transfer hardware, provides area fills and vector generation at speeds allowing fast manipulation of complex images.

Dedicated display memory and a palette of over 16 million colors lets the user tackle the most demanding applications in solids modeling and visualization, image analysis, finite element analysis, and other computer-aided engineering applications.

#### **DN460**

The DN460 workstation offers high-end supermini computational performance. This dedicated 32-bit supermini, using the same processor as the DN660,

lets you tackle even the most demanding applications in computer-aided engineering and design such as finite element analysis on a high-resolution monochrome display.

#### **DN550**

The DN550 low-cost color workstation combines high-end graphics power with mid-range computational performance to provide a cost-effective solution to graphics-intensive applications such as IC layout, PC layout, mechanical design, logic design, and presentation graphics. The DN550's modular packaging is specifically designed for the office environment, and fits neatly under the user's worktable.

#### **DN320**

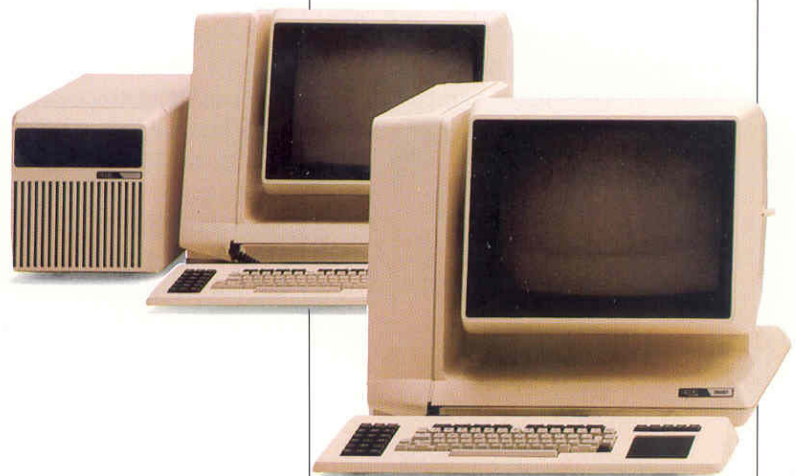
The DN320 workstation is a powerful integrated workstation designed to place the power of a 32-bit supermini right on the user's desktop. Offering hardware floating point, 1.5 to 3M byte

main memory, 16M byte virtual address space, high-resolution bit-mapped graphics display, and an integral high performance local area network, the DN320 provides the architecture and the power needed to address computationally intensive applications such as pre-and post-finite element analysis, drafting, and circuit design.

#### **DN300**

The DN300 workstation places powerful mid-range supermini performance on every user's desk. The DN300 offers 1 to 3M byte main memory, 16M byte virtual address space, high-resolution bit-mapped graphics display, and access to the 12M bit per second DOMAIN local area network.

By itself, the DN300 is a powerful workstation designed to expand the productivity of an individual technical professional. The DN300 can also become the low-cost entry vehicle to the larger shared-resource



computing environment of a DOMAIN network.

#### **Full Range of Peripherals**

A full range of peripheral devices is available for DOMAIN Systems. For high-speed, on-line mass storage, disk units range from 34 to 500M byte disk drives. A printer is available for the generation of both text and graphics hardcopy; as is an industry-standard tape drive for backup and data interchange.

#### **DSP160**

The DSP160 provides a high-performance, supermini computational resource to be shared throughout a DOMAIN network. Users can transparently share the DSP160's powerful computation capabilities, as well as its ability to manage peripheral resources by off-loading computation-intensive tasks.

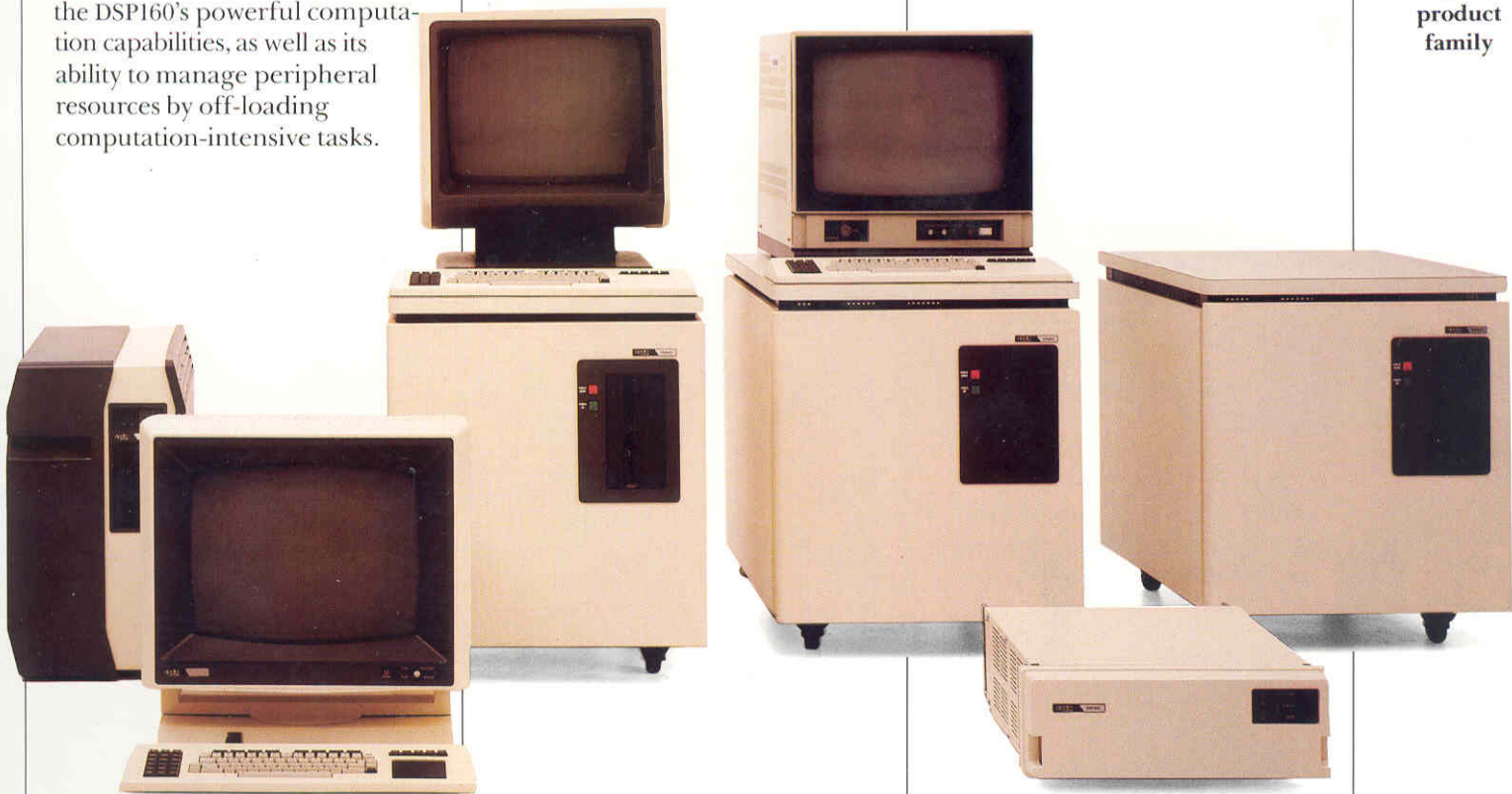
#### **DSP80A**

The DSP80A lets users connect a wide variety of shared peripheral devices to a DOMAIN System. By effectively managing peripherals and communications lines in the network, the DSP80A frees users' nodes to handle specific application-related processing. The DSP80A also can serve as a communications gateway.

#### **A Continued Commitment**

Choosing DOMAIN lets you rest easy knowing that Apollo has made a continued commitment to:

- Software and user interface compatibility across generations and across the entire DOMAIN Product Family
- Configuration choices that make for orderly expansion as your needs change
- Long-term system compatibility within the Product Family
- State-of-the-art hardware improvements and software enhancements
- Interconnectivity between DOMAIN systems and foreign networking environments



**D**OMAIN  
provides a  
complete and  
compatible  
product  
family

### **The Apollo Advantage**

Apollo offers the user low-cost entry, an incremental growth path, high availability, and long-term investment protection, as well as application software that is performance- and cost-effective.

Companies with main-frame needs and minicomputer budgets can get into operation initially with a small, low-cost DOMAIN System, even a single node, and then add to that system as needed.

A DOMAIN System naturally expands. New workstations can be added as demand increases; system growth can be an orderly, continual process. Incremental growth lets DOMAIN users expand their DOMAIN Systems in a productive and efficient manner.

The DOMAIN System is easy to maintain. The failure of a single DOMAIN node has little impact on the rest of the network. A malfunctioning workstation can be immediately taken off-line and diagnosed; the workstation can be back on-line with a minimum of downtime.

The DOMAIN System has been designed around a high-level architecture that makes it far less susceptible to technological obsolescence than other systems. The essential organization

of the system transcends currently available chip-level architecture. DOMAIN users will be able to move to tomorrow's technology without abandoning their current investment.

### **Apollo: The Leader**

Apollo Computer is a full service computer company: designing, manufacturing and supporting integrated hardware/software systems. Headquartered

in Chelmsford, MA, Apollo is committed to continued technological leadership, aggressive market penetration, full customer support, and rapid growth. **Technology Driven/Market Oriented**

Apollo is committed to serve reliably the needs of the market and to exploit quickly the opportunities presented by new technologies. There are Apollo field marketing centers in

**A**pollo's  
worldwide  
corporate  
headquarters is  
located in  
Chelmsford,  
MA



the major computer centers of the United States, Europe, and the Middle and Far East, including Japan. Apollo's marketing force of experienced computer professionals has been organized to serve end users in science, engineering, research, education, government, and business.

**The Competitive Advantage:  
The OEM Success Story**

Quality OEMs are basing their product on the DOMAIN System because of Apollo's unique system architecture. This architecture provides OEMs with the competitive advantage that they need to compete in today's marketplace.

OEMs add value to Apollo systems with the result being industry-specific solutions. Many of today's leading-edge workstation solutions are being offered by Apollo's OEMs.

Competitive terms and conditions, comprehensive support programs, standards, and a worldwide presence make Apollo the company of choice for today's OEMs with plans for tomorrow.

**Commitment to  
Customer Support**

Apollo is committed to integrated hardware and software support to provide maximum system productivity. This total service approach provides timely service for all system hardware and software support needs.

Apollo's service programs cover a broad range of customer needs including:

- Pre-sales consultations with specialists to help you define your hardware/software system needs
- Installation services provided by experienced personnel
- State-of-the-art engineering improvements and software enhancements
- A centralized Apollo Response Center to provide the user with immediate access to System Support Specialists

## **Apollo Computer Sales and Service Offices**

### **North American Sales and Service**

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