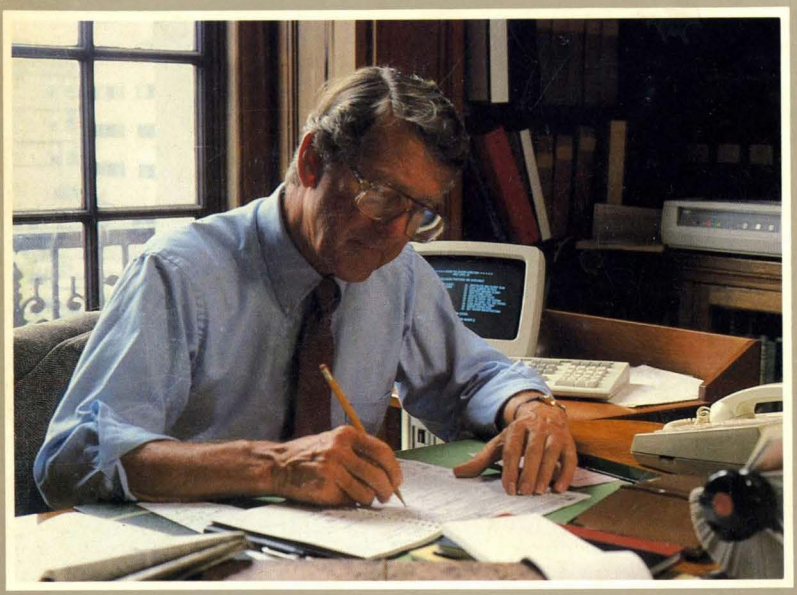
digital

ALL-IN-1 Handbook

January 1984

ALL-IN-1

Office & Information Systems



Digital's Office Solutions

digital

Copyright © 1984
Digital Equipment Corporation.
All Rights Reserved.

Digital Equipment Corporation makes no representation that the interconnection of its products in the manner described herein will not infringe on existing or future patent rights, nor do the descriptions contained herein imply the granting of license to make, use, or sell equipment constructed in accordance with this description.

The information in this book is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this book is furnished under license and may be used or copied only in accordance with the terms of such license.

Unless otherwise noted, K = 1,024 and M = $1,024^2$.

1-2-3 is a trademark of Lotus Development Corporation.
BASIS is a trademark of Battell's Columbus Laboratories.
CP/M is a registered trademark of Digital Research, Inc.
Dow Jones is a trademark of Dow Jones & Company, Inc.
Dow Jones News/Retrieval is a trademark of Dow Jones & Company, Inc.
DOW JONES FOR VAX-11—DOW JONES is a trademark of Dow Jones & Company, Inc. VAX is a trademark of Digital Equipment Corporation.
E-COM is a trademark of the U.S. Postal Service
IBM is a trademark of IBM Corporation.
MBASIC is a trademark of Microsoft Corp.
MS/DOS is a trademark of Microsoft Corp.
MULTIPLAN is a trademark of Microsoft Corp.
SELECT is a trademark of Select Information Systems.
UNIX is a trademark of Bell Laboratories.
THE NEW YORK TIMES INFORMATION SERVICE is a trademark of The New York Times Company.
The SOURCE is a trademark of Source Telecomputing Corp.
TOUCH-TONE is a registered trademark of American Telephone & Telegraph.
VisiCalc is a registered trademark of VisiCorp, Inc.
Z80 is a trademark of Zilog, Inc.

The following are trademarks of Digital Equipment Corporation:

ALL-IN-1	Correspondent	COS-310
Daisy Aids	DATATRIEVE	DEC
DECalc	DECgraph	DECmail
DECmate	DECnet	DECprinter
DECservice	DECset	DECslide
DECspell	DECsupport	DECsystem-10
DECSYSTEM-20	DECtape	DECtype
DECword	DECword/DP	DECwriter
DECUS	DIBOL	the Digital logo
GOLD KEY	HSC-50	IVIS
LA	Letterprinter	Letterwriter
LN	LQP02	LSI-11
LXY	MASSBUS	MICRO/PDP-11
PACKETNET	PDP	P/OS
Professional	PROSE	Q-BUS
Rainbow	ReGIS	RSTS
RT-11	TMS	VAXcluster
VAXstation	UNIBUS	VAX
VMS	VT	WPS-8

ALL-IN-1
Handbook

digital

TABLE OF CONTENTS

PART I

DIGITAL'S OFFICE INFORMATION SYSTEMS 1-1

PART II

CHAPTER 1. THE USER INTERFACE 2-1

CHAPTER 2. OFFICE CAPABILITIES

Overview 2-21
Section 1. Word Processing 2-25
Section 2. Graphics 2-50
Section 3. Voice and Electronic Mail 2-67
Section 4. Calculation and Modeling 2-89
Section 5. Time and Resource Management 2-105
Section 6. Filing and Retrieval 2-113
Section 7. Movement of Information 2-125

CHAPTER 3. DATA PROCESSING CAPABILITIES

Overview 2-145
Section 1. Applications Development 2-149
Section 2. Information Management 2-157
Section 3. Office Networks 2-177

CHAPTER 4. SYSTEMS, WORKSTATIONS, STORAGE, AND PRINTERS

Overview 2-193
Section 1. VAX and PDP-11 System Families 2-195
Section 2. Workstations 2-201
Section 3. Storage Devices 2-237
Section 4. Printers 2-241

CHAPTER 5. SERVICE CAPABILITIES

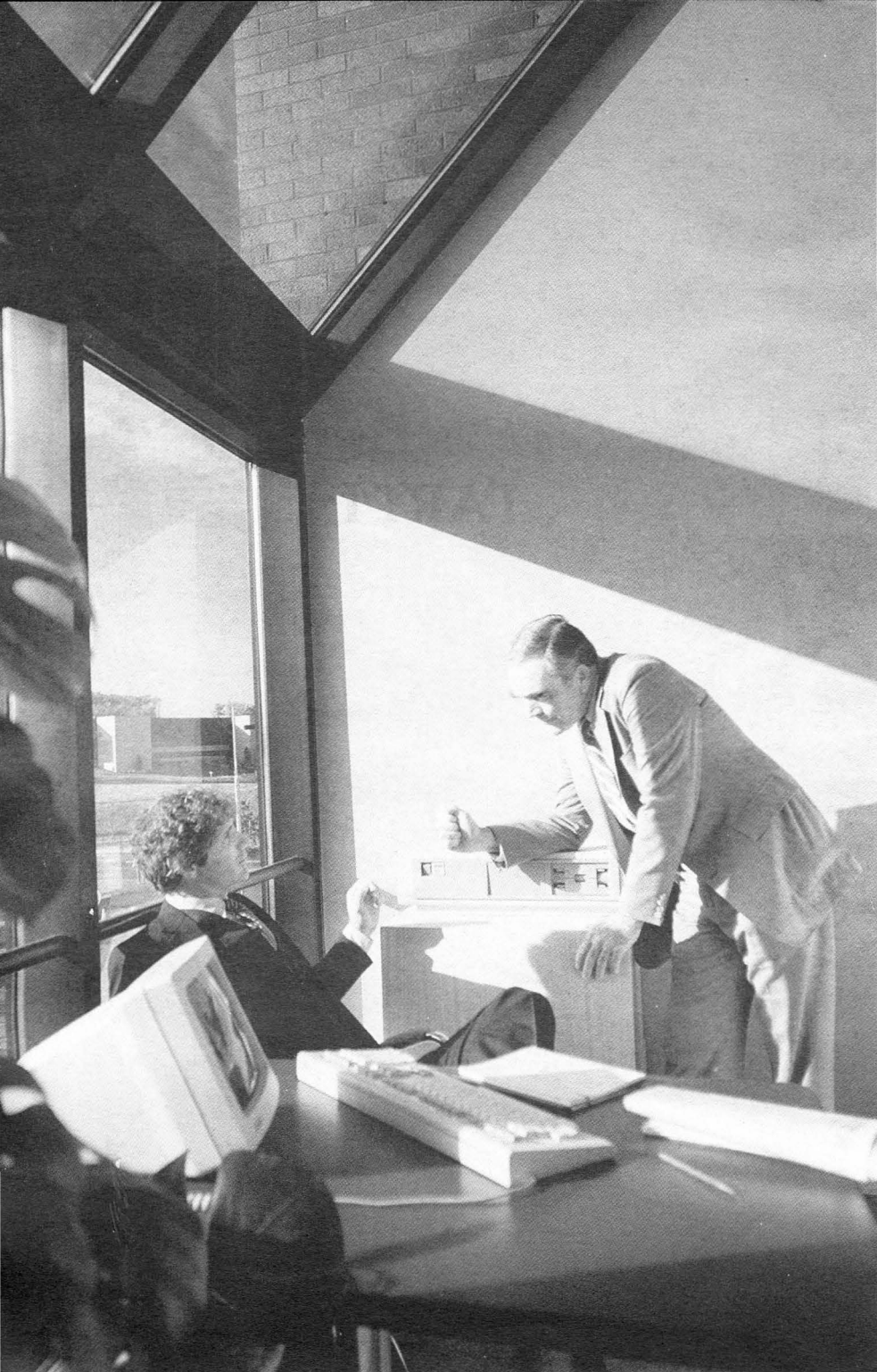
Overview 2-245

PART III

PRODUCT SPECIFICATIONS AND ORDERING INFORMATION 3-1

APPENDIX

A. ADDITIONAL LITERATURE A-1
B. SALES OFFICE LOCATIONS B-1



PART I

Digital's Office Information Systems

Let's Put "Office Systems" In The Right Perspective

You may recall from your school days that the room near the front entrance of every school is called "The Office." But even in school people who work outside "the office"—teachers, counselors, and custodians—are doing what looks like office work. They are filling out forms, updating records, using files, and generally creating or making use of information.

The same sorts of tasks are performed by doctors and nurses in hospitals, by managers, secretaries, engineers, and other professionals within companies and institutions of all kinds and of all sizes. The fact is, today the vast majority of people who work deal with information, even though they may not think of themselves as working in "The Office."

It is this broader area of information use that we at Digital Equipment Corporation are talking about when we discuss "office systems." The more narrow definition of "the office"—meaning only clerical or administrative tasks—is but a part of our broader view. Office systems address all areas of information use within any organization, and they support the way people and organizations really work.

The Realities of Today's World

In the United States, Europe, and the Pacific Basin, a major economic shift is taking place, creating unprecedented opportunities and challenges in information processing and communications. The economies of these areas are moving away from their traditional industrial bases into more and more service-oriented economies. In the American and Western European workforces, there are now more white- than blue-collar workers.

In a service-based economy, perhaps a more definitive term than white-collar or office worker is information worker. Unlike clerical employees who perform predictable and highly circumscribed tasks that are relatively easy to automate, information workers require a full range of services that only an integrated office information system can provide. Information workers need services beyond the generally understood "office automation" applications, like word processing, graphics, filing and retrieval, voice and electronic mail, and calendars and tickler files. They also need access to sophisticated data processing and data communications resources, and they must have specific applications tailored to the needs of their specific industry, organization, department, and working environment.

In a recent report on advanced office automation systems, The Yankee Group identified integration as the most important trend in office automation for the 1980s—integration locally, between facilities, and throughout an organization to make the organization's full complement of automation resources accessible to workers via the "ubiquity of low-cost user workstations."[1]

IDC Europa, Ltd. agrees. "The indications to IDC analysts are that the long term future of the AO automated office calls for an approach offering a mix of facilities, i.e., word processing, electronic mail, file queries, information retrieval, etc., and a high measure of compatibility."[2]

Not only is this mix of services necessary—and inevitable—it must be made available through a single, consistent, and easy-to-use interface. Only one vendor can provide a truly integrated solution to the office's total automation needs *today.*

Digital Equipment Corporation's computer systems, software architectures, communications capabilities and ALL-IN-1 office automation software work together to provide single-terminal access to an organization's full complement of information and information processing resources and beyond. Digital's design imperative—single-terminal access—makes office information systems truly a window on the world.

Industry Leadership Worldwide

Since introducing the first commercially successful minicomputers 25 years ago, Digital has consistently led the industry in the development and installation of automated systems designed for high performance, high reliability, and ease of use in online and distributed data processing environments. Digital, more than any other computer manufacturer, pioneered the systems and software that moved computer resources closer to the user.

Distributed data processing, the ability to locate computer power closer to the centers of work, allows an organization to implement systems compatible with its own structure and workflow. Distributed data processing is central to the concept of the automated office as a comprehensive resource for everyone in the organization—professionals and administrators as well as secretaries and clerks.

Katherine Fishman's succinct description of distributed data processing can easily be used to describe an automated office. "A computer system equals a collection of bookkeepers, librarians, and file cabinets," she writes. "How a corporation distributes the latter depends on its own organizational convenience. A company couldn't operate comfortably keeping the whole lot in one central office . . . . No artificial barriers dictate the way a manual information processing system should be organized. It is now possible to disperse an electronic data processing system as if it really were a collecton of bookkeepers, librarians, and file cabinets."[3]



In fact, existing Digital-based distributed data processing configurations are providing a natural base on which to build office automation networks. Salens, Sweden's largest shipping company, uses Digital's VAX superminicomputers to support a variety of business applications in a distributed processing environment. The company is currently implementing Digital's ALL-IN-1 office information systems software package on its existing VAX systems. The office automation software is used primarily as a window for executives into the company's other database, data communications, and data processing resources to provide rapid, single terminal access to a full range of current and accurate business data. ALL-IN-1's menu-driven interface allows the managers to extract and manipulate data from the company's databases without having to surmount programming language, file structure, and other technical "barriers."

Executives, like the ones at Salens, need to access data, perform analysis, and present the results of their analysis in a useful format. Digital was one of the first vendors to make both full-function word processing and data processing available from a single keyboard. The original DECmate, an enormously successful product, performed a wide variety of office functions and in many ways set the standard for today's personal computers.

Surveys of desktop computer users indicate that most of them—64 percent—use their machines for word processing. Interestingly enough, the next most frequent application is financial analysis at 53 percent, followed by accounting at 38 percent and database inquiry at 36 percent. And the trend is toward integrating traditional computing, or data manipulation with data presentation capabilities.

Not every information worker, however, needs a personal computer. Some,though need much more. Because Digital's full range of computer systems, terminals, user workstations, and personal computers are compatible in terms of software architectures, documents and data can be moved easily among them, and integrated office networks can be easily built. These office networks can include any of Digital's personal computers, Rainbow, DECmate, or Professional, or VT family terminal connected to VAX, PDP-11, or DECsystem-10 or -20 system, and provide access to a variety of non-Digital data processing and office systems. The ability to tie together fully compatible systems brings with it the ability to share resources, to protect previous investments in equipment and software, and to assign new capital investments appropriate to the level of individual usage.

Digital's commitment to compatibility and ease of use is further reflected in our approach to the international market. Of the 340,000 Digital systems shipped worldwide, 40 percent are installed outside of the United States. The company is unique in providing the industry's most comprehensive set of native-language keyboards with consistent ergonomics. Digital keyboards are available in 10 major European languages, Arabic, and Hebrew. The company also offers a Professional-based system coupled with a very high resolution display screen and printer that produce katakana and hiragana phonetic alphabets and Kanji ideograms for Japan.

Digital works very closely with software partners throughout the world through the Digital Classified Software Program and joint marketing and support agreements to provide office information systems that meet the unique requirements of local languages, business and cultural conventions, communications carriers, and other indigenous factors.

Consistent User Interface Through ALL-IN-1

ALL-IN-1 is both a concept and a discrete software product. The ALL-IN-1 concept is simple: to provide information workers with everything they need in automated support via a single workstation.

The ALL-IN-1 software product provides a common, menu-driven user interface that makes general office applications, user-specified applications, and program development tools easily accessible to information workers whether they are in an executive suite, a sales representative's home, a laboratory, or a branch office.

The ALL-IN-1 Office Menu runs on VAX family superminicomputers running under the powerful VAX/VMS operating system software. The VAX system stores application programs and makes them available to users, performs database management functions, provides file and communications interfaces with external systems, supports applications development, and provides the capacity and control necessary to handle multiuser workloads, large numbers of records, and the high levels of usage typical of office applications like electronic mail. Users can access the system via VT100 and VT200 terminals, graphics terminals, DECmates, Professional series personal computers, the Digital Rainbow personal computer, or a variety of other interactive access devices.

The level of interface can be customized to meet the specific needs of users. An example of the benefits of this is how it's used at Amatil, Australia's most diversified international manufacturing concern with $1.5 billion in annual sales in food, tobacco, printing, and packaging. The corporation has 40 branches in Australia and subsidiaries in Europe and Southeast Asia. Amatil has layered ALL-IN-1 office information systems software on two VAX-11/780s running a variety of other applications at its Sydney headquarters. The two home office systems are linked to five other VAXs throughout the country that run sales and inventory applications. Layering ALL-IN-1 onto the existing systems provides Amatil a highly cost-effective office network. Amatil ALL-IN-1 users at VT100 terminals access the system via customized menu selections appropriate to one of three classes of users. New users are provided with the standard hierarchy of self-guiding menus. More experienced users can bypass the menu and access functions directly. Analysts and programmers can access VMS commands and utilities directly.

General Office Capabilities

The applications most widely needed in the office environment are word processing, graphics, voice and electronic mail, calculation and modeling, time and resource management, and filing and retrieval. While word processing is currently the most often-used application for office automation systems[4], the online storage and retrieval of information may soon overtake it in importance.

And, consider electronic mail . . . another major general application provided by ALL-IN-1. Because it is fully integrated with capabilities like word processing, graphics, and calendar management, ALL-IN-1 electronic mail is more than a mere memo replacement. It is a means of making communication both easier and more effective. Users can move information, whether it's in the form of programs, data processing output, spreadsheet models, graphics, or documents. When it is part of an integrated system, electronic mail becomes a data communications tool to other systems that users can manage for themselves without having to deal with complex logon procedures and bewildering communications protocols. The Employee Transfer Company, for example, uses ALL-IN-1's electronic mail capability to communicate housing and real estate data all over the United States.

Cost Justifications

It is in these three major general applications—word processing, storage and retrieval of information, and electronic mail—that the hard cost justifications for office automation are apt to show up. But are paper, typewriters, additional secretaries, physical filing systems, time, and frustration saved sufficient justification for implementing an office automation system? They are if the system is fully integrated.

An IDC survey of 8,400 data processing executives conducted last year showed that hardware is still the largest factor in the office automation budget[5]. The Digital approach to office automation is to look at users first, determine their needs, and then configure the workstations and applications they need. Many, in fact most, hardware resources like storage and output devices and central processing units can be shared for significant savings in total system cost. By letting information workers share documents, data, and software in an extremely reliable and streamlined hardware/systems software environment, system cost can quickly be offset by workers' increase in productivity and their ability to make more timely and informed decisions.

By providing hardware resources appropriate to the level of need, costs are minimized. The average information worker costs a company $50,000 a year, including overhead. The capital cost to support that work with a total access to office automation, user-specified applications, database and data communications capabilities is around $10,000. That's not the cost of a workstation. That's the individual's piece of the entire integrated system. Figuring annual straight-line depreciation brings the per-workstation/per-worker cost down to $2,000 annually. In short, fully integrated systems can provide the individual worker with

access to a full range of computer resources including but not limited to office automation for something between two and four percent of his or her cost to the company.

A recent article in *Business Week* quoted a number of industry analysts on just this point. They believe the current rush to implement standalone personal computers and even networks of personal computers in the office will skid to an ignominious halt as soon as organizations start recognizing the hidden cost of maintaining them, each with its own baggage train of peripherals, software, and communications links. Incompatibility with existing corporate systems "... can drive per-unit cost to $20,000 although the personal computer is *perceived* as a $2,000 to $5,000 item." The article goes on to point out that managers and executives turned to personal computers in frustration at the 18-month to 2-year applications backlog common in overburdened MIS departments. They are not likely to give up their desktop financial analysis without a fight. The outcome is clear. "Personal computers will have to plug into an integrated system," says *Business Week*[6].

Data Processing Capabilities—Tools To Develop Customized Applications

Every organization requires not only general office automation capabilities but capabilities customized to meet the specific needs of industries, companies, occupations, and even the role of given individuals within the organization. With the ALL-IN-1 Office Menu it is possible to implement user applications, integrate them with the general office applications, and make them all available through a common interface. The ability to easily customize the system by adding user-specific applications is one of the major keys to a successful office information system. Two professionals in the same department, for example, an engineer and a market researcher, may need very different statistical packages tailored to their unique function.

Customized applications may be developed by the user, obtained from a third-party supplier, or produced quickly by internal data processing staff using ALL-IN-1's Extended Package of utilities. These utilities include forms development, database inquiry and reporting (supported by the VAX Common Data Dictionary and DATATRIEVE), business graphics, external database communication, high-level programming languages, and spelling checking.

British Telecom's Long Range and Strategic Studies Division is currently using ALL-IN-1 for standard electronic mail, and document preparation and transfer. The division has also paired with Cambridge University to design customized artificial intelligence (AI) applications for the system. The applications will be accessible to users via the ALL-IN-1 Office Menu. The software is being developed on a Digital Professional 350 personal computer at Cambridge linked to British Telecom's VAX via telecommunications. "The research will, we hope, produce a friendly office system that does your routine work for you ... sorts your mail ... decides which pieces of mail are top priority, finds the information you need,

regardless of its source, performs other time-consuming office tasks," says Ian McIvor, an executive engineer who is directing the product. The group is also tailoring ALL-IN-1 to its unique needs by adding business and research applications.

Decision Support Emerging As Most Important Office Automation Benefit

IDC identifies management as the "hottest OA area of the 80s" and calls decision support applications a "logical step in the process of integration". In fact, the real savings possible from implementing integrated office systems may turn out to be the intangibles like informed management decision making and more effective communication—the "soft" cost justifications.

In the final analysis, office automation's real boon is not so much that it lets information workers do more work faster, but that it helps them to do work they could not do before.

The ability to understand the dynamics of a given business situation based on complete and timely information is an immeasurable benefit. A marketing group, for example, can use ALL-IN-1 to prepare earnings projections. The task requires input from manufacturing, sales, credit, order processing, and a number of other data sources. Before automating the process of gathering the data, combining it for analysis and assigning probability-of-sale percentages, preparing earnings projections took a day-long meeting to iron out all the figures and try to see their relationships to each other. With ALL-IN-1 support, the same procedure can be done in an hour-and-a-half. More important, the focus of the meeting has changed radically. Marketing and sales personnel can now stand back from the raw data and analyse even small shifts in sales patterns and discern the true reasons for them. Why, for example, are estimates for second-quarter revenues lower this month than last month? A quick query shows that cancellation rates are up. Why? Other data shows that interest rates went up precipitously and as a result certain letters of credit didn't come through that had been applied for earlier. The appropriate response in this situation is not to beef up sales activity but perhaps to look for financing solutions. In this case, the availability of information from disparate sources means the difference between an effective response to a business problem and even being able to identify the true nature of the problem in the first place.

The 3M Company of Minnesota has made office automation a part of its total corporate computing strategy in order to provide 1,200 management and engineering personnel with decision support capabilities. Managing engineers needed electronic mail, graphics, time accounting, purchasing, financial spreadsheet and a staff assignment database so they could carry out their functions more effectively. Furthermore, they had to tie their office automation system into existing hardware and software systems. An ALL-IN-1 system was configured on a new VAX computer with Digital personal computers and tied into the company's existing mainframes to provide a comprehensive set of office automation and data processing services in a multivendor network.

Improved Communication A Measure of Success As Well As A Goal

An integrated office information system, by definiton, requires an open network architecture that allows the interconnection of multiple communications facilities, support for various protocols, and access to multiple vendors' equipment. Digital Equipment Corporation is fully committed to the open network architecture concept in both spirit and fact.

Support of the major communciations schemes is built into Digital's Network Architecture. This ensures not only the widest possible range of system interconnections but future viability for any DECnet-based network as well.

In an elegant and very apt comparison, IDC likens the need for a universal communications standard to the use of Latin as the common scholarly, diplomatic, and finally commercial language in medieval Europe. Digital strongly supports the development of and adherence to international standards for coding schemes, formats, and communications protocols that will, like medieval Latin, facilitate the interchange of vital information within and among organizations.

DECnet is compatible with the International Standards Organization's (ISO) Open System Interconnection Reference Model. It provides gateways to the major non-Digital networking schemes, including SNA. It supports X.25 and X.22 interconnection with the world's most widely implemented public packet-switching networks.

Just as packet switching reduces the cost of data transmission over telecommunications lines, local area networks can provide significant cost savings and higher performance by providing high-speed, high-volume data communications within a geographically limited area. Of the total number of local area network installations in the world, some 74 percent are used to support data transmission within offices. Digital sees the local area network as a critical component in the success of integrated office automation systems. With Xerox and Intel, Digital supports the Ethernet local area network system. Ethernet provides data transmission speeds up to 10 million bits per second and supports data transfer between central processing units, terminals, peripheral devices, and other intelligent office equipment like copiers and typesetting systems.

According to a July, 1983 Arthur D. Little report on "The Evolution Toward Integrated Information Processing," the two major communications technologies that will affect office automation in the 1990s are local area networks for voice and data and third- and fourth-generation voice/data PABXs (Private Automated Branch Exchanges). Both will become available on chips, and the battle between them will, according to Arthur D. Little analysts Norman Weizer and Leon Jackson, result in their use together.

DECnet can be used in conjunction with Ethernet, with other local area network systems, and with PBX and PABX-based internal communications networks. Digital has agreements with ROLM, Northern Telecom, and Mitel Corporation for the joint development of interface products that will help organizations integrate Digital office systems with internal voice/data facilities.



Access to value-added networks including telex and interactive videtex networks like Prestel in the United Kingdom, Bildschirmtext in Germany and Teletel in France is also provided for in the DECnet architecture. According to IDC, ". . . . these techniques teletex and videtex and their close relation to electronic mail will be amongst the first and most important of AO facilities in Europe . . ." These public services are designed to meet both domestic and commercial needs, and the latter within this decade will be the most important.[8]

Adaptable Integrated Systems Keep Pace With Change

The market for advanced office automation systems is growing at an unprecedented rate. The Yankee Group projects an annual growth rate of between 25 and 35 percent to equipment sales of between $8 and $15 billion by 1985.[9]

Integrated systems will grow even more dramatically. Arthur D. Little agrees that the United States market for office automation will grow at an average 26 percent per year between 1983 and 1988, but projects a growth rate for integrated systems of 85 percent per year from $1 billion to $23 billion worth of equipment.[10] IDC estimates that in Western Europe, by 1990 a $200 billion investment in office equipment will have been made, a substantial portion of which will be office automation. The primary office automation expenditures will be for word processing, PABXs, electronic mail, intelligent copiers, and "increasingly as the decade passes in integrated systems."[11]

The tremendous interest in integrated office automation systems has been created by complex interactions between available and emerging technologies and rapidly changing business environments. Every day information workers see the efficiency gains achieved by traditional computer applications. Personal computers and limited-task office systems like word processors have contributed to user readiness. They have also underlined the hardware cost reductions that have, in the last few years, made even very powerful systems affordable alternatives to waiting out the MIS applications development backlog or simply doing without the automated support and information one needs.

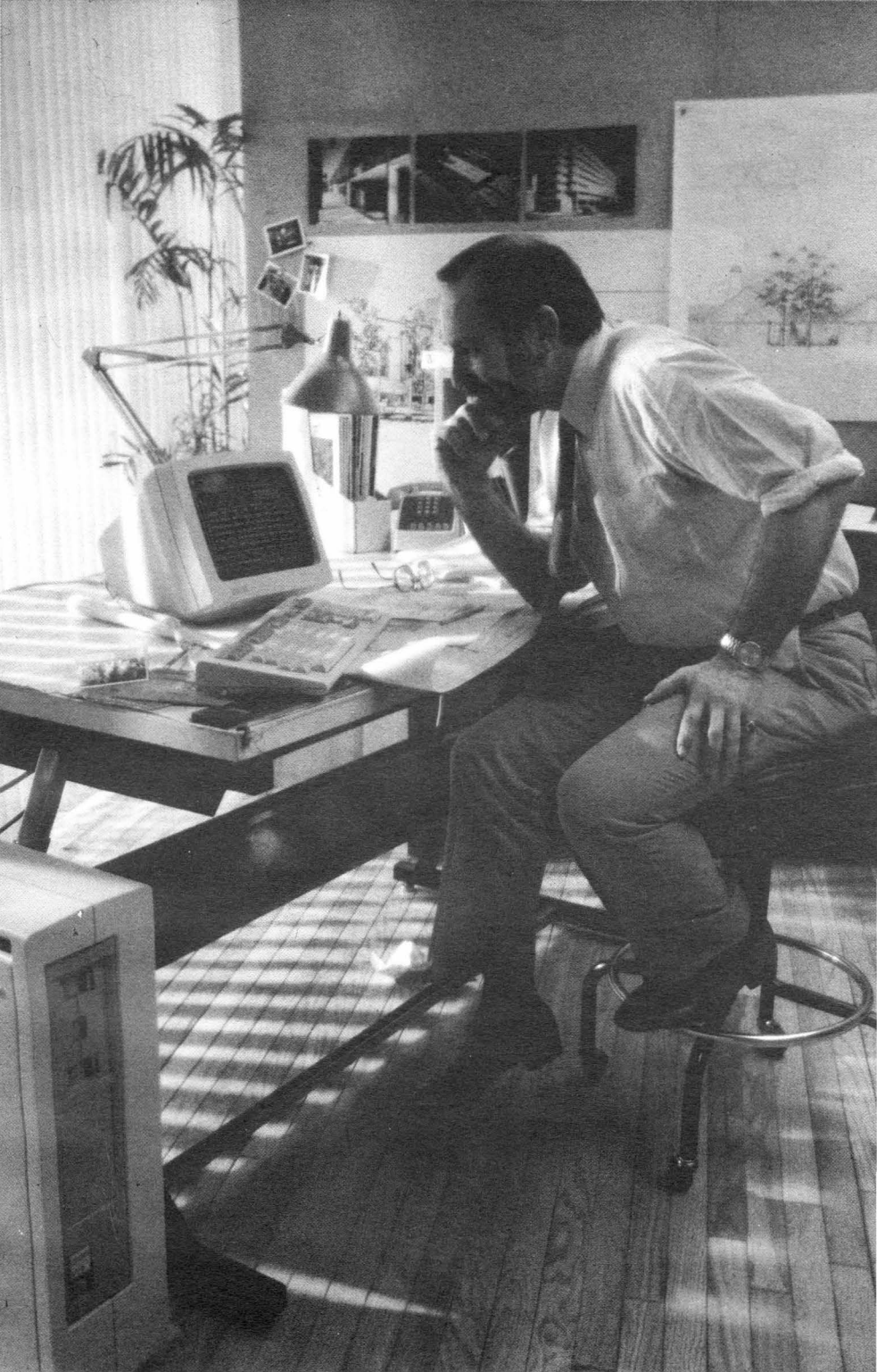
Furthermore, unlike the first office beneficiaries of automated support—clerical workers—secretaries, managers, professionals, and other information workers perform complex functions rather than discrete tasks. They require integrated systems that can support those functions. At Renault's Paris headquarters, office solutions have been layered on existing VAX business, technical, and distributed manufacturing applications. ALL-IN-1, called *AB/VAX Architecture Bureautique* in France, provides the automobile maker's professionals, engineers, and secretaries with single-terminal access to electronic mail, document processing, and calendar management. Engineers also use their workstations to access Computer Aided Design (CAD) applications running on the VAX.

The great changes taking place in the economies of the major commercial areas of the world, the challenges of shifting work patterns and more rapid communication, and the opportunities created by new technologies have made the office the

central focus of systems development for an entire industry. The direction is firmly toward integrated office information systems. Digital's complete range of compatible hardware, software, and data communications products—embodied in the ALL-IN-1 concept—sets the standard today for all the integrated office systems of tomorrow.

In the following pages, we unfold in detail the broad range of office information system capabilities available from Digital—including the user interface, office capabilities, data processing capabilities, systems, workstations, storage and printers, and service capabilities—all are available to become components in your office information system.

1. Advanced Office Automation Systems.
Boston: Yankee Group Research, Inc., June 1982, pp. 2-3.
2. Automated Office Overview: Western Europe.
London: IDC Europa, Ltd., March 1981, p. 6.
3. The Computer Establishment. Katherine Fishman, (New York, 1982), p. 416.
4. Office Automation Equipment Markets 1982.
Framingham, MA: IDC, June 1982.
5. User Spending in Office Automation.
Framingham, MA: IDC, November 1982, p. 36.
6. "Computer Shock Hits the Office", Business Week.
August 8, 1983, p. 49.
7. The Evolution Toward Integrated Information Processing.
Cambridge, MA: Arthur D. Little Decision Resources, July 1983, p. 24.
8. Same as 2 but p. 31.
9. Same as 1 but p. 4.
10. Same as 7, but p. 7.
11. Same as 2, but p. 2.



PART II



Chapter 1.
The User Interface

The User Interface is that part of the ALL-IN-1 product that you see. It provides a structure and "language" that lets you and the computer interact with each other. The User Interface is a combination of hardware (such as a videodisplay and a workstation keyboard) and software (menus, prompts, commands). All of that provides you with an easy way to access the computer's capabilities.

To you, the user, the User Interface is the product.

ALL-IN-1 User Interface products provide access to all of the capabilities you need to do your job from a single workstation. You can choose the workstation and combination of applications most suited to your specific needs. This combination of hardware and software products can provide a unique solution to every customer's specific business problem.

Shared Systems

From workstations connected to host computer systems, ALL-IN-1 users can access:

- Office applications (word processing, electronic mail, spreadsheets, graphics, desk management tools, and more)
- Data processing capabilities (information management, database query and reporting, languages and programming tools)
- Communications software (file and data transfer, transparant access to applications on other systems, protocol emulation)

All of this computer power is available from a single, simple menu system.

- On the VAX, Digital offers ALL-IN-1 Office Menu.
- On the PDP-11, Digital offers MENU-11.
- On the DECSYSTEM-20, Digital offers OPUS-20.

Team Computing

The PDP-11 series of products offers a variety of office applications to fill the needs of the team computing environment.These applications include:

- Word processing
- Electronic mail
- Calculation and modeling
- Filing and retrieval

Using MENU-11 or Digital's forms management system and information management tools, application programmers can build an office-oriented user interface.

Personal Systems

From each of Digital's personal computers, you can run the software packages designed for your system, as well as access any of the capabilities provided on a host office system.

The DECmate II is a multifunction workstation designed to run word processing, personal computing, and business-specific applications. It is a fully compatible VAX, PDP-11 or DECSYSTEM-20 office workstation. The Easycom and Master Menu facilities provide the DECmate II user with access to any, local or remote, application or information using a single command. With its optional CP/M card it can also run industry-standard applications.

The Professional workstation provides a variety of office applications and an ideal environment for the development and execution of specific user applications. It has a comprehensive menu system that provides a full complement of user interface facilities in a customizable environment.

The Professional is also a personal minicomputer. It has been designed to take advantage of the same file system as much larger systems and the same networking architecture. It is also fully compatible with Digital's ALL-IN-1 Office systems.

The RAINBOW is a versatile personal computer that can double as an office workstation. It provides transparent access to both 8-bit and 16-bit industry-standard applications. It is also fully compatible with Digital's ALL-IN-1 office systems.

Each of these workstation's capabilities are discussed in greater detail in the section entitled "Workstations" in the Systems, Workstations, Storage, and Printers chapter of this book.

The ALL-IN-1 Products

The ALL-IN-1 products were designed for the office environment.Their User Interface characteristics differentiate them from products designed for other types

of users or environments (program development, for example). ALL-IN-1 User Interfaces provide:

- Framework for a total office solution
- Integrated applications environment
- Adaptability to the user's needs, workstyle, and environment
- Easy to use for all levels of computer experience

Framework for a Total Office Solution

The ALL-IN-1 products give you the ability to do office functions, data processing, and communications from a single terminal and a single menu. You are given a choice of selecting the workstation and combination of capabilities (local and host-based) best suited to your needs.

All-IN-1's capabilities can be expanded and customized. Your system can be tailored to include software to meet the needs of a range of business and/or profession specialties, as well as your own specific needs.

It can be customized to include:

- Additional Digital-provided products
- Third-party and OEM software products
- Custom-written software packages (customer-written or Digital-provided)

More capabilities are provided to you through office networks. You can have transparent access to applications and data anywhere in an office network.

ALL-IN-1 is flexible. It can be changed as your needs change. As new user interface technologies or innovations (like voice) become available, they can be easily incorporated.

Integrated Applications Environment

ALL-IN-1 menus and commands are consistent. Applications (office, data processing, customer-written, etc.) all look similar to the user. The user Interface is responsible for providing consistency across applications and systems. Standards have been set, so that multiple applications can be developed that appear and operate in a similar manner—an obvious benefit to the user.

ALL-IN-1 applications work together. ALL-IN-1's capabilities work together the way people in a department work. Information is moved easily from one application to another, without complicated procedures or file compatibility problems.

ALL-IN-1 workstations provide integration. Local applications and host applications functions similarly. The same keystrokes and commands are used on both the workstation and the host computer. Information can be sent easily from one workstation to another, without complicated procedures or file compatibility issues (any conversions that are necessary are kept transparent to the user).

Adaptability to User Needs, Workstyle, and Environment

Customization

The functional capabilities of the ALL-IN-1 system can be tailored to accomodate your business needs and workstyle. The appearance of the system can also be modified for your unique business needs.

- For organizations or departments, menus options and commands can be modified to add more capabilities and to reflect the way a company does its business. Company logos and interoffice memorandum formats can be added to personalize the system.
- Individuals can modify the system to match their own personal preferences.

Your personal information (such as name, location, department) is entered into a User Profile. ALL-IN-1 uses the information to fill in electronic mail memo headings automatically, to keep the phone directory up to date, and more.

Multiple levels of access protection

Access to ALL-IN-1 is protected by a password security system. You designate your own password to get into the system and can change it as often as you feel necessary. Data processing privileges are controlled by the system manager and can be provided to experienced users.

Interruptable workflow

ALL-IN-1 works the way you work. You can move from one job to another and later return to where you left off automatically. It gives you control of your activities and workflow.

Easy access from different environments

The User Interface provides many different ways of interacting with the user.

- Natural language versions for countries other than the U.S.
- Hard-copy or command mode for access from hardcopy terminals, portable terminals, dialup, or slow speed lines.
- Digitized voice output for electronic access from a telephone.

Easy to Use for All Levels of Computer Experience

Computer Based Instruction

Computer Based Instruction is an ease of learning feature designed into many of the ALL-IN-1 products.

Computer Based Instruction provides the following features.

- CBI provides online tutorial style instructions for the novice user.
- You learn at your own pace.
- It is an economical training solution, in that you never have to leave your office to take a course.

- It complements personal hands-on training, but does not replace it.
- It makes learning fun, especially for your novice users.

Features for ease of use

ALL-IN-1 products don't require you to memorize command sequences.

- Simple menus, commands, and prompts lead you through operations by listing permissible options and instructions.
- Forms allow you to give the system instructions by filling in the blanks.
- Auto-recognition lets you fill in only part of a command, file name, or user name. The system automatically completes the word or phrase.
- Online help provides a quick reference for information and short reminders on how to do something.

Flexible ways of doing things

Since all users are different, ALL-IN-1 user interfaces provide multiple ways of doing things. This makes the system easy to use no matter what the user's level of computer familiarity and experience, ranging from novice to expert.

- Menu bypass and command stringing. Experienced users can enter many commands without passing through intervening menus or prompts. Functions are executed more quickly by taking shortcuts.
- Direct access to operating system command language (such as VMS DCL). Computer-experienced users, technical users, and programmers can use system capabilities without the nuisance of learning of new commands.

ALL-IN-1 OFFICE MENU

ALL-IN-1 Office Menu is a customizable menu-driven office information system. In its basic form it gives you word processing, electronic mail, calendar and meeting schedulers, resource schedulers, a simple desk calculator, project management tools, and computer-based instruction. Its powerful system management facilities give you easy access to your VAX computer system for filing and retrieving information.

Based on the power and organization of the VAX Information Architecture products, ALL-IN-1 Office Menu lets you spend your time applying information to your job while the system handles the tasks of manipulating that information for you. You can also modify ALL-IN-1 Office Menu, so it can change as your job or business changes. And you're not limited to just those applications that come with ALL-IN-1 Office Menu—you can easily add other applications, such as BASIS inquiry retrieval software, to your system.

Menu-Driven User Interface

If you have ever used a computer system, you know that after you turn it on or login to it, the system responds with a "READY" or " > " or "$" or some other type of prompt indicating that it is available to do something for you.

What do you do now?

If you've used that system before, or one like it, you may know the name of some program and the sequence of commands needed to run it. If you've never used the system before you've come to a halt.



Where do you go from here?

You could ask the system for help. Some systems will give you enough instructions to get started. If you've used a computer system before, you may even be able to make it do something useful. If you've never used a computer system before, you may need to read an instruction manual or even take a computer course. No matter what, it will probably take a while before you learn how to use that computer system well enough to do some useful work.

But if your system is a VAX and it has ALL-IN-1 Office Menu on it, the system doesn't respond to you with a prompt. Instead it displays a "Main Menu" which list the many things it can do for you. You immediately have access to document processing tools, electronic mail, desk management tools, information management tools, business applications, and profession-specific applications. You also have easy access to "help" and computer-based instruction.

To use the Office Menu System you simply select one of the items on the menu. The system will either start running an application for you or give you an additional menu of options to select from.

No matter what your level of experience and familiarity with computers the ALL-IN-1 Office Menu System is easy to learn and easy to use. Its simple menus can lead the novice user through complex operations. Users with more experience can bypass menus and execute functions more quickly. Programmers can move directly to VAX/VMS commands and program development facilities.

Instead of taking days or weeks to learn your system well enough to do some useful work, you can start being more productive in a matter of hours or even minutes with the ALL-IN-1 Office Menu System.

Single Workstation Access

You can use the ALL-IN-1 Office Menu System from a broad range of workstations, including hardcopy terminals, video terminals, personal computers, and even bisync block-mode terminals. You can use the workstation best suited to your needs and still use the office menu system.

With a single terminal at your desk you can run your business applications, do word processing, send electronic mail, produce graphs or charts, and do program development. ALL-IN-1 Office Menu eliminates the need to have multiple terminals in your office area to access different systems.

Flow Control

To start an application running on a computer system requires a command or series of commands. If you are a system programmer or operator, you know and use these commands daily. But if you are an office worker or business professional, these commands and sequences of commands are not something easily remembered.

The Flow Control feature of ALL-IN-1 Office Menu keeps track of all of the computer's specific commands and sequences needed to run the applications you need to do your job.

When you make a selection from one of the office menus the Flow Control feature determines if an additional menu with more options should be displayed or if an application should be started. If an application is to be started, Flow Control gives the system the command or sequence of commands to start running that application for you.

Information you gather with your applications can also be added to your documents or electronic mail. If you where creating a monthly report, for example, you could include some sales figures that you had on a spreadsheet model. Flow Control allows you to temporarily suspend writing your report and go to your spread sheet calculator and display the needed information. Flow Control then lets you take that information, just as you saw it, and add it to your report.

You don't have to be a programmer or have any experience using a computer system to make ALL-IN-1 Office Menu work for you. Its many features make the system work the way you do.

Electronic mail

If you have ever sent or waited for time-critical information to be sent through interoffice mail, you know how frustrating it can be if that information is late or lost.

ALL-IN-1 Office Menu's Electronic Mail Subsystem, DECmail, lets you communicate with your group, department, and even with your corporation from your workstation. It works the same way your office mail system should works, except it is quicker and more efficient. With it, you can create, edit, send, read, and print your mail. You also can answer you incoming mail, forward your mail to other system users, request return receipts, and file your mail in the ALL-IN-1 Office Menu filing system.

DECmail can do a lot more for you. You can include information from VAX DATATRIEVE (an ad hoc information query and reporting tool) or from DECalc (a spreadsheet calculator), or even include previuosly created documents from your ALL-IN-1 Office Menu filing cabinet.

For more information see the Mail Messaging and Conferencing section of this book.

You can improve office communications. Not only will your mail be delivered faster, it will contain more useful information. Electronic mail can open the lines of office communication making you and your organization more effective in your jobs.

Document Processing

A major feature of any office system is its ability to do document processing well. ALL-IN-1 Office Menu comes with a simple, easy-to-use document processing

package. This package lets you prepare and produce documents as you would on a typewriter, but with all the advantages of having your text on a computer.

Document Processing gives you a "clean sheet of paper" to type on. Anything you type is displayed on your terminal screen. You can make changes at any time, to anything on the screen or anywhere in your text. When your document is finished you can save it in your Office Menu Filing Cabinet for later use.

ALL-IN-1 Document Processing is easy to use and to understand. The Document Processing menu lists and briefly describes all of the commands and indicates how to select a command. If the system needs more information to complete a task, Document Processing prompts you for that information.

Document processing is totally integrated into ALL-IN-1 Office Menu. Your documents are not limited to the text you type in from your keyboard. You can create documents that contain financial information, graphs, electronic mail messages, data from application programs, and so on.

Another feature of ALL-IN-1 Document Processing is that you are not limited to the editor offered with ALL-IN-1 Office Menu. You can add or replace it with two other editors available from Digital or any other editor you want*. For more information about the word processing editors from Digital, see the Document Preparation section of this book. *Some restrictions may apply.

You have the simplicity of a typewriter with the power of a computer on your desk. Not only will your documents look better, but they will contain more useful information.

Interruptable Work Flow

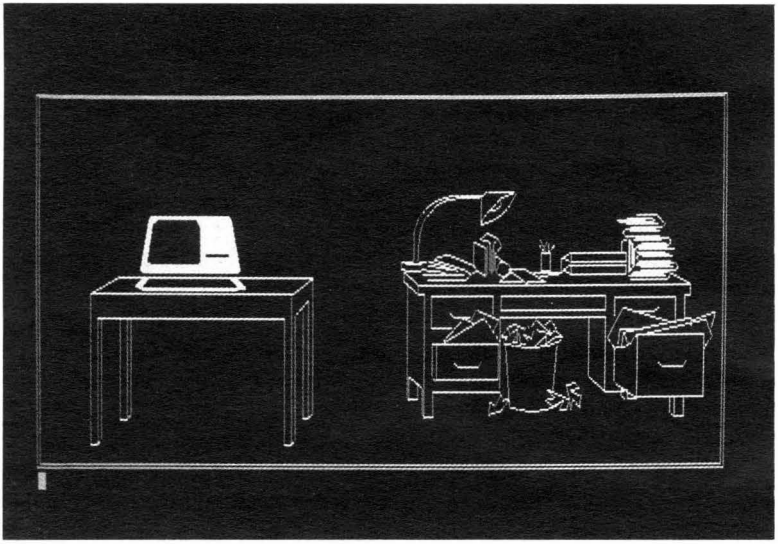
ALL-IN-1 Office Menu is designed to be "interruptable." While you are creating a memo using document processing, for example, a message appears on your screen telling you that someone has sent you new mail. You can interrupt what you are doing, read that mail message, and then return to the place in your memo you left.

This feature demonstrates just one way in which ALL-IN-1 works the way you work.

Desk Management

The Desk Management feature of ALL-IN-1 Office Menu helps you organize and simplify the repetitive tasks that you do at your desk every day. These tasks include updating your "things to do list" (or tickler file), telephone directory management, scheduling meetings and conference rooms, managing your calendar, and organizing your electronic filing cabinet.

Desk Management can look up telephone numbers faster than you can find and open your telephone book. It can let you know if you have any action items to take care of and remind you about those items that you've noted as high priorities. It can also schedule meetings for you based on the attendees, meeting times, and meeting rooms you specify.



Another feature of Desk Management is its Desk Calculator. Not only can you do such simple functions as addition, subtraction, multiplication, and division, you can do trigonometric functions as well. Any results from your Desk Calculator can be incorporated into your documents, reports, and mail messages.

Instead of spending your valuable time trying to keep your desk organized, Desk Management helps to organize your day and your work space, giving you more time to concentrate on the more important aspects of your job.

Program Development

The Program Development feature allows you to use your VAX/VMS system's full capabilities. You are not limited to using only the software that comes with ALL-IN-1 Office Menu. With Program Development you can add your own customized applications to the menu system.

You can also use this feature, with a small amount of training, to create your own simple applications using the forms development utilities and VAX DATATRIEVE.

In addition you can quickly develop simple applications to get at information that used to take weeks to get access to new applications, programs, and capabilities are easily added to your ALL-IN-1 system.

System Management

System Management has also been simplified on the Office Menu system. All of the tools for adding users to the system, updating user information, and maintaining mailing lists are easily available from menus on the system. Managing your files and filing cabinet is now as simple as answering questions or filling in the blanks.

You don't have to hire a experienced, expensive programmer to manage your system. System operations and management have been simplified so that anyone with a minimal amount of VAX/VMS training can manage your system.

User Profile

In this fast-moving world of business your job, location, and telephone number may change, on a monthly, weekly, or even daily rate. User Profile allows you to keep your personnal information up to date.

Information from your user profile is used by the system to create memo and electronic mail headers. You have control of keeping that information updated with the user profile feature. You can change your title, department, telephone number, location, account password, and additional information to control how ALL-IN-1 Office Menu works with you.

You don't have to wait for the system manager or a programmer to change your personal information. You can change your own information when you need to.

Help

The help feature has been designed as an integral part of ALL-IN-1 Office Menu. It's not always possible to keep a full set of documentation around to help you use all the features of the Office Menu system. Even if you did, you would spend too much time looking things up.

You can request help from just about anywhere in the Office Menu system. The system will respond by giving you simple help. It will give you more advanced help if you need it, and it also has computer-based instruction courses if you need in-depth assistance.

ALL-IN-1 Office Menu is easy to use. You don't have to memorize commands or keep a set of manuals around to use it. Help is available any time you need it.

Open System Architecture

It is not always easy to keep all of the information you need to do your job in one place. You keep information in your desk, in your filing cabinets, in your brief case, in filing cabinets in your office area.

An office system has to work in much the same way. Your information may be in your workstation, in the large computer system it's connected to, in the word processor out in the office, in the data processor down the hall, or even in some computer system across the country. No matter where that information is stored, though, you should be able to get it from the workstation at your desk.

ALL-IN-1 Office Menu lets you do just that. You have information immediately available from your DECmate, Professional, or Rainbow workstation. Using the communcations capabilities of your workstation you can access the Office Menu system for your electronic mail, electronic filing cabinet, and office applications. Using the Office Menu system you can also access information from other vendor's equipment, such as IBM or Wang, using the powerful communications capabilities of the VAX/VMS systems.

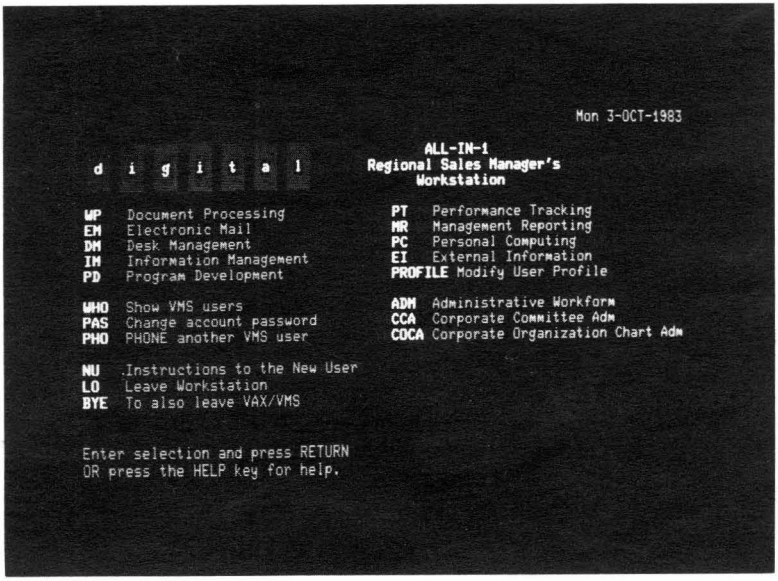
The information you need to do your job is available at the one workstation on your desk. Getting information from another mainframe or word processor is as simple as making a selection from a menu on your Office Menu system.

Customization and Adaptability

Every business is different. In fact, every person in every business is different. When you set up your office area, you do so in a way to make yourself productive, efficient, and comfortable. ALL-IN-1 Office Menu has been designed with this same thought in mind.

Any of the screens, menus, and forms can be changed to fit your specific needs. Using some simple tools you can customize ALL-IN-1 Office Menu to work the way you work, to make you more productive, to increase your effectiveness in your job, to make you feel comfortable using a very powerful office tool.

You aren't restricted to using a system designed by someone else to do just any job. You design your system to do your job.



Integrated Applications

With ALL-IN-1 Office Menu, you can also add additional applications or programs specifically designed to address your business problems. These programs can be provided by Digital (both standard products and custom written applications), by users, or by third-party software vendors.

In this way you can integrate those applications you need to run your business into ALL-IN-1 Office Menu. And that's the way you get a complete office solution.

ALL-IN-1 Office Menu Security

Through the use of sound operating procedures and system controls, information that you keep in your office system can be as secure as it would be if you kept it in your desk. You control many levels of the ALL-IN-1 Office Menu system's security. All of your private information can be kept private even if someone on the same system tries to access it. Using security and protection features of the VAX/VMS operating system and the additional security features of the Office Menu system, you can be confident that your information will remain yours.

Access to VAX/VMS

Every user of a VAX/VMS system is assigned an account, a user name, a user identification code (defining your group and member number), and password. You can change your password at any time, resticting access to your account to those people that you give your password. Even the system manager of your system cannot find out what your password is unless you divulge it.

Access to the Office Menu System

Once you have logged into your VAX/VMS system, you can start the Office Menu system (this may be part of your VMS login command procedures). In every Office Menu user's profile is a password. (This password is in addition to the password you need to log into the VAX system.) If you leave your password blank the system displays the first menu without checking for a password. If you put a password in, the system asks you for that password as an extra level of security. If you don't answer the password correctly, the system logs you off the system.

Documents and File Protectection

Every file, document, program, or database on a VAX/VMS system has a file protection assigned to it. This protection controls who has access to those files and what they can do to them. Your information can be protected using four categories that refer to what types of users can access and manipulate your data.

- Owner—users whose identification code is identical to that of the file's or data structure's.
- Group—users of the system whose group numbers are the same.
- System—users of the system with group numbers of an octal 10 or less. System users have certain privileges.
- World—all users.

In each category you can control the access to four levels of protection. They include Read, Write, Execute, and Delete. Using these levels of protection and the user categories you could, for example, limit access of a document to only those people in your group, and limit their access to read only.

By being able to control who can access your files, you can be assured of the security of your data.

Help and Computer Based Instruction

One of the major problems facing every office worker is education.

- How do you learn your job?
- What does your department do, and how is it done?
- Who do you call when you have a problem?

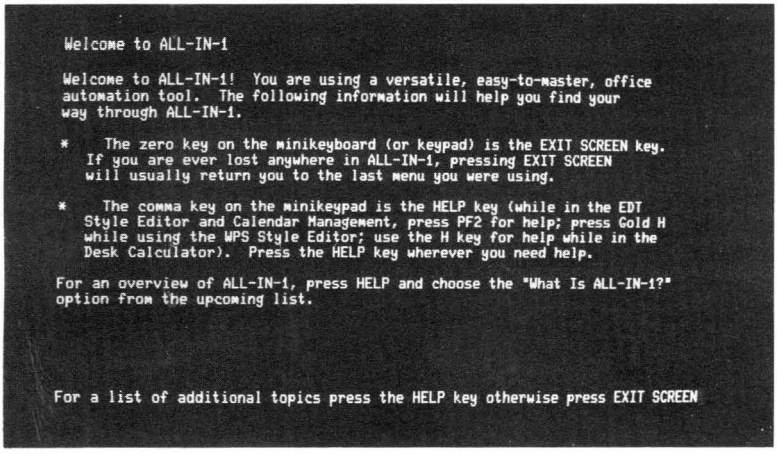
With the addition of Office Automation the office worker's job has been made easier and more complex at the same time. In addition to learning your job you now have to learn how to use and depend on an electronic piece of equipment on your desk. How do you learn how to use this workstation on your desk? Once you learn it how are you supposed to remember all it can do? Who do you go to when you have a question? Do you fear that your question so simple that you'll be laughed at for asking?

Digital has been asking these same questions, when designing products. Sure we offer educational courses to help educate and train you initialy, but what happens when you leave the classroom? What happens even before you get to the classroom?

Help

Help features are being designed into Digital's ALL-IN-1 Office Products. The Help key on the DECmate II, Rainbow, and Professional can give you immediate assistance on how to use your workstation. Help is also available, with a single key stroke, from the ALL-IN-1 Office Menu System.

Help is designed to give you a quick reminder for how to do simple tasks. Help is used as a reference, before you pick up an instruction manual. Usually the simple help messages will help you remember how to use a feature, find a special function key, or tell you what options are available in response to a command.



The Help feature can make your job a little easier, by having a reference available whenever you need it. With Help, your office solution gives you the simple answers to your questions.

Computer Based Instruction

Many All-IN-1 Office products come with a Computer Based Instruction package. These personal instruction packages can teach you the basic things you need to know to start using your Office System as soon as it is installed.

Computer Based Instruction courses are modular, step-by-step tutorials that you can take at your own pace. You can take the more advanced lessons whenever you have time or whenever you need to learn a new feature. An advantage of Computer Based Instruction is that you can take the courses right in your office, without ever leaving your desk.

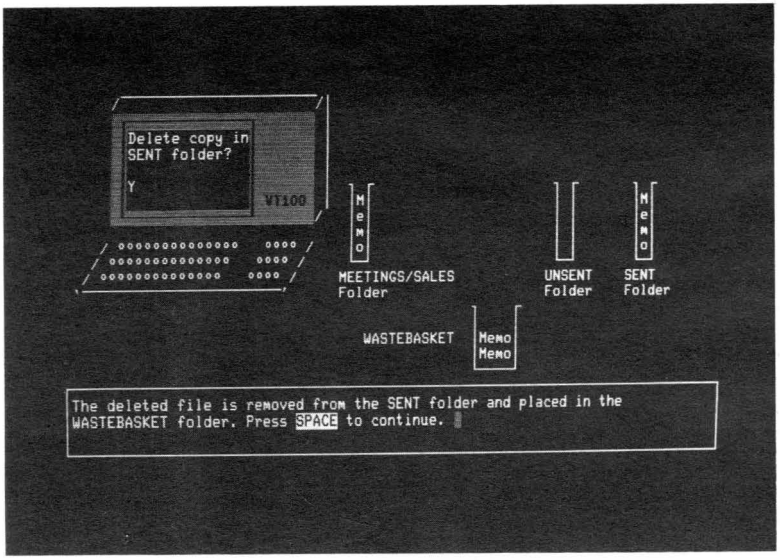
Computer Based Instruction doesn't replace the personal teaching approach, it complements it. If you need specific training not offered in computer based form, Digital offers more advanced classroom education.

Computer Based Instruction is like having an instructor available whenever you need training. You can start using your office system the very first time you sit at a workstation.



OPUS-20 Menu System

OPUS-20 is an easy-to-use menu-driven interface for DECSYSTEM-20 systems. It provides word processing, information management, and communications capabilities, as well as extensive help features for both distributed processing and the office environment. You don't have to know TOPS-20, the DECSYSTEM-20 operating system, to take advantage of OPUS-20, because OPUS provides a common, easy-to-use interface to all your application software. You have simple access to decision support as well as word processing software. Further, OPUS integrates with your distributed systems, so all your staff can access many data files.



Office Automation for DECSYSTEM-20

OPUS-20 provides word processing, information management, and communications abilities, including electronic mail, as well as special options that give you a calendar keeper, automated telephone directory, and keypad calculator. The menus and capabilities are similar to those of the ALL-IN-1 Office Menu System on the VAX, so once you learn on one office menu system you can use them both. This menu approach to all your applications increases your efficiency considerably.

Word Processing

OPUS includes access to a complete word processing editor that looks similar to DECmate's. You can have the features of an electronic typewriter with the extensive capabilities of a large computer. Pictures, illustrations, charts, and graphs created on any available graphics software packages can be incorporated into your documents.



You can create documents with that professionally printed look, that are easy to maintain, and can be easily shared among system users.

Electronic mail

OPUS offers a complete network electronic mail system that supports both distribution lists and nicknames. You can exchange information with other DECSYSTEM-20 users or with users on VAX/VMS systems. Your office communications thereby improves with quicker mail delivery.

Communications

Since only OPUS needs to know where each tool in a system or network resides, everyone can use the same computer for interoffice communications. Your mail system and calendar management utilities can run on the same system for all users.

This cuts down on network overhead and allows you to communicate easily.

Network Interface

OPUS can keep track of where your applications and information are stored. It also can run applications on other systems for you. All of the command information needed to run an application on another networked system is initiated by OPUS, simplfying your job.

Menu-driven Interface

OPUS's interface gives you a choice of applications, without any knowledge of the TOPS-20 operating system, so you need less training. For networking, OPUS keeps track of which application runs on which system and how they're accessed, so you don't need to know system information or commands.

Folders

OPUS has a simple, easy-to-use folder manager that lets you create filing folders electronically. With this feature, your information management performance improves significantly because of fewer lost documents.

Menu development

You can customize OPUS to meet your needs. You can change and expand menus to give you access to any application that runs on the DECSYSTEM-20. You then can have a menu appropriate to the way you work.



Chapter 2.
Office Capabilities

ALL-IN-1 has essential capabilities that can be classed as "office" functions or "generic office" capabilities. Certain tasks are performed by all white-collar workers, independent of the department in which they work or the profession they practice. All need to:

- Write down information
- Manipulate and configure information in a form that is easily understood by others
- Communicate and collaborate with other workers
- Manage their time
- File and retrieve information
- Move information from one place to another

ALL-IN-1 provides the computer applications that address each of these essential needs.

- *Word processing* products, provide efficient and effective tools for word and text management. Different people have very different word processing tasks. A complete range of ALL-IN-1 word processing products are available that address production word processing, for "typing pool" needs, for casual word processing, for the user's that only write an occasional memo or electronic mail message, and scientific word processing, for those who require the capability to input and edit equations.
- *Calculation and modeling* products give the ALL-IN-1 user powerful and easy-to-use tools that range from simple, interactive electronic calculator replacements, to the popular spreadsheet, to modeling systems, that allow algorithmic or complex interrelationship analyses.
- *Graphics* products allow display of information in easy-to-read and easy to understand formats, for reports or presentations. ALL-IN-1 supports a variety of graphics products, including simple graphics for analysis of information, financially oriented standard accounting datadisplay, and rapid and easy-to-use 35mm slide creation and generation. All are designed for use by an office worker who has neither programming or computer training or background.
- *Voice and Electronic Mail* offerings are extremely easy-to-use products for communicating with others. ALL-IN-1's Electronic Mail offers a full-purpose,

powerful electronic mail system, to meet your most demanding communications requirements. In addition, Digital's Voice Messaging System provides all the functionality, speed, accuracy, and security of text-based electronic mail, but offers the added dimension of voice handling capabilities. For conversion of computer generated text into natural human-quality voice, Digital's DECtalk offers voice quality and flexibility unparalleled in the industry.

- *Calendar and Desk Management* functions provide electronic calendar, tickler, and meeting scheduling capabilities. A giant step forward in the area of office practices, these simple tools eliminate loss of information, the shuffling of slips of paper, and the telephone tag often associated with scheduling meetings.
- *Filing and Retrieval* capabilities are straightforward and closely resemble traditional manual filing methods through the use of named documents, named file folders, and named electronic file cabinets. However, the benefits are significant. Information is available where you need it and when you need it. Departmental libraries or databases can give everyone with the same up-to-date information. A security system, which requires two levels of passwords for information access, protects valuable information. The user need not even know where a given piece of information is located. The VAX Information Architecture provides a "window" to the world of information for every ALL-IN-1 user.
- *Movement of Information* capabilities are integral to the ALL-IN-1 system. An ALL-IN-1 user can send information to anyone on the office network, regardless of location, worldwide. Data can be accessed from corporate or third-party databases and "moved" electronically into the user's own information structure for analysis, manipulation, or even inclusion in a report, presentation, memorandum, or private database.

The Key to a Complete Set of Office Capabilities is Integration

Thus, it becomes clear that ALL-IN-1, supported by the VAX Information Architecture and Digital Network Architecture, provides powerful, flexible, and essential functions for the office worker. But, there is more. ALL-IN-1 provides a tightly integrated system within which these functions operate. They all work together. Any document prepared by a word processing product can be mailed to any user on the network via the electronic mail facility. Words, data, and graphics can be combined in one document. The electronic mail facility is used to set up meetings through the calendar management menu. A document can be stored and retrieved. An application program can access the same facilities as a user workstation or terminal, allowing unique applications to be written that further enhance the overall office effectiveness.

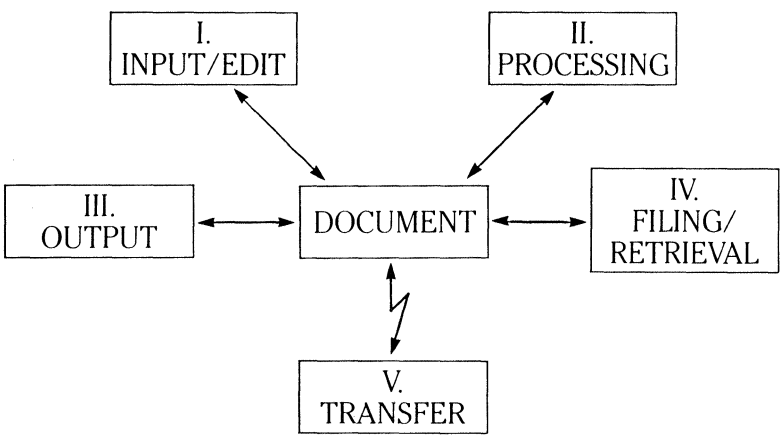
These are only a few examples. Of equal importance is the overall integrated design of ALL-IN-1 from a user perspective. All of the office functions described in this chapter are invoked by simple ALL-IN-1 menu selections. The ALL-IN-1 Office Menu flow control then sequences through all of the steps required to successfully complete the task or transaction with no user involvement. The user is freed from any concern about the details.

The following sections in this chapter discuss the ALL-IN-1 capabilities from a feature/benefit standpoint. Additional technical details are included in subsequent chapters.


COBO

Section 1.
Word Processing

Word or document processing can be defined as all aspects of producing any document that has text as its principal element. It is one of the most important pieces of an office system, and is the cornerstone of many other office applications. The five major components of document processing are:



This section will highlight the capabilities of Digital's word processing products in the first three areas: text input and editing, document processing and document output and printing. Components IV and V are discussed in the sections "Filing and Retrieval" and "Movement of Information."

Text Input and Edit

Digital has a variety of products that meet word processing needs. Selection of the best word processing product is based on two key requirements:

1. How frequently the user needs word processing to do a job. The casual user may actually access word processing only 10 percent of the time, while the heavy user may need it up to 50 percent of the time.
2. The specific features and functions the user requires. Managers may only need simple edit commands to create short mail messages or memos, while a professional or secretary may need full word processing capabilities.

Digital has three major word processing products to satisfy this range of needs.

- For the heavy user of word processing who requires full functionality: The *DECmate II* word processing workstation.
- For the casual user of word processing that also requires full functionality: *WPS-PLUS,* ALL-IN-1-based word processing.
- For the casual or heavy user who only requires minimal editing functionality: the *ALL-IN-1 Editor,* a simpler ALL-IN-1-based text editor.

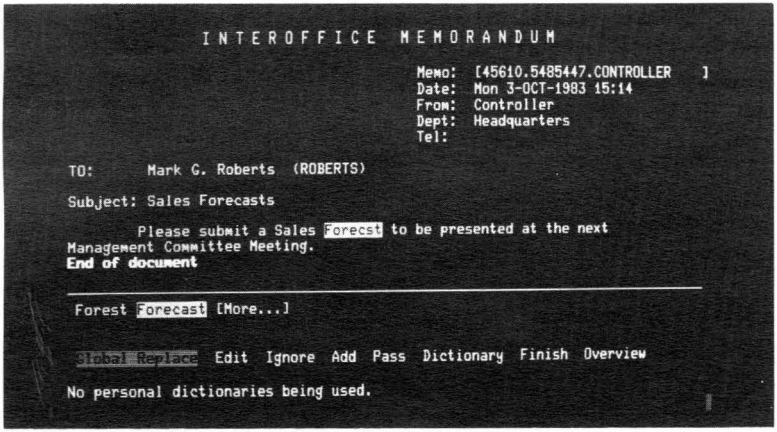
These three products all offer the same editing interface and can access the same documents. Users can start out using the ALL-IN-1 Editor, and grow into WPS-PLUS or the DECmate II as their needs evolve and expand. They can also be used in combination, too. A professional can use WPS-PLUS or the ALL-IN-1 Editor to create an initial draft of a document, and then send it to a secretary's DECmate II for final editing and printing.

This family of word processing products provides solutions for the majority of your needs. However, special cases may arise when you might need other alternatives for some specific applications. Digital's breadth of word processing offerings also includes:

- *MASS-11,* for the technical, scientific, or financial professional who needs advanced word processing features.
- *DECtype,* for OEMs who need to integrate word processing with DIBOL application packages.
- *SELECT,* for users who want to add word processing to Digital's industry-standard personal computer, the Rainbow 100.
- *PROSE-PLUS,* for users who need a basic text editor for Digital's Professional series of personal computers.

Document Processing

During or after creation of a document, users may need to perform additional operations. They may need to merge records and text via list processing, or to



check and correct spelling. Digital provides specific products to address these needs.

- *DECspell.* Spelling checking and correcting facility. Available for WPS-PLUS and the DECmate II. Full spelling verification and correction. Large standard lexicon plus user-specific lexicons.
- *List Processing.* Standard component of WPS-PLUS and the DECmate II. Subset available in DECtype. Full selection criteria. Integrated math and sort. Used for merging form letters with name and address lists, reports, data, etc.

Document Ouput and Printing

During document creation and production, users will require hard copy output of the document, both as drafts and as a final finished product. Included in this step is the selection of a specific printer for output, final pagination, page layout (margins, spacing, etc.), justification and hyphenation, number of copies to be printed, etc. The requirements for output vary widely between draft and final copy, between types of output device, between local and remote printing, etc.

- *WPS Print Menu.* Included as a standard feature on the DECmate II, WPS-PLUS, DECtype, and MASS-11. Used to output standard word processing documents. Choice of draft or letter-quality printing. Basic page layout and printing options.
- *DECpage.* An ALL-IN-1 application. Outputs any DX-format document to LN01 laser printer or letter-quality printer. Used to obtain high-quality output of office documents, such as proposals, reports, presentations, and manuals. Supports multiple fonts (on same page), true justification with proportional spacing, corporate logos, and automatic hyphenation and pagination. No graphic arts skills needed to use it; user picks from a standard library of print styles (fonts).

Digital's word and text processing offerings are broad and deep to meet the specific needs of a wide range of office users. Our goal is to provide the right word processing product for every individual, and to provide products that are fully integrated into the overall office information system.

DECmate II/WPS

DECmate II/WPS (Word Processing Software) is a full featured, professional word processing product available on the DECmate office workstation. Designed for high-volume document creation and modification, the software is entirely menu-driven for easy use; many intermediate menus can be skipped once you are used to the system. DECmate II/WPS uses Digital's Gold Key interface, which reduces most commands to two keystrokes. Other special keys let you delete, add, move, transpose, or duplicate text by character, word, line, paragraph, or block.

DECmate II/WPS's formatting features include underline, boldface, centered lines of text, uppercase/lowercase transposition, automatic pagination, automatic word wrap, date and time of document creation, automatic line justification, and semiautomatic hyphenation. And the DECmate displays underlined and boldfaced characters with highlighting for easy editing. In addition, DECmate II/WPS provides the following features and benefits:

User-Defined Keys

You can record a series of frequently used keystrokes and reduce the series to one stroke of the User-Defined Key (UDK). This not only saves your time by reducing the number of keystrokes you need, but also eliminates the chance of error in hitting the wrong key within a sequence. UDKs greatly simplify system use. And you can have up to 100 UDKs in your DECmate II/WPS system.

Concurrent Printing

While you're printing one document, you can edit another one. You save the elapsed time that would be required if you waited until printing was complete. You can continue to be productive while the system prints your document—or documents: up to eight documents can be waiting to print.

Automatic Document Index

DECmate II/WPS records the name, size, version number, date and time of creation, and date and time of modification of each document on the diskette in use. The software also maintains a running total of time spent on each document and on the most recent edit, and indicates how much space on diskette has been used and how much remains. This feature eliminates confusion about what is stored on any diskette. And you don't have to record and update valuable information about each document—it's done automatically. If you need to maintain logs, possibly to keep track of time to be charged against different jobs, you don't have to do it manually. DECmate II/WPS does it for you.

Computer-Based Instruction

An interactive teaching program provides the information you need to learn to use the WPS system, at the pace you can learn it. You learn about the system while you use it. The system is easy to learn; the instruction is under your control and moves at your pace. You can become productive quickly, and costly training is unnecessary.



Rulers

DECmate II/WPS's rulers allow you to set and change your format through margins (up to 158 characters), spacing between lines (single, double, half, or one-and-one half), tab stops, right margin justification, paragraph indentation, center of document position, and column alignment (right, left, or on a decimal point). You can design as many rulers as you want, and you can store up to ten in a boilerplate library for easy, quick reuse.

Global Search and Replace

DECmate II/WPS moves forward or backward through a document and finds or replaces all occurrences of text that you specify. You can save time by quickly making a global change. This feature simplifies and speeds editing and eliminates the possibility that you might miss some text you want to change.

Go-to-Page

With just a few keystrokes, you have immediate access to any page in a document. You can move forward or backward to a specified page or through a specified number of pages. You save the time you would spend to scroll manually through a document, and move quickly and easily to any page you want to see or change.

Boilerplate Library and Abbreviation Dictionary

DECmate II/WPS allows you to store standard information—boilerplate text, letter or memo formats, expressions, names, addresses, titles, technical words, and distribution lists—and easily add this information to the document you're working with. The text doesn't have to be retyped, reformatted, and proofread. Errors are reduced, with less time required for document preparation and editing.

Cue Cards

Prompting commands requesting further information, if the DECmate II/WPS system needs it, appear automatically on your screen. This feature simplifies system learning and use.

List Processing

You can create unique and customized documents from a form document. Because List Processing performs a select and merge function, you can pair the form document with all entries in your list or with selected entries. It's easy for you to prepare mass mailings, standard monthly reports, or standard forms. The flexibility this feature provides lets you mix, match, and customize your text in the form that you need it.

Editor and List Processing Math

With DECmate II/WPS, you can perform calculations (addition, subtraction, multiplication, and division) while you edit a document or during list processing. And you can add the results of these calculations to the document you're editing or processing. It's easy for you to create, update, and maintain numerical tables in documents. This feature improves the speed and accuracy of your numerical calculations.

Sort

You can arrange information in a list in ascending or descending alphabetic or numeric order. With a list of names and addresses, you can quickly order by name of addressee, name of town or state, or zip code. You can get accurate information quickly, and a tedious, time-consuming task is done automatically.

CX/AX/DX Communications

You can move documents electronically from a DECmate II to another DECmate II, or to another Digital word processing system such as WPS-PLUS. Rekeying and proofreading is unnecessary when information needed for one document is already contained in another document.

Communications Made Even Simpler

DECmate's true value as an Office Workstation becomes more obvious once you realize how easy it is to transfer documents to and from other systems. A new WPS software feature called Easycom makes it easy to dial, log onto a host, and issue start-up commands.

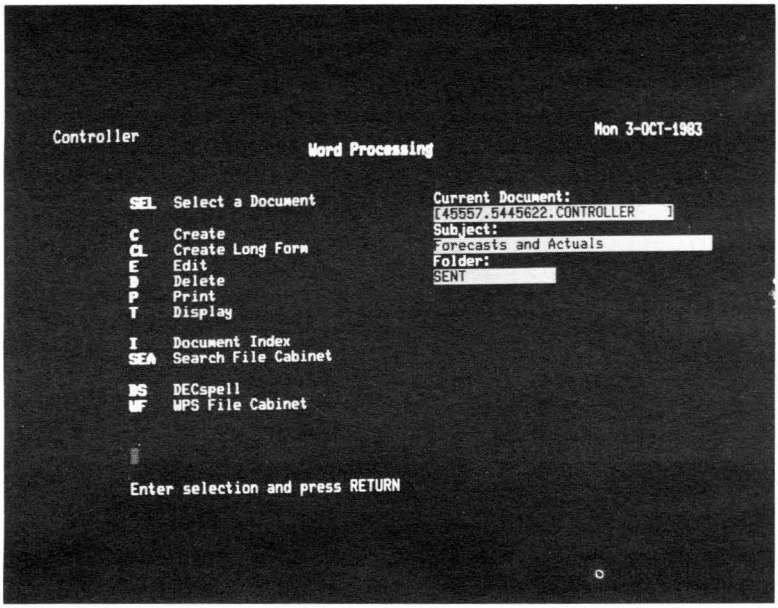
A single keyboard command puts you and your documents in touch with other office information systems such as our All-IN-1 system, other DECmate users, or even other vendor's systems and public information data bases like Dow Jones News/Retrieval, Compuserve, WESTLAW, and The Source.

ALL-IN-1 Editor

The ALL-IN-1 Editor, provided with ALL-IN-1 software products, is a basic word processing editor with which you can create documents and electronic mail messages. The ALL-IN-1 Editor uses Digital's standard WPS user interface. Features and benefits include:

User Interface

The ALL-IN-1 Editor uses the same easy-to-use word processing interface used by DECmate II/WPS and WPS-PLUS. This minimizes retraining, if you're already familiar with Digital's WPS system. You can be productive quickly. And you have the mobility to work in the same way on any computer system, such as the DECmate, that uses Digital's WPS word processing software.



Gold Key Functions

The Gold key allows use of the alternate functions of the keyboard and keypad. You can press the Gold key, for example, and then the key for G on the keyboard (the Gold Get combination) to add text from another document in the ALL-IN-1 system to the document you're editing. The Gold key functions enhance and expand your word processing capabilities, and save your time by reducing most commands to two keystrokes.

Cursor Movement

You can move the cursor horizontally or vertically by character, word, line, section of 16 lines, or page. It's easy to position the cursor to wherever you want to change your text.

Full-Screen Editing

You can edit your document at any place that appears on your video screen. It's easy to make changes—you can see how they'll fit into the overall context of the page.

Word Processing Capabilities

You can delete characters and words, cut and paste text, swap characters to correct transposition errors, search for text and replace it if you want, center text, and set tabs and margins. These basic capabilities make it easy for you to create and change documents.

Full Integration with ALL-IN-1

While you are using the ALL-IN-1 Editor, you can add information stored in other ALL-IN-1 files to your document; you can also incorporate information from standard VAX/VMS files into your document. This saves the time of retyping information already available elsewhere, thus eliminating the potential of introducing typing errors and the need for proofreading.

MASS-11

MASS-11 is a full-featured word processing software product that gives you the capability to create and edit scientific and technical documents. Its scientific character set can be used either with its English character set for text or to create and edit scientific equations. And MASS-11's features of automatic paragraph numbering, redlining, and footnoting make it easy to work with large documents. Features and benefits include:

Scientific Character Set

MASS-11 provides the full complement of math symbols and Greek letters. And you can see these characters on your screen or in printed form on your VT100 video terminal or LA100 printer equipped with a special ROM. MASS-11 gives you the character set, and supports the output options, that you need to create scientific and technical documents easily.

Equation Editing

You get full-screen editing and the capability to mix English and scientific characters, move complete equations, use full-line and half-line spaces, and denote any level of equation through subscripts and superscripts. It's easy to create and change the equations presented in your scientific and technical documents.

Footnoting

MASS-11 automatically places each footnote at the place appropriate for its reference, numbers the footnote according to where it occurs, and keeps track of the numbers of all footnotes in the document. You can easily add and track footnotes with great accuracy.

Redlining

When you make changes to your document, MASS-11 highlights them so that you can see them. New characters appear in bold on the video screen and on the printed copy; deleted characters appear in reverse on the video screen and have dashes through them on the printed copy. This feature helps you keep track of changes that have been made. It also reduces the time required for proofreading, because only the changed areas need be checked.

Automatic Paragraph Numbering

You can use symbols rather than actual numbers for paragraphs; if you then reorder paragraphs, they are renumbered automatically. Each document can include up to five numbering schemes, with any combination of Arabic, uppercase and lowercase alphabet, and uppercase and lowercase Roman numerals. Automatic paragraph numbering simplifies the production of large reports and proposals. And it ensures that the numbers of your paragraphs agree with their order in the final copy.

Column Manipulation

MASS-11 allows you to reorder rows or columns through copy, cut, and paste. It's fast and easy to work with the tabular material frequently used in scientific and technical documents.

Full-Screen Editing and Cursor Control

You can change your document at any place that appears on your video screen, and you can move through your document horizontally or vertically with the cursor arrow keys. It's easy to make changes—you can see how they'll fit into the overall context of the page. And by using the cursor arrow keys to move through the text, you can get to the place you want to change quickly.

User Interface

MASS-11 uses the same easy-to-use word processing interface used by DECmate II/WPS and WPS-PLUS. This minimizes retraining, if you're already familiar with Digital's WPS system. You can be productive quickly. And you have the mobility to work in the same way on a VAX/VMS system with WPS-PLUS or on a DECmate system.

DECdx File Transfer Compatibility

Everything that you type into a document—the text itself and the commands that control the format—can be moved to a DECmate or to another computer system with Digital's DECdx document transfer software. This saves time by eliminating the need to rekey documents created on DECmate and needed on VAX/VMS, or vice versa.

Automatic Pagination

You can let MASS-11 control widows and orphans and page numbers, specifying any combination of Arabic, uppercase and lowercase alphabet, and uppercase and lowercase Roman numerals. And with semiautomatic pagination, you can control any pages that you want to change. With this flexibility, you get your choice of numbering schemes and pagination. And you save the time required to number pages manually.

Dual-Column Printing

MASS-11 allows two columns to be printed at the same time. You don't have to print one column, realign the paper, and print the second column. This gives you the flexibility of two-column copy without the time required to realign and print again or paste up pages manually.

Horizontal Scroll

The cursor scrolls across your screen horizontally in increments of 40; your maximum width is 250 characters, 132 of which show on the screen at one time. MASS-11 thus allows you to create and edit wide tables easily.

On-Screen Justification

Your document can be printed with right margins justified or ragged, and the document you see on your screen looks like the document that will be printed. You have the choice to produce a document with a high quality appearance, and you can see what the document looks like before you print it.

List Processing

With List Processing, you can select and sort records, such as addresses, and merge them into documents. This saves you the time of pulling together mailing lists and addressing each document.

Libraries

MASS-11 lets you store boilerplate text, forms, phrases, and signature blocks for use in any documents where they're needed. The necessity to rekey standard material is eliminated. Standard text is inserted quickly and accurately, without the need for proofreading.

User-Defined Keys

You can record a series of frequently used keystrokes and reduce the series to one stroke of the user-defined key (UDK). This not only saves your time by reducing the number of keystrokes you need, but also eliminates the chance of error in hitting the wrong key within a sequence. UDKs greatly simplify system use.

Concurrent Printing

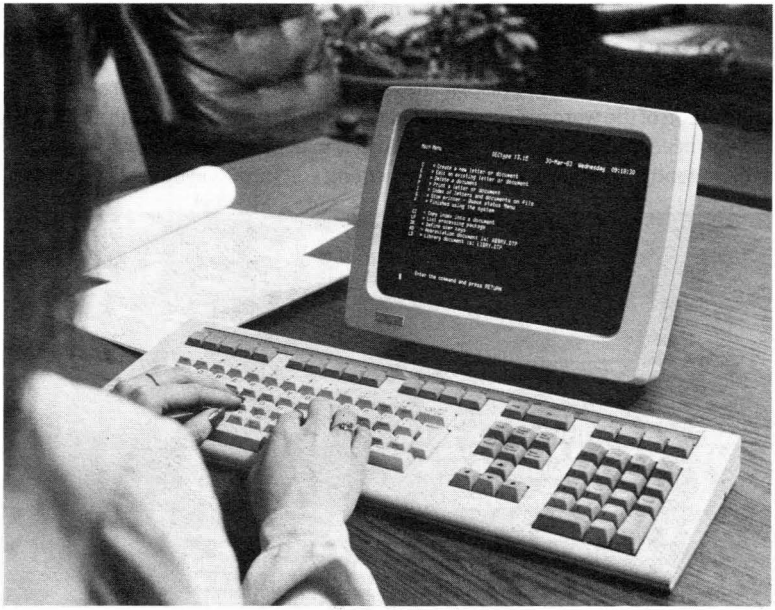
While you're printing one document, you can edit another one. You save the elapsed time that would be required if you waited until printing was complete. You can continue to be productive while the system prints your document.

DECtype

DECtype brings layered word processing to Digital's Datasystem 300 and VAX/VMS computer systems. This product adds word processing capabilities to a system whose primary function is data processing, and is recommended as the solution to secondary needs for word processing. Its features and benefits include:

Menu-Driven Operation

DECtype gives you a list of options (creating, editing, or filing) from which you select the function you want to perform. Because your options are presented, it's easy to learn about and to use the system. You can be productive quickly, with minimal training and minimal frustration.



Center Screen Editing

You make changes to your document in the center line on your screen, which allows you to see preceding and following text. It's easy to make the change—you can see and think about how it will fit into context.

User Interface

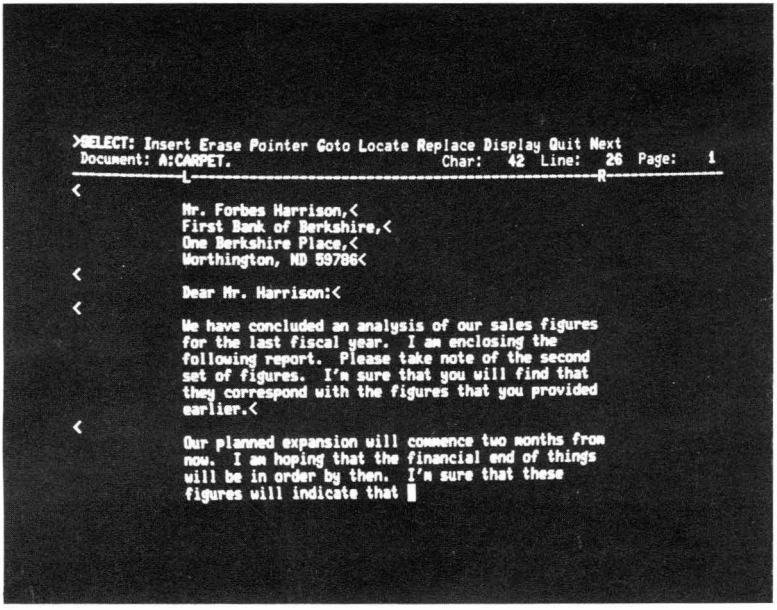
DECtype uses the same easy-to-use word processing interface used by DECmate II/WPS and WPS-PLUS. This minimizes retraining, if you're already familiar with Digital's WPS system. You can be productive quickly. And you have the mobility to work in the same way on a VAX/VMS system with WPS-PLUS or on a DECmate system.

User-Defined Keys

You can record a series of frequently used keystrokes and reduce the series to one stroke of the user-defined key (UDK). This not only saves your time by reducing the number of keystrokes you need, but also eliminates the chance of error in hitting the wrong key within a sequence. UDKs greatly simplify system use. And you can have up to ten UDKs in your DECtype system.

Help Facility

This feature allows you to display the keyboard layout on the screen and get an explanation of the word processing function keys. You can easily get the information you need to use the system fully, if you lack experience with the system or use it infrequently. This saves your time by helping you through your task quickly.



Math Package

With DECtype, you can perform calculations (addition, subtraction, multiplication, and division) while editing. You can then add the results of the calculation to your document, if desired. This increases the accuracy of the numbers you use in your document, and saves you the time of turning to a separate calculator for answers.

List Processing

You can create unique and customized documents from a form document. Because List Processing performs a select and merge function, you can pair the form document with all entries in your list or with selected entries. It's easy for you to prepare mass mailings, standard monthly reports, or standard forms. The flexibility this feature provides lets you mix, match, and customize your text in the form that you need it.

SELECT

SELECT, a word processing software product, runs under the CP/M operating system on Digital's Rainbow 100 series of personal computers. Professionals will find SELECT easy to use for reports, memos, lists, schedules, and other documents. SELECT's features and benefits include:

Menu Driven Software with Computer-Assisted Teaching

SELECT provides a menu of options from which you choose the function you want to perform and demonstrates on your video screen how the system works. With these capabilities, SELECT teaches you how to use the system. With this easy-to-learn and easy-to-use system, you can be productive quickly.

Full-Screen Editing and Flexible Cursor Movement

You can edit your document at any place that appears on your video screen. It's easy to make changes—you can see how they'll fit into the overall context of the page. And with SELECT, you can move the cursor forward and backward by character, word, line, or page; to characters you specify; or to the top or bottom of your document. With this flexibility, it's easy to get to the place you need to change, as well as to make the change.

On-Screen Formatting and Justification and Automatic Pagination

The format you choose is displayed on the screen as you create and edit your document. You can see what the document looks like—and make any changes you want—even before you get a printed copy.

CP/M ASCII File Format

SELECT creates files in CP/M ASCII format, and edits files created in this standard format with other software. This allows you, for example, to generate a file with MULTIPLAN software and then edit it with SELECT, saving the time of retyping it.

Spelling Verification

You can verify correct spelling from SELECT's 10,000-word dictionary, expandable subject only to the limitations of disk space. SELECT can help you ensure accuracy and thus enhance your professional image.

Form Letter Processing

You can create unique and customized documents from a form document. Because SELECT allows you to merge documents, you can pair one document, a form letter, with each entry in another document, a list of names and addresses. SELECT increases your productivity by reducing the time-consuming repetitive tasks required for mass mailings.

Running Heads and Feet, and Variable Pitch

At your option, SELECT provides heads and feet with page numbers. This saves you the time of manually adding heads and feet, and guarantees accuracy in page numbering. SELECT also prints with variable horizontal pitch (characters per inch across the page) and vertical pitch (characters per inch down the page). You can print with differing sizes of type fonts, according to your needs.

PROSE-PLUS

PROSE-PLUS, a full-screen text editor, adds word processing capabilities to the Professional 300 series of personal computers. As one more member of the growing family of software applications for the Professional 300 series, PROSE-PLUS combines with the multitasking, storage, and communications capabilities of the Professionals to provide a truly integrated and efficient method of producing written communications. PROSE-PLUS meets the needs of the secretary, professional, or executive through an easy-to-use system that makes even the casual user feel comfortable.

PROSE-PLUS lets you easily delete or insert characters. You can cut and paste blocks of text to rearrange words, sentences, or even paragraphs, with speed and accuracy. And you can easily control all tabs, margins, and page breaks to ensure that your final page will look great. The system's features and benefits include:

PROSE Compatibility

Files prepared with your existing PROSE editor are fully compatible with PROSE-PLUS. You can use PROSE-PLUS to edit any documents you've already created with PROSE. And if you've already learned to use PROSE, you'll find PROSE-PLUS especially easy to use.

Menu or Command Mode

You can use PROSE-PLUS no matter what your level of experience with the system. If you're a casual or inexperienced user, you can choose PROSE-PLUS's menu mode, which gives you a list of your options. You'll be productive quickly, without frustration. And when you're familiar with the system, you can skip the menus and switch to command mode.

Help Key

Online help is available through one keystroke. And the help you're given when you press the Help Key addresses your current task and options. The system is easy to learn and easy to use.

Full-Screen Editing

PROSE-PLUS is a full-screen editor, which means that you can move the cursor to any place on the screen to make your change. You can see how the change will fit into context. And you'll be able to see the new page format as soon as you make your change.

DECspell

DECspell is an easy-to-use, interactive spelling verification and correction software product based on the American Heritage Dictionary published by the Houghton-Mifflin Company. DECspell has a British English or American English master lexicon (dictionary word list) of 76,000 words. This dictionary can be expanded through personal and shared lexicons by up to 12,000 words. DECspell is available in two versions: one that includes spelling verification only and one that includes both verification and correction.

DECspell runs on VAX/VMS and DECmate II computer systems. The product's features and benefits include:

Spelling and Capitalization Verification and Correction

DECspell identifies errors, drawing on its list of 76,000 words correctly spelled and capitalized. This eliminates the possibility that an error will be overlooked, improves the accuracy and quality of your document, and minimizes proofreading and the time it requires. And when DECspell finds an error, it suggests the correct spelling, saving you the time of looking the word up in a dictionary.

Menu of Verification and Correction Options

After identifying a misspelled word, DECspell lists your options. You can replace the error with a correction where it is identified, or you can save time and replace it throughout the document. You can ask for more correction possibilities. You can edit the line, leave the word as is, or add the word to the dictionary. Or you can ask for online help about DECspell. With this flexible product, the choice is yours.

Typographical and Cognitive Correction Capability

DECspell offers correct options both for typographical errors (for example, *the* for *teh*) and for cognitive errors, or misspelled words that are close to correct or sound like a correct word (for example, *absolute* and *obsolete* for *obsolute*, or *physician* for *fizishun*). DECspell enhances the quality of your documents by extending your written vocabulary with words you know but cannot spell.

High Degree of Accuracy

Spelling correction is 99 percent accurate, the highest degree of accuracy available on the market today. And this accuracy comes with an average of only 1.2 suggested corrections, as compared to 4 or 8 suggestions by other spelling-correction products available. You get highly accurate correction, and it's fast. You don't spend time considering many potential corrections.

British and American Lexicons

DECspell's lexicons, or dictionary word lists, consist of 76,000 words with either British or American spellings based on the American Heritage Dictionary. You have the flexibility to use DECspell whether your English is British or American. And DECspell is comprehensive: the list of 76,000 words well exceeds the average working vocabulary of 30,000 words. The lexicons are organized to show you the most frequently used words first, so you don't spend unnecessary time considering obsolete and infrequently used words.

Personal and Shared Lexicons

The dictionary of correct spellings can be expanded with up to 12,000 industry-specific and personal terms. The personal lexicon contains words that you alone have access to; ten other shared lexicons contain words that both you and others in your organization can use. DECspell can be adapted to your specific needs. You won't have to spend time approving a correct word that is not listed in the American Heritage dictionary, nor will you misspell a word specific to your occupation, organization, or industry.

Edit Capability

You can edit your document and check the spelling at the same time. This saves you the time of making a separate pass through the document. In addition to the time saving, you have the flexibility to revise or correct your document while you're checking the spelling.

ASCII and DX Document Support

DECspell checks ordinary, industry-standard ASCII text files as well as documents in Digital's DX format. You have the flexibility to use DECspell with a wide range of documents created on word processing systems by Digital.

List Processing

Digital's word processing systems like DECmate II and WPS-PLUS include a powerful and flexible list processing tool to help you use the data stored in your system. With list processing, you can select data from your files and merge them with another document. You can write a letter, for instance, and automatically personalize it from a list of names and addresses, or you can combine financial information with a report. List processing lets you mix, match, and customize your documents in almost any way you want.

Personalized Multiple Copies

From your list of names and addresses, for example, list processing produces a crisp, original letter personalized for each one. You type the basic letter only once and it's automatically reproduced for each name on your list.

This automatic merging enhances the quality of the work environment because it eliminates a boring, repetitive task, saves time, increases productivity, and reduces errors.

Selection Criteria

List processing software can test records in your lists and select only those that meet your criteria for processing. The flexibility list processing gives you saves you time; it prints only the information you need.

Ease of Use

You create your lists of names and forms for statements, reports, and letters as easily as you would type any other document. Your selection commands are in ordinary English, so you don't have to learn special codes or mnemonics.

WPS Print Menu

For each document you create on your ALL-IN-1 Office Menu system, you have a choice of how it should be printed. The Office Menu system and DECmate II/WPS come with a standard print menu. This menu gives you a choice of any of the available printers, including high-speed impact printers, draft-quality printers, and letter-quality printers.

Printer Selection

The Print Menu gives you a choice of any of the available printers on your office system. Choices can include draft printers, letter-quality printers, laser printers, or even your own terminal (DECmate II/WPS is limited to draft or letter-quality printers). Printer selection allows you to pick the printer closest to you, so that you can pick up your document outside your office instead of somewhere else in the building. If there is one printer you use most often, you can have that printer established as your default printer. Of course, you can always override the default if you need your document printed on another printer. The system helps you determine which printers are available, taking some of the guesswork out of your job.

Variable Print Formats

To meet your specific office needs, Digital offers a wide range of printers that can be attached to your office systems. Printers can be set up to take advantage of special type fonts or formatting characteristics. When you are creating your documents, you can use draft printers to print your work quickly. When your document is in a final form, you can send it to a letter-quality printer or a laser printer for high-quality output.

You have a choice of printers for general printing requirements and for formal high-quality printing, so your documents are presented in the most appropriate formats.

Automatic Document Selection

The Print Menu automatically selects the last document you worked on, since it is usually the document most often requested. However you can also enter the name of any document in your filing cabinet.

You don't have to remember the name of the last document you worked on, or even type the name in—the system fills in the needed information for you, making your job just a little bit easier.

DECpage

DECpage is an ALL-IN-1 application that allows you to print documents produced on your word processing system with professional print quality and accuracy, without the need for text markup or graphic arts skills. DECpage takes advantage of multiple fonts, true proportional spacing, and even corporate logos to create high quality office printing.Much more than a print facility, DECpage adds visual impact and professional quality to word processing. It's easy to use, requires no special characters, and anyone with access to a word processing system can use it.

Comprehensive Word Processing Support

DECpage can print any document created with Digital's word processors. If you use a DECmate II, WPS-PLUS, or any word processing system on ALL-IN-1 (DECdx format), you can create DECpage documents.

DECpage Uses Digital's LN01 Laser Printer

DECpage can print any document on an LN01 attached to an ALL-IN-1 system. This means that you can increase your productivity dramatically; with the LN01, DECpage can print much faster than a letter-quality printer. Also, you enhance your professional image, because the LN01 has higher print quality than a letter-quality printer. Finally, you save money by saving paper; you can print the same text in a smaller space.

DECpage Also Supports Letter-Quality Printers

You also have the option of standard letter-quality printing, so you can choose the most suitable printer for your needs.

If you don't need laser quality for certain jobs, especially initial drafts, you have a choice. So you can conserve money and resources.

Standard Word Processing Keyboard Conventions

You use regular word processing characters, like bold, underline, returns, and tabs when you create a document. You don't have to learn special typeset or graphic arts symbols. In fact, anyone who can use word processing can use DECpage; you don't need additional training.

A Library of Standard Print Styles

Once you create a document, you select the best print style from the library. This includes styles for memos, letters, reports, directories, newsletters, presentations, and general printing. DECpage then takes care of everything else—formatting, spacing, and font selection.

DECpage, therefore, saves you time: you can create several different "looks" for a single document by simply selecting different print styles, without revision. And you don't need graphic arts skills to do it!

Customized Print Styles

You can have several of the standard print styles customized to suit your organization, so your printing looks exactly the way you want it. Even corporate logos (available through the Compugraphic Corporation) can be installed as part of DECpage.

Advanced Printing Procedures

DECpage automatically controls vertical and horizontal text justification, hyphenation, pagination, section numbering, "widows and orphans," or single lines of text left abandoned at the top or bottom of a page.

This saves time, increases productivity, and helps establish a good work environment by relieving you of repetitive manual proofing.

ALL-IN-1 Facilities

You access DECpage using ALL-IN-1 menus, so you take full advantage of such facilities as online Help. Because of the ALL-IN-1 menu system, DECpage is very easy to learn, so you can become productive quickly.


PRODUCT SALES
SALES IN THOUSANDS
PROD C
PROD B
PROD A
0
100
200
300
(THOUSANDS)
1974
1975
1976
1977

Section 2.
Graphics

Use of graphic representation of information is a key office capability. Information presented through charts, graphs, and pictures help both the presenter and the viewer interpret and communicate ideas. Graphics provide an easy-to-read, often dramatic, high-impact information medium for analysis or presentation. This section descibes Digital's graphics software products.

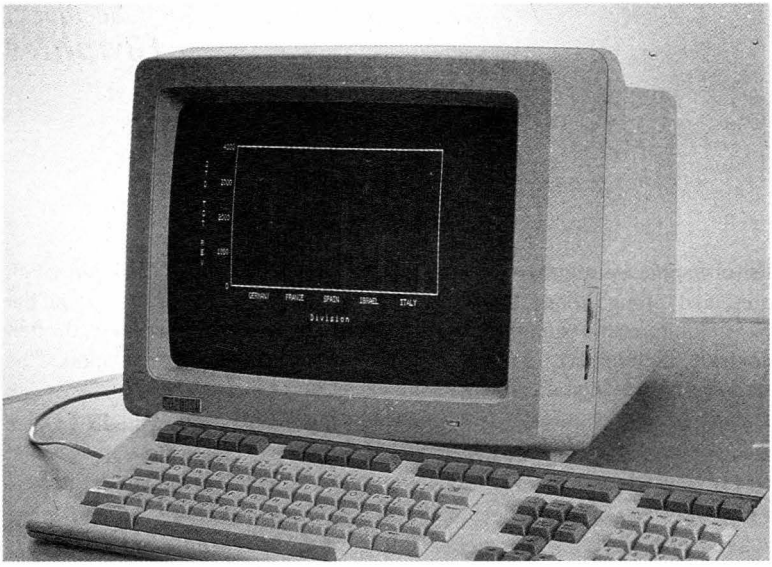
When graphics software and hardware are made a part of the ALL-IN-1 Office Menu System, the user can quickly and inexpensively create those images that best get the point across. With ALL-IN-1, you can select the capabilities that best suit your needs.

Key to how easy a graphics product is to use is the level of integration it exhibits with other office functions and applications. DATATRIEVE and DECgraph, for example, can be used both interactively and can be called by applications programs to access the information you need and format it the way you want it. These products will process the raw data, from any of the databases supported by the VAX Information Architecture, and generate highly legible graphics displays of that information. The use of DATATRIEVE or DECgraph provides superior information management tools for decision support or information display. Both are easy to learn and easy to use.

FINGRAPH provides graphic display of standard financial information for individuals who analyze or manage business functions through the use of such data. It is epecially useful for auditors, security analysts, and venture capital partners who use comparative financial information. FINGRAPH displays bar charts that show all changes that result from a change on one parameter, for example, to allow analysis of trends and their causes.

DECslide is a tool for the rapid development of presentation graphics. With ease-of-use as the key design parameter, this product can be used by business professionals with a minimum amount of training, directly from the workstation in their office. Through the use of a 35mm camera presentation-quality slides can be quickly and easily generated.

POLYGRAFIX is a set of five integrated graphics utilities that provide sophisticated plotting and graphics design tools for the technically oriented business professional. Full editing, plotting, and presentation capabilities are provided.



All of the Digital's graphics products can coexist on a single machine, allowing use of the right product for any given task. They are all callable from a customized ALL-IN-1 menu. A brief overview and the positioning of these products follow.

An Overview of Digital's Graphics Products

DECgraph

- General decision support graphics
- For professionals and managers
- Easy to use by nontechnical users
- High-quality presentation of graphics information

DATATRIEVE

- Used by application developers or interactively accessed via workstation or terminal
- General decision support graphics

FINGRAPH

- Standard financial decision support (balance sheet, operating statement, etc.)
- Specific audience, for example, auditors, security analysts, venture capital partners
- Graphic display of traditional standard financial data for individuals who analyze or manage through use of this type of information

DECslide

- General easy-to-use, rapid preparation of A/V (slide) quality graphics
- Used with Polaroid 35mm slide maker or similar output device

POLYGRAFIX

- Sophisticated capabilities and complexity
- Basic capabilities replaced by DECslide and DECgraph
- For technically oriented users

The following sections describe the capabilities of each of these products.

DECgraph

With DECgraph, an interactive business graphics application, you can create, modify, and disseminate charts and graphs. It increases your productivity as an office professional by providing necessary decision support easily and efficiently. You can gather information stored in any of several databases on multiple systems and/or simply enter the information directly on a terminal.

You then can design the graph and combine it with data to create a graph file for printer or video terminal display. Because the data, design, and graph files are maintained independently, you can modify or store them as you wish.

Menu-driven interface

Regardless of your technical experience, you can use DECgraph to design and generate high-quality graphs.

The simple instruction menu helps you produce sophisticated graphics with no loss of productive time.

Also, the ALL-IN-1 system gives you access to larger databases.

Electronically mailed graphics

ALL-IN-1's electronic mail facilities mean that you can mail the graph you create to other users or offices.

This enhances communications, saves time, and saves on paper.

Color graphics

DECgraph provides up to 10 palettes with 10 colors per palette. This means that you can control the visual impact of your charts and graphs; increased impact means better productivity because your information is retained better by your readers. Color graphics also enhances your image as a professional because your graphics look so professional.

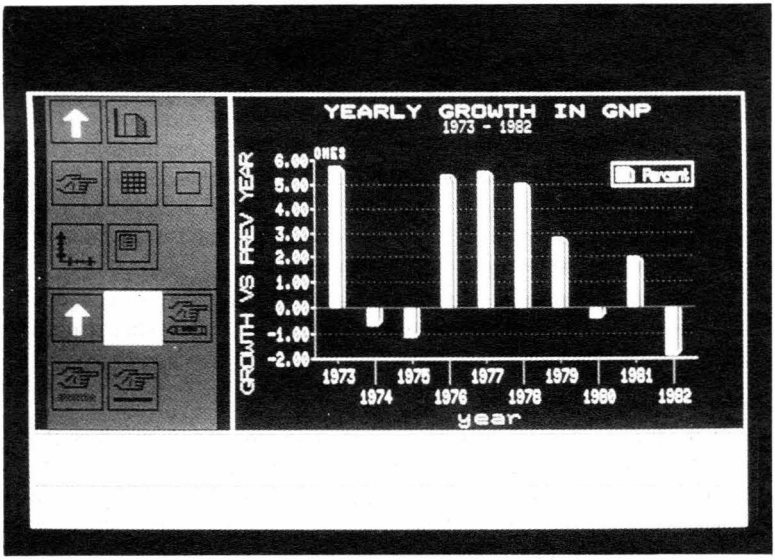
Variety of graph types

You have the choice of six different types of charts from which to choose—line, scatter, vertical cluster bar, vertical stacked bar, pie chart, and histogram. Besides those, you have further chart options that include drop shadow, fill, trend lines, and isolated pie chart sections. You can plot up to six Y variables for every X variable, and your X values are unlimited.

You can see that your productivity will be increased markedly through use of these detailed, easy-to-read graphics.

Icons

DECgraph's user interface incorporates state-of-the-art Icons.These are special menu pictographs that helps inexperienced users to easily learn and use DECgraph. To further aid the novice user, there's an online help facility.



Output flexibility

Your DECgraph charts can either be printed on a black-and-white printer or output to a color hardcopy device that makes them into 35mm slides, overheads, or prints.

This flexibility makes it easy for you to generate graphs for the greatest visual impact with the greatest efficiency. You don't have to redesign charts for reproduction in various media, so you save time and effort.

These and other features like full-screen chart display for easier editing; single- or double-sized printing; and simple-to-understand documentation make graphics presentation easy for the user who has little or no computer experience.

DATATRIEVE Graphics

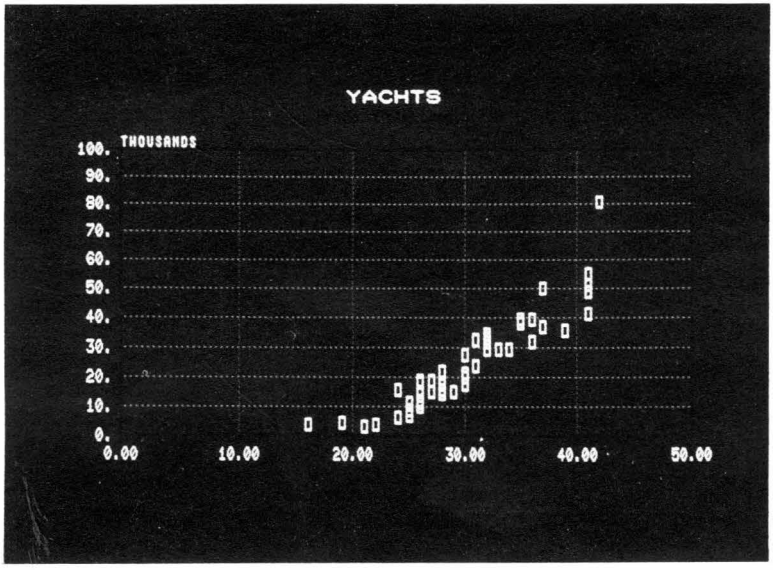
DATATRIEVE is a versatile, easy-to-use software tool for data storage and retrieval and report writing and graphics. It's a complete data management package that you can use quickly and profitably, yet it is sophisticated enough to serve the needs of even the most experienced users. Information is at your fingertips. It can give you the big, little, or in-between picture, lets you change perspectives, and helps you produce detailed reports that present facts, statistics, and breakdowns. DATATRIEVE graphics capability includes histograms, bar charts, a variety of pie charts, X-Y scatter diagrams, and time-series graphs.

Above all, it lets you share information with a central VAX/VMS system or a multiprocessor cluster. Freedom of information, therefore, stretches to encompass your whole organization.

Interactive Graphics

With the PLOT statement, you can enhance your reports with graphics. PLOT allows the system to interpret the values in each of the fields you've selected, calculate interrelationships, plot a line on the basis of those calculations, and display it on your screen.These displays can be histograms, bar charts, several varieties of pie charts, X-Y scatter diagrams, time-series graphs, and many others.

With DATATRIEVE PLOT, you get a clear reading of the developed trends; DATATRIEVE allows you better analysis of vital information to give you the competitive edge.



This is only a small portion for the larger DATATRIEVE picture. DATATRIEVE is discussed in more detail elsewhere. The graphics capability helps support the greater whole; because DATATRIEVE has the capacity to interpret data rather than merely follow your instructions, it can be of significant help in such areas as data management, in which data is organized according to the structures you define; information management, in which established system functions like graphics convert the data into a readable format; and decision support, to help you make informed decisions in the daily operations and future of your organization, and to communicate those decisions to your colleagues.

FINGRAPH

For tracking and plotting vital business data like regional sales, quality-control performance, manufacturing and sales quotas, budget analysis, and market penetration, through parameters that you define, FINGRAPH is an extremely powerful yet easy-to-master information management and decision support tool. Developed by Irwin W. Jarett & Associates, Inc. and Digital, FINGRAPH lets you transform pages of data into graphs. You can "see" operations and make decisions more easily and with greater accuracy with FINGRAPH information at your fingertips.

FINGRAPH, converts financial data into highly legible bar charts that show all changes that result from a change in one parameter. With this powerful analysis at your disposal, you can identify trends and their causes—information that you need to help make better informed decisions.

Menu-driven

A menu interface makes access to FINGRAPH quick and easy. Because FINGRAPH guides you, it's not necessary to learn a new system. User productivity, therefore, is enhanced.

One-time setup

FINGRAPH stores the initial setups of your charts for future use. You can quickly generate the most often-used ones. You can regenerate charts to review and compare information quickly. You then have more time to make informed decisions to retain your competitive edge.After the initial one-time design and database linkage is completed, you can regenerate charts whenever the database is updated.

Automatic chart scaling and labeling

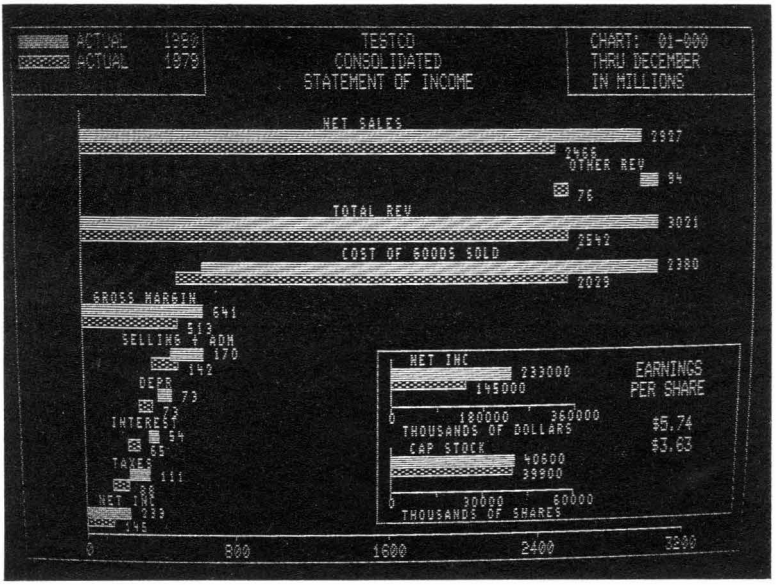
FINGRAPH's design lends itself to showing such performance comparisons as time periods and budgets. When charts and their elements are labeled and in scale, you can get a better picture of your business and its operations.

Because scaling and labeling make data easier to comprehend, you save time and increase control over your management functions.

Addition, subtraction, and multicolor elements

Addition, subtraction, totaling, and multicolor elements in FINGRAPH let you more easily isolate and identify various parts of your chart.

By having this comparison tool available, you can compare actual results with forecasts, focus on exceptions, and better understand underlying causes. Here, FINGRAPH helps you retain a competitive edge, reduce or avoid expenses, and analyze and synthesize information in a more timely manner.



A variety of financial performance graphics formats

FINGRAPH displays several standard financial data like income statements and balance sheets, so you can use it at once to analyze common financial data without setting up special formats.

A variety of outputs

FINGRAPH offers slide show capabilities for logical sequencing of chart displays, and provides print output to either screen or paper through many of Digital's graphic devices.

Through FINGRAPH, you can generate sophisticated business graphics at a fraction of the cost of traditional methods. You automatically increase profits through reduced expenditure, saved time, and increased productivity.

FINGRAPH is invaluable for any business that must control, report, or analyze financial or numeric data. By making complex information easier and quicker to understand, FINGRAPH can give your company a head start on the competition.

DECslide

Presentation of your ideas is the most critical aspect of effective management—"a picture is worth a thousand words". Without using an art department, *you* can create screen presentations with DECslide. You can present both text and charts inexpensively and quickly. Easy to learn and use, DECslide allows you, regardless of your computer or graphic arts expertise, to make single-frame, full-screen images. You can either display them on a color monitor or output them to a color printer or to a 35mm camera that produces color slides and transparencies.

DECslide helps you to produce professional-quality presentation graphics that are both practical and easy to do. Aspects that make DECslide an efficient, cost-effective means for presentation of your visual data.

Save and Restore keys

DECslide's Save and Restore keys let you edit and change your slides after creation, and add them to other directories if you wish. You can then, merge a standard boilerplate with your newly created slides if you wish.

With the Save and Restore keys, you can increase productivity and save time by not having to produce an entirely new slide in every instance. You can take a "snapshot" of your slide anywhere during its construction and store it for future reference. DECslide provides a powerful tool for better and more timely information synthesis.

Menu-driven interface

Standard ALL-IN-1 text menus plus special DECslide submenus help users who have or no experience get an easy, step-by-step tutorial in designing, displaying, storing, merging, and printing screen images.

DECslide's ALL-IN-1 menu interface enhances the quality and consistency of the work environment. The result is an increase in productivity and a significant reduction in training expense.

Online help facility

Online help makes the DECslide system easy to use, even for the novice. Simple question-and-answer formats help you find your way out of any design difficulty.

Because DECslide's help facility works with you it helps your work style, increases your productivity, and increases your ability to make timely decisions.

DECslide's Icon interface operates in much the same way as DECgraph's. This means that there's a standardization of symbols. Icons help you select such functions as Design, used to design both text and figure slides; help to call the help function, Single and Double, used to print single- and double-sized hardcopy images.

Icons simplify your use of this powerful business tool, because you don't need to remember several unfamiliar mnemonics. At the same time you have a quick and inexpensive way to produce "art-department" presentations.

Message key

DECslide notifies you of messages received while you're working on slides.

The system works the way you work; you can't devote whole, uninterrupted time blocks to one project, so DECslide keeps you informed. The result is that you have more control over your time.

Two-step slide design

DECslide lets you construct images just as if you were using drafting tools. Initially, you draw a rough draft, using erasable and changeable lines, text, and objects. Only after you're satisfied do you color or ink the image to "accept" it. The construction process is at all times visible to you.

Because slide construction is a step-by-step process, you won't be confused when doing a DECslide. You have total control over the the quality of the work you produce.

Paint function

Paint accesses a menu designed to color your images; Palette gives you a choice of 10 palettes and 10 colors per palette. Background gives you the same options for background color. Object lets you paint specific parts.

You have a wide range of choices to customize and dramatize your images. With the flair available, you can present a more forceful message to your audience, attain a competitive edge, and therefore improve your results.

Export function

Export creates a file with the graphics commands in it that can be sent to another user.

The Export facility allows slides to be rapidly and accurately delivered to remote users via DECmail. It puts information or decision-making tools in the hands of those who need it, so the data are current and users have a broader information base.

Good management is good dissemination of information. Presentation of that data in a timely, easy-to-understand manner is vital to you, your staff, and your market. DECslide, an easy-to-learn management graphics tool, can make your management more effective.

POLYGRAFIX

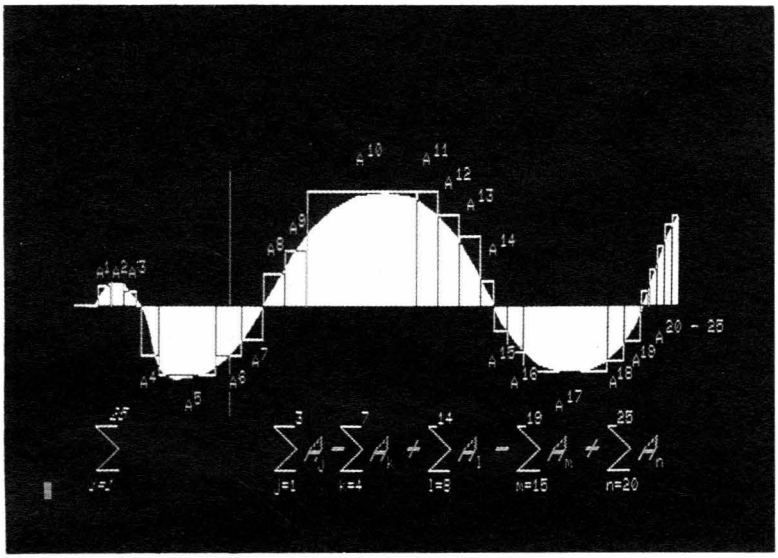
POLYGRAFIX is a set of full-function modular computer graphics packages that can bring your ideas to life. With it, you can simplify complex thoughts and turn them into colorful graphic presentations, analyze and plot data by multicolor charts, and turn text and artwork into illustrated documents quickly and inexpensively.

POLYGRAFIX is a combination of five software packages—Graphics Editor, Data Plotting, Character Set Editor, DEC-RITE, and Slide Projection—that can work together or as separate units. These modules, designed to interact with one another, are integrated into the ALL-IN-1 concept to provide wide-ranging graphics capabilities.

Modular, building-block design

Each POLYGRAFIX package supports and enhances the others and can support other of Digital's products, within the ALL-IN-1 framework.

This modular design gives you access to a broader information base, and enables you to make more informed business decisions before you put your ideas onto your terminal.



Graphics Editor

The POLYGRAFIX Graphics Editor Package lets you create a picture—from a simple word slide to a complex drawing. Simple curves, circles, lines, boxes, and text are your building blocks to powerful visual aids. Because you can see what you're doing, you can create and modify your images dynamically to produce just the effect you want.

The Graphics Editor gives you effective and practical tools for better and more timely analysis and evaluation, and establishes a foundation for more and better data integration. This, in turn, means more informed decisions for a competitive edge.

Data Plotting

The Data Plotting package permits you to translate numbers into pictures and graphs, whether a corporate balance or a market demographics breakdown. It equips you with spreadsheet analysis and plotting capabilities, and uses basic statistics like mean, range, variance, standard deviation, and percentage, or nonparametic comparative statistics like chi-square.

Pictures are more easily digested than numbers: the Data Plotting Package can really present your message so that productivity is enhanced and both you and your staff have more time to make decisions.

Character Set Editor

With the Character Set Editor, you can redefine your keyboard. If you need characters with special meanings or even an entirely new set of symbols, you can create them using CSE Scientific notations, the Cyrillic alphabet, or your company logo are a keystroke away. You can incorporate them into regular text with no problem. Also, because it's so simple and visually dynamic, you can customize your keyboard without any previous programming knowledge.

Because you don't have to use valuable time to manually modify your presentations, you save both in actual expense and in enhanced work environment. Your presentations are clearer, so you maintain your competitive edge.

DEC-RITE

DEC-RITE creates documents that incorporate both graphics and text. You can perform a full range of editing tasks like fill, word wrap, copy, tab setting, search, cut and paste, full cursor motion, and picture placement; and you can watch what you're creating on the monitor as you create it. Combined with POLYGRAFIX's other packages, DEC-RITE is even more powerful. Together they allow you to insert diagrams into your text according to your own layout preferences.

DEC-RITE increases your productivity by permitting easy, time-saving creation of illustrated documents that enhance your persuasive powers and communicate your ideas.

Slide Projection

The Slide Projection Package is an interactive capability that gives you the power to create high-quality slide presentations yourself, quickly and inexpensively. You produce the images you want with Graphics Editor, Data Plotting, or your own previously developed slides, and collect, edit, and display them by slide projection on your monitor or large video projecion screen. If you need portability, it can produce the same high-quality graphics in hardcopy with various cameras and other output devices.

The Slide Projection Package is easy to use, so you save time, increase productivity, and better control the time available. Also, you're sure to get your ideas across.

The five packages that comprise POLYGRAFIX are unique in that they can be purchased and used as separate entities, or purchased and used together to form an extremely powerful yet easy-to-use complete graphics presentation system. You can incorporate only what you need, and if you need greater capabilities later, you can add them without fuss. Get the sum or its parts: it's up to you.

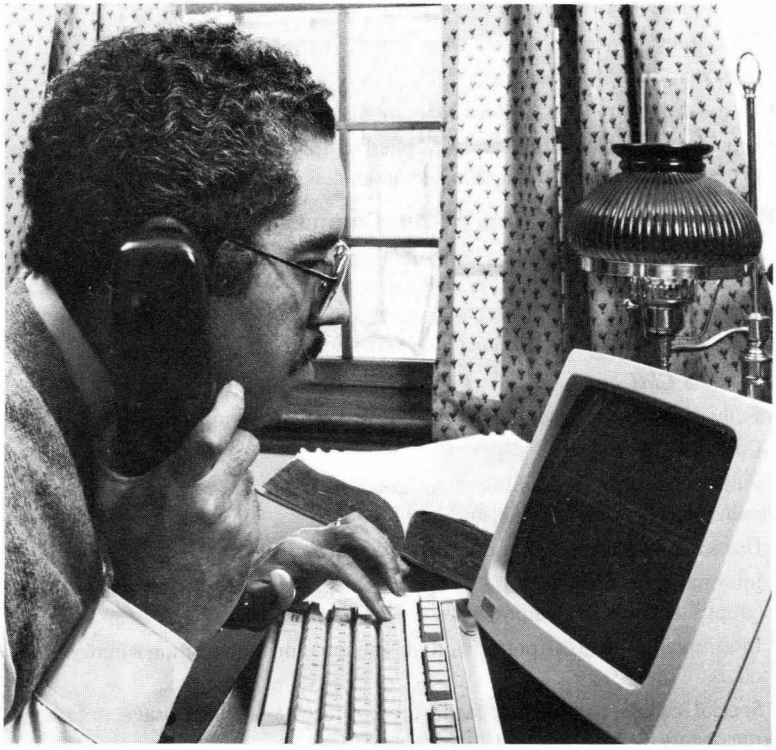


Section 3.
Voice and Electronic Mail

Electronic mail addresses a major need in any business: efficient and effective personal communication. A key problem in the way we communicate today is that we are not always available or "at our desk". Therefore, successful communication products must allow us to be in our office, at home, on the road (hotel or pay telephone), or in our automobiles, when we communicate.

Digital offers a range of voice and electronic mail products that address these needs. They can conveniently be partitioned into three areas:

- "Telephone" communication
- Written communication with those within your company
- Written communication with those outside your company



Telephone Communication

Digital offers a variety of products to cope with the problem of cryptic, incomplete phone message scribblings and difficult access to information while away from the office.

Digital Voice Messaging System

- Standalone Voice Messaging System
- Converts and stores voice input in digitized voice format
- User can send voice message using telephone
- User can access stored voice messages from telephone
- Provides ability to communicate when office workstation is not accessible (out of the office, on the road, in a hotel, at a pay telephone)
- Provides ability to communicate with users who do not have access to an office workstation

DECtalk

- Text-to-speech conversion system
- High-quality computer-generated voice
- Offers range of voices, speech rates, and intonation patterns
- Speaker or telephone output
- Stored dictionary for trade terms, acronyms, product names, etc.
- Provides technology that can be applied to applications that need telephone access and/or voice output of information stored on computer

Written Communication Within Company

Electronic mail applications facilitate the generation, sending, receiving, and processing of written information. Digital provides electronic mail capabilities for users on all of its major operating systems. Each of these message handling services can be connected to each other in a DECnet network environment.

ALL-IN-1 CMI

- Fully integrated electronic mail for ALL-IN-1 Office Menu
- Customizable
- Full complement of mail functions: send, read, create, answer, forward, file, edit, print, distribution lists, and more
- Users can send mail without concern for status of network links
- Information from other ALL-IN-1 applications can be included in mail message (graphs, spreadsheet output, word processing documents, etc.)
- Interruptable—you can perform other functions and then resume where you left off
- Special features include help facility, return receipt, status message, automatic messaging for calendar meeting scheduling

VAX DECmail

- Full-function standalone electronic mail system
- Excellent for dedicated corporate mail networks
- Optionally available for general purpose VAX/VMS systems and VAX ALL-IN-1 systems
- Users can send mail without concern for status of network links
- Special features include computer based instruction, command mode, nicknames, scheduled send, DX for distributing WPS documents
- System management accounting utilities for billing/charging purposes

DECmail/RSTS

- Electronic mail for multiuser RSTS/E PDP-11 systems
- Available as separate product and as MENU-11 option
- Offers full complement of capabilities
- Provides ease of use necessary for office environment
- Commands consistent with VAX DECmail
- Users can send mail without concern for status of network links
- Special features: Help, folder filing system, list messages by author or subject, export message into RSTS/E

DECmail/MS

- Electronic mail for DECsystem-10 or -20
- Available as separate product and as OPUS-20 Office Menu System option
- Provides full complement of mail functions
- On DECSYSTEM-20, users can send mail without concern for status of network links
- Special features include communication to ARPAnet users, attach file or document to message, DX, choice of editors

Mail utilities for VMS and RSX

- Quick messaging utility offered with operating systems
- Suitable for technical users or computer experience users
- Basic mail functions such as send, read, answer, forward, etc.
- Requires some operating system expertise for more advanced functions (distribution lists, nicknames)
- Knowledge of node addressing required for multinode messaging via DECnet
- User resends message if network links not available

Written Communication Outside Company

It is often necessary to exchange written information quickly and efficiently with individuals in another company. Digital offers solutions for electronic communication between different companies.

Electronic Mailroom

- Electronic mailing to the U.S. Postal Service's E-COM service
- Provides ability to do cost-effective mass mailings outside company
- User creates mail on office workstation, computer transmits mail to E-COM system, E-COM prints letters, stuffs envelopes, delivers mail
- Supports five letter types
- Provides powerful word processing for letter creation

Gateways

- Provide electronic mail message delivery from office workstation to other companies via external message systems (example: TWX, Telex)
- Gateway development available through Digital software services consulting
- Software architecture supports flexible communication extensions

Digital's Voice Messaging System

Digital's Voice Messaging System gives you all the capabilities, speed, accuracy, and security of text-based electronic mail, but offers the added dimension of voice-handling capabilities. From a standard touch-tone or rotary-dial telephone anywhere in the world, you can access the system to send, receive, file, or delete voice messages to another person, regardless of whether that person is a subscriber to the system or not. This added dimension of voice personalizes the message and, more importantly, greatly expands the accessibility and flexibility of communications.

The Voice Messaging System offers you timed delivery so that you can have the message or information delivered to whom you want, wherever that person may be, when you want it delivered. You can schedule a message for delivery up to nine days hence the Voice Messaging System is a boon to the business organization with on-the-road personnel who do not always have easy access to a terminal or workstation. Sales representatives, for example, can receive or send important business communications anytime of the day or night from a standard telephone. Sales management can provide sales leads, set up meetings, or request account updates with the Voice Messaging System. Your company's engineers and technicians can call in for "next call" assignments, updates on the delivery of machine parts, or for any other up-to-the minute information.

Digital's Voice Messaging System consists of a Digital Equipment Corporation computer, a proprietary sound and voice processing device called the "Big Talker," and proprietary software developed by Voicemail, International.

Voicemail, International's "Big Talker" hardware and software subsystem converts the human voice into a form that can be used by a computer. Once converted, or digitized, the voice message is directly sent to a system disk, bypassing the computer's CPU. This direct deposit to disk frees up the system, prevents bottlenecks and high-system overhead associated with other types of voice messaging systems. Once digitized, the message can be retrieved from the disk or disks and handled by the computer system just like any other information. It can be stored, forwarded to another person, delivered, filed, retrieved, or deleted.

The basic voice messaging system lets you:

- Send a message
- Cancel a message
- Send a message for delivery up to nine days later
- Time and date stamp and check a message
- Perform message forwarding with up to six telephone numbers
- Perform "VIP" message forwarding where only messages from selected callers will be forwarded
- Broadcast group messages

- Save messages
- Replay messages
- Delete messages
- Skip forward through messages for quick review
- Automatically head-up a response to eliminate the need to enter the addressee's box number

The device used to create or access the message is a standard telephone. The user's key to invoking the message-handling functions of the Voice Messaging System is the standard touch-tone pad. If touch-tone dialing is not available, Voice Messaging operator-assistance is activated automatically. The delivery or output of the message is done via the telephone; the message is "read" by the system in the sender's natural voice because the Voice Messaging System employs a high-quality reproduction process incorporating state-of-the art electronic recording techniques.

Digital's Voice Messaging System does not require PBX supervision. It is FCC-licensed and approved for direct connection to the public switched telephone network. This eliminates the need and costs of a PBX.

Voice Medium for Electronic Mail

Digital's Voice Messaging System uses the medium of voice to transfer information contained within mail messages.

Voice provides you maximum messaging flexibility and offers:

- Intonation/inflection capability for emphasis, or effect
- Ease of message creation
- Ease of message comprehension (most commonly used communicative interface)
- Flexibility in message creation and receipt vehicle (no need for access to a terminal or workstation—messages can be created or received at or from any standard telephone worldwide, anytime of the day or night)
- Can be used by the visually impaired

These features of the Voice Messaging System work to communicate your information in a flexible and powerful way, overcoming traditional barriers to communication.

Identification Code Protection

Digital's Voice Messaging System checks for a valid user identification code before access is permitted.

Use of or access to your account is protected. The Voice Messaging System provides quick accessibility for authorized users who enter a proper seven digit code defined as your key.

Quick Scan and Retrieval of Waiting Messages

Quick access to selected messages allows you to instantly play, replay, or save important or interesting messages.

Digital's Voice Messaging System lets you quickly scan your message inbox and select one or more that you may want to hear right away. Important messages can be saved and replayed at any time. These important features provide you with a system that is both flexible and secure.

Message Forwarding Capability

Messages can be automatically forwarded to any location. Critical information is never lost or delayed if you happen to be elsewhere. The message can still get through to you with no compromise in time or effectiveness.

VIP Message Forwarding

The forwarding function can be used (or invoked) for messages only from a specified list of callers.

You can have all the benefits of "do not disturb", but still allow the important messages to get through to you. You determine the list of senders whose messages will be forwarded.

Timed Delivery and Reattempts

You can control or specify the delivery time and date as well as the reattempt frequency (if initial delivery is impossible).

Important or time-dependent messages can be sent when you want them to be sent. If the receiver is not available at the originally designated time, you can designate alternate delivery times (or reattempt schedule). This powerful feature allows your messages to be time-controlled for maximum effectiveness.

Message Broadcast Capability

You can deliver a single message to a large group of individuals simultaneously. Digital's Voice Messaging System lets you simultaneously send your message to a large group of people. Your important messages can be timely and consistent.

Touch-tone or Rotary-dial Capable

Digital's Voice Messaging System can be used from either a touch-tone or a rotary dial phone. This unique feature offers extreme flexibility to "on the road" personnel. Your important communication gets through regardless of phone type, location or time of day.

Printed Call Activity Report

The Voice Messaging System can generate a printed itemization of all messaging activity. This hardcopy audit trail can be used for verification, confirmation, or tracking purposes. Vital communication activity is tallied and can be monitored.

Message Box

A subscriber can offer access to his/her message box to anybody. Even nonsubscribers can call a user, hear a user-delivered message, and leave a message.

This added dimension gives you or your organization a powerful customer service tool. Communication to or from nonsubscribers and subscribers broadens your communications boundaries.

DECtalk

DECtalk's powerful and exciting new text-to-speech system converts text from a computer system into natural, human-quality speech. Using a unique, state-of-the-art combination of voice, microprocessor, and signal-processing technology, DECtalk offers voice quality and flexibility unparalleled in the industry.

Before DECtalk, if users wanted computer-generated voice for an application, they had to settle for simple messages and robot-like voices. DECtalk has changed all this by producing natural, human-quality voice with unlimited vocabulary.

Physically, the product is a small, modem-sized unit that is connected to a computer via a RS232C (standard) terminal port. The unit can be compared to a printing terminal, except instead of printing, it talks.

Unlike less advanced systems, DECtalk's vocabulary is unlimited. Its large, built-in dictionary includes familiar and frequently used words, numbers, and abbreviations. A user can also build an auxiliary dictionary for trade terms, acronyms, and other special words. In addition to its dictionaries, DECtalk's library of letter-to-sound rules increases its pronounciation capabilities even more. With these rules, DECtalk can generate "educated guess" pronunciations for unfamiliar words or letter combinations not found in its dictionaries. High-quality speech, however, requires more than just precise pronunciation. It requires voice variety as well. This, too, is a unique feature of DECtalk. DECtalk "speaks" with a wide range of voices, speech rates, and intonation patterns to give messages both variety and emphasis. The user can choose from a variety of



voice types, speaking rates, and pronunciation and intonation patterns. The voice types can be male, female, or child. The rate of speech can range from 120 to 300 words per minute. DECtalk offers a selectable speaking mode so that it can "speak" full-sentence, word at a time, or letter at a time. Its flexibility works to meet your needs.

DECtalk has the flexibility to meet the needs of a broad range of applications. It can be configured as part of a system sending voice output to a speaker. Or, it can interact with a user over a common telephone. DECtalk's Touch-tone phone decoding capability means you can develop interactive applications where a standard telephone Touch-tone keypad is used remotely input data into the system. The output, or required information, can be "spoken" by DECtalk. Additionally, DECtalk can be used with a video display terminal or workstation to provide voice translation of displayed text.

For the office, DECtalk provides convenience, control, and flexibility. Users who do not have immediate access to a terminal or workstation can access their electronic mail using a telephone. Remote or "on-the-road" professionals can use any standard telephone to read their mail, access electronic calendars, or proofread word processing documents anytime of the day or night. DECtalk can also be used for voice output in training and instructional applications.

Text-to-voice conversion

DECtalk converts text that is either resident on or input into a computer to high-quality, user-selective speech.

Users can access electronic mail messages from any location, at any time, over a standard telephone. DECtalk can to provide voice renditions of training or instructional information. It can also be used to access electronic calendars, transfer or "read" documents, and files.

State-of-the-art application of technology

DECtalk uses a combination of sophisticated voice, microprocessor, and signal processing to provide unparalleled voice quality and flexibility. DECtalk "speaks" in a natural, human-quality voice with precise pronunciation and unlimited vocabulary. So DECtalk is easy to understand and very effective.

Unlimited vocabulary

DECtalk incorporates two dictionaries. The main dictionary includes a comprehensive collection of familiar and frequently used words, numbers, and abbreviations. You can also specify special words like trade terms, and acronyms for an auxiliary dictionary.

DECtalk's unlimited vocabulary makes it the most effective and flexible text-to-speech conversion system in the market. You won't need to write messages around system vocabulary constraints—DECtalk can deliver your messages the way you want them delivered. DECtalk can even incorporate your industry's or corporation's jargon and product names.

Sophisticated pronunciation capabilities

DECtalk incorporates an extensive library of letter-to-sound rules. This allows DECtalk to generate an "educated guess" pronunciation of unfamiliar words or letter combinations that are not found in its two dictionaries.

This increases DECtalk's pronunciation capabilities and broadens the applications that DECtalk can be used for.

Voice variety

DECtalk "speaks" with a wide range of voices, speech rates, and intonation patterns. Voice types can be male, female or child. Speech rates can range from 120 to 300 words per minute, and the speaking mode can be either full sentence, word-at-a-time, or letter-at-a-time.

DECtalk "speaks" in a natural, human-quality voice.

Flexibility in output devices for DECtalk

DECtalk can output to its integral speaker, an auxilliary speaker, or a telephone.

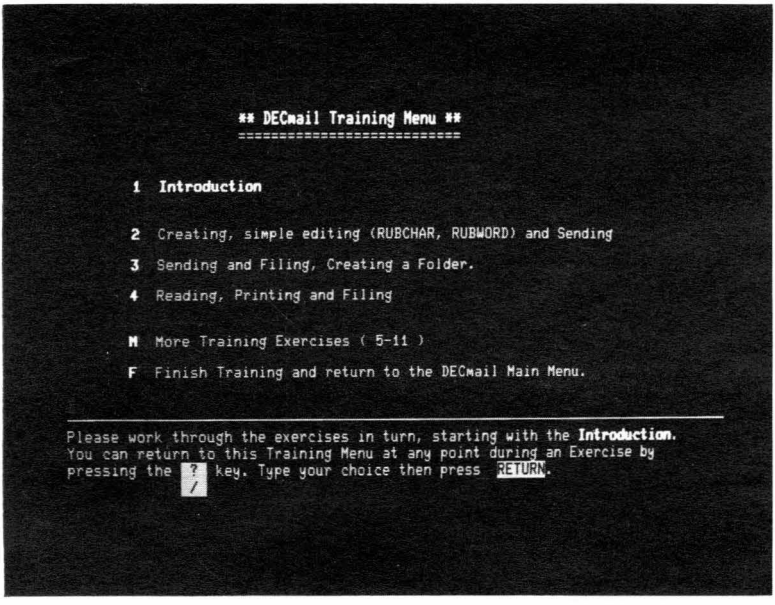
This flexibility in device used for output or "delivery" of messages allows you to choose the most appropriate means of delivering your message.

Office Menu Electronic Mail

To address the important communications needs of your office, Digital offers a powerful and flexible electronic mail product called Office Menu Electronic Mail. These electronic mail capabilities combine our proven network communications products with an easy-to-learn and easy-to-use menu-driven user interface.

A Customizable Mail Interface (CMI) provides a fully integrated electronic mail package for ALL-IN-1 Office Menu. Documents and information from other ALL-IN-1 applications or databases can easily be included in electronic mail messages. And as the name indicates, it can be customized to adapt to user's needs and preferences.

DECmail, a standalone electronic mail system, is also available with ALL-IN-1 Office Menu. It provides a complete set of mail, messaging, document management and document transfer capabilities necessary for a corporate-wide mail network.



"Total Capability" Electronic Mail

ALL-IN-1 Office Menu's Electronic Mail products offer a full complement of general mail functions, including:

- READ incoming or filed memos
- CREATE memos
- ANSWER or respond to memos
- FORWARD memos with automatic generation of a cover memo
- SEND a memo, answer, or forwarding memo to another user
- FILE memos in one or more folders
- EDIT or revise a memo
- ATTACH a copy of one memo to another
- DETACH or break up a memo into component pieces or attachments
- PRINT a copy of a memo
- IMPORT or include a system file into a memo
- EXPORT or transfer a memo into a system file
- DX or document transfer capability between an ALL-IN-1 system and DECmate word processing system

Menu-Driven

The options and capabilities of Electronic Mail are presented to you in menus. These menus guide you through the entire process of working with the product. Simple keystroke responses to the menu options make Office Menu's Electronic Mail work for you. Powerful electronic mail functions can easily and quickly be accomplished with little or no training.

Command Mode

ALL-IN-1 Office Menu's Electronic Mail gives users flexible access to their messages by accomodating different user's workstyles and environments. For experienced users already familiar with the menus and commands, the abbreviated command mode can be used to bypass menus. For users that don't have access to video display terminals or workstations, command mode can be used with hard copy terminals. In the same way, users that access the system over slow speed dial up lines can use command mode to avoid displaying the menus on the screen.

User Profile

Office Menu's Electronic Mail catalogues information about you so that at computer speeds and accuracy, this information can be retrieved and used to fill in the headings for your memos, provide other users with non-confidential information about you (your name, title, department, telephone number, and other pertinent business information), and generally facilitate the functions of electronic mail.

Distribution Lists

You can easily establish and maintain your own distribution lists for mailings to groups of people. Memos to groups of people with a common interest, relationship or "need to know" can be quickly and easily accomplished through Office Menu Electronic Mail's powerful distribution list capability. Rather than addressing a memo to a large number of people by indexing all of their names, the simple typing of the group's name is all it takes to send the memo to all the members. Because you develop the distribution lists yourself, this capability can be tailored to meet your unique messaging needs. Lists can be quickly and easily created or changed to accomodate your needs.

Mail Networks

Users of ALL-IN-1 Office Menu Electronic Mail can exchange messages with users on other computer systems. Through the Digital Network Architecture and Message Router product, literally thousands of users can be tied together to communicate with each other using electronic mail. Best of all, the use of this powerful and extensive networking capability requires no technical expertise or involvement by you, the user. All you need to know is the name of the person to whom you wish to send a message. Electronic mail takes care of finding the recipient's computer address and routes the message over the communications network. And you do not have to be concerned about re-sending a message if the communication links to other systems are busy or unavailable. The electronic mail system will automatically forward your message to its recipients when the network becomes available.

CMI Provides Custom Features

Integration

CMI can help you communicate with other users in a variety of ways. Because CMI is integrated with ALL-IN-1 Office Menu, the VAXInformation Architecture AND Digital's networking products, it's easy to distribute information electronically from other ALL-IN-1 applications, from databases, from word processing systems. For example, you can use CMI to automatically notify other users of a meeting that you are trying to schedule; at your request, it can even cancel the meeting for you. You can include words, charts, spreadsheets and graphics in a mail message to other users.

Customization

The functions that you use with CMI can be customized to meet your specific business needs. It can be expanded to include capabilities for your environment, and it can continue to change as your needs changes. The appearance of the menus and commands can also be customized to suit your workstyle. Such flexibility provides you with everything needed to solve your communications problems.

Delivery Confirmation of Messages

CMI can let you know whether a message that you've sent has been received. Time and date of message delivery can easily be obtained. You can use either the Return Receipt feature or the general Delivery Status feature—both are valuable functions offered by CMI.

Flexibility When Answering Correspondence

An important feature of CMI is that through a simple key command, you can branch back and review the message that you're responding to while you're writing your response. The same simple key command will bring you right back where you left off in your response message. While you are branching to the original message, you can even extract text from the message and insert it directly into the body of your response.

Status Message

You can enter a brief status message into the mail system that will be displayed to other users whenever they address mailings to you. In this way you can notify or remind senders of whatever information you want relayed. For example, you can notify all users that you are on vacation or out of town for the week.

DECmail Provides Powerful Features

Computer Based Instruction

The animated computer based instruction modules that are included with the DECmail product provide users with a fun approach to learning how to use the product. Novice users can learn at their own pace. Experienced users can refresh their memory on certain functions easily.

Scheduled Send

DECmail provides you with the flexibility to defer the sending of a message to a particular date and time that you specify. In this way you can instruct the system as to when you want a message sent. This is particularly useful if you want to send messages during time periods when telephone line rates are less expensive, or if you want to send "reminder" messages when you're not in the office.

Nicknames

One of the features that makes DECmail easy to use is that it allows you to assign nicknames to users that you correspond with frequently. You can use the nickname that you defined when you fill in prompts for the addressing of a memo.

System Management and Accounting

DECmail provides an extensive set of utilities for the system manager to set up user accounts, monitor system usage, and verify the message databases. All of the information is extremely useful for maintaining a reliable, available mail network, as well as for billing users or departments for its use.

VAX Smart Mailer

You spend a good portion of your time trying to keep in touch with people, either to announce new products, inform your sales force, collect payments, or maintain membership rolls or subscriber lists. The VAX Smart Mailer makes reaching your audience as easy as operating your ALL-IN-1 keyboard. It's an efficient way to maintain address lists, print them out as labels, and sort them in any sequence you may need. It helps make you a much more efficient "postmaster" with full listing and editing capabilities to save both time and money.

Menu- and Form-Driven

VAX Smart Mailer is both menu- and form-driven, so you don't have to remember commands or worry about syntax. The system prompts you for information and suggests answers.

You save valuable time by not needing specialized training; anyone on your staff with a word processor and access to ALL-IN-1 can master VAX Smart Mailer in a very short time.

Choice of Printers

You have a variery of printers, forms, and formats at your disposal. VAX Smart Mailer prints on any paper stock you can load into your printer—file cards, standard labels, envelopes, or your office stationery. You can cut down on overall printing time and cost, have less repetition, and waste less paper, all of which saves you time and expense.

167-character Record Lists

A single record in a list contains up to 167 characters in five lines for address information: 30 per name, 30 in each of three address lines, 25 for the city/town, 12 for the state/country, and 10 for the zip code.

Through an address counter included in every address, you can change data whenever you print it.

U.S. Mail Bulk Presorting

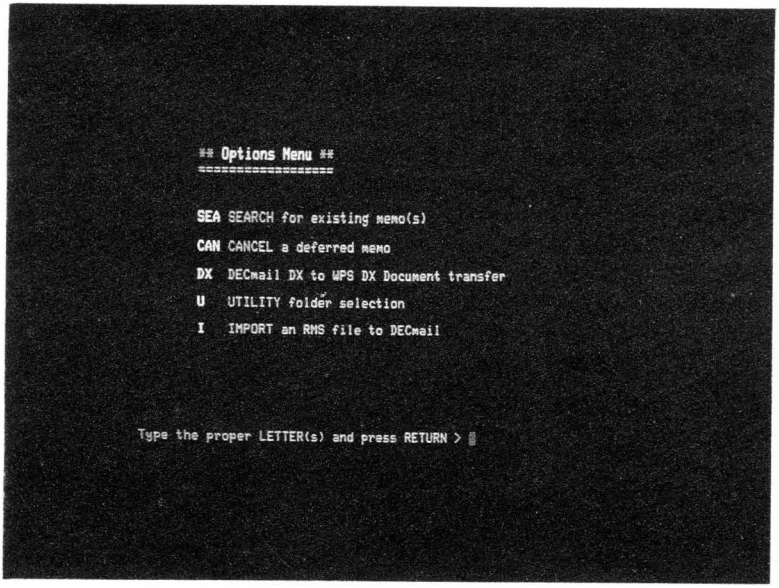
Presorting saves time and money. To qualify for reduced postal rates, mailings of 500 or more must be presorted by zip codes. VAX Smart Mailer handles this tedious job automatically. It also can assemble your list into U.S. Post Office-specified groupings. Your mass mailing gets out sooner and you reduce your expenses dramatically.

Interface to ALL-IN-1 Features

You can use VAX Smart Mailer with any of your word processors to produce personalized letters to stuff inside the labeled envelopes. In this way you can gain and maintain your business's competitive edge.

DECmail/RSTS

DECmail/RSTS is a powerful electronic mail system that is layered onto any PDP-11 running RSTS/E. DECmail/RSTS is a unique tool to create, edit, file, format, forward, retrieve, and copy messages. Any Digital terminal or workstation can be used with DECmail/RSTS to speed office communications and support timely management decisions.



Full-function electronic mail product

DECmail/RSTS electronic mail offers your office the powerful benefits of a full-function mail system including features and capabilities like:

- message creation—to quickly and easily create a memo, document, or message for sending to other DECmail users.
- message editing for unsent messages—so you can make modifications to your unsent messages using a powerful editor that is part of DECmail/RSTS.
- message answering—to efficiently and effectively respond to messages sent to you.
- message forwarding—to forward a memo, message, or document to another user with your comments, recommendations, or requests.
- message listings—to display messages according to author or subject, whichever way is best to meet your work requirements.

- message filing—allows you to file messages into folders that you name and set up. Storage and retrieval is natural and meaningful. It reflects your work procedures.
- distribution lists—to be established and used to facilitate mailings to groups of people; merely index the name of the distribution list and the message is sent to all members.
- message printing—to print the message so you can have a hardcopy record.
- message deleting—to remove unwanted or unnecessary messages or files from your system.

Multinode capabilities

When DECmail/RSTS is used with DECnet/E, you can have all the benefits and features of DECmail/RSTS in a multinode environment. In a multinode environment, DECmail/RSTS provides network mail services to other DECmail/RSTS users anywhere in a DECnet network. VAX/VMS systems with electronic mail can also exchange messages with systems running DECmail/RSTS.

The multinode capabilities of DECmail/RSTS broadens the scope of communications for your office. With DECmail/RSTS, you can transfer messages to other users of DECmail within your network—whether that DECmail product resides on a PDP-11 or a VAX system.

Help feature

DECmail/RSTS incorporates a resident Help facility that provides you with useful information on how to perform its electronic messaging, processing, and storage functions.

Though DECmail/RSTS is an easy-to-use electronic mail product, there are times when you need help to perform a particular function. The Help feature presents detailed, step-by-step instructions or prompts whenever summoned. Help makes DECmail/RSTS easier to learn and easier to use.

Text file inclusion as a message

With DECmail/RSTS, you can send, as a message, an ASCII text file created outside of the DECmail/RSTS environment.

You can attach a text file, even one created on another system, to your message. This means you can directly transport files over a DECnet electronic mail network. Through this process, you can realize tremendous time and labor savings as well as eliminate dangerous transposing errors.

Ability to put message text into RSTS/E files

DECmail/RSTS messages or portions of messages can be put into nonmail files for storage and/or subsequent processing and retrieval.

This feature makes DECmail/RSTS more than just a messaging system—it is a total information communications system.

DECmail/MS

DECmail/MS, a powerful electronic mail system for the DECsystem-10 and DECSYSTEM-20 family of products, makes Digital the office vendor who offers office automation capabilities on an unmatched range of products. All of Digital's product families now support the three components of office automation: communication, word processing and data processing—whether you need a single DECmate word processor or hundreds of timesharing terminals on a DECsystem-10 or DECSYSTEM-20.

DECmail/MS gives you, as a user of a DECsystem-10 or -20, the fundamental element of office automation capabilities—communication. It also gives you the ability to participate in an office system composed of a variety of Digital products. With DECmail/MS, you can exchange messages or documents with other users on the same processor, or among multiple DECSYSTEM-20s connected with DECnet. Access extends to other Digital products in the office when the DECsystem-10 or -20 serves as a host to dedicated word processing on a DECmate. The DECmate and the DECsystem-10 or -20 can "communicate" through CX/DX or DECnet.

Below is a summary of the major features of DECmail/MS:

Mail and filing system with extensive capabilities

DECmail/MS is available on a DECsystem-10 or -20 and offers flexible electronic mail capabilities including:

- Read incoming mail
- Send mail or messages to a specified user or users
- Create, display, and edit or modify a message
- Reply to a message sent to you
- Forward a received message to another user with added text, if desired
- Copy a specified message or messages from the message file into another specified file
- Edit or modify an unsent message through a choice of editors

In addition to the above capabilities, common to most electronic mail systems, DECmail/MS also offers other powerful tools and functions:

- Status information that includes important details about messages that you've sent or received
- Capability to insert a specified file at the end of a message (you can attach a file or document to your message)
- Distribution list capabilities

DECmail/MS is a powerful, proven electronic mail system for the DECsystem-10 and DECSYSTEM-20 families of computers. DECmail/MS offers you maximum flexibility, enhancing your communications and making them more efficient and more effective.

Multinode mail/messaging capabilities for DECSYSTEM-20s

DECmail/MS on a DECSYSTEM-20 running TOPS-20 lets you create, edit, send, and process messages. All the features of DECmail/MS are available if your DECSYSTEM-20 is part of a multi-node environment.

The multinode capability greatly enhances the usefulness of your electronic mail system.

Automatic message head-up

DECmail/MS will automatically supply message heading information for the sender. Included for every message are the date of message creation and the author's name.

The automatic message head-up feature saves you time and effort. All messages have a uniform format. An important "audit trail" for your messages helps identify your mail, its source, and its date of creation.

Choice of editors

DECmail/MS for DECSYSTEM-20s offers you a choice of editors. You can take advantage of the editors supported by TOPS-20 so you don't have to spend time learning a particular editor.

Working with DECmail/MS, you can use the editor that you're most familiar with, making you more efficient.

Status information

DECmail/MS can provide you with important status information, including the date and time the message file was last read, the number of messages and their subject, the number of pages the message file occupies on the disk, the number of flagged messages, and the current message number.

DECmail/MS gives you pertinent information about your message files. This allows you to manage your "electronic mail boxes" effectively and helps streamline the operation and control of your electronic mail system.

Password protection

DECmail/MS incorporates security features including user identification and password protection upon entry into the system. File security is provided by the operating system.

DECmail/MS is a secure system; your account and your files are protected from unauthorized use and access.

Distribution lists

Using DECmail/MS, you can establish and maintain a distribution list for sending messages to groups of people.

This distribution list can be maintained and identified by the name you establish for it. Instead of having to address a message to many addresses, you merely type in the name of the distribution list. The system will send the

message or document to all members on the list. This can be a great timesaver and ensures that everyone who should be getting your message does, in fact, get it.

File attach

Important or pertinent information in the form of a file or document can be attached and sent with a message. This feature is especially useful in sending a document that you reference in your message or in sending a document or data file that you want the addressee to have. This feature saves you time and ensures accuracy and consistency because you don't have to retype information from your files into your messages.

DECmail/MS-20 ARPAnet capability

In addition to the DECnet interface, the multinode ability provides ARPAnet message passthrough capability to deliver and receive messages from ARPAnet users. ARPAnet capability gives you additional communications options by extending the messaging range of your electronic mail. With DECmail/MS-20, you can deliver messages to and receive messages from the wide community of ARPAnet users.

DECmail/MS-20 spooled message transfer

DECmail/MS-20 in a multinode environment will spool your messages. This means you don't have to know whether a node is available or free when you send messages. DECmail/MS-20 will spool, or temporarily hold, your messages until such time as the node or destination path is available. This feature saves you invaluable time spent resending or attempting to resend messages. Once created and sent, you can move on to other work with full assurance that your message will get delivered, regardless of the present state of the communications link or the receiving node.

Digital's Electronic Mailroom

Direct mailing has always been a lengthy and tedious process. With the advent of electronic mail, communication in the office has improved greatly, although it has not replaced the need for hardcopy letters that need to be sent outside of the company.

The United States Postal Service now supports computer entry of first-class mail directly into post offices. This capability is called E-COM (Electronic Computer Originated Mail).

Digital's Electronic Mailroom works like this: you create your letters using an application, such as accounts receivable or word processing. These letters are then changed into the format required by E-COM. Your computer then dials an E-COM Serving Post Office (SPO) equipped to handle E-COM transmissions and transmits your letters electronically over the phone.

The post office will print the letters, provide the paper and distinctive envelopes, fold the letters and stuff them into the envelopes, sort the letters by ZIP code, and pay the first-class postage.Digital's Electronic Mailroom lets you to create, edit, print, store and mail electronic letters from your workstation connected to a VAX/VMS system. You don't have to be concerned or even aware of the E-COM letter formats or transmission to the Serving Post Office.

Interactive Interface

An interactive interface is provided with the Electronic Mailroom to guide you through letter creation, editing, printing, and mailing.

The system makes it as easy as possible for you to get your mail created and mailed.

Command Mode Interface

A command mode interface allows your application programs, such as payroll invoice, to send Electronic Letters as part of the application.

You don't have to take information from an application and manually enter it into your letters. Electronic Letters can be created and sent automatically from your applications.

Forms

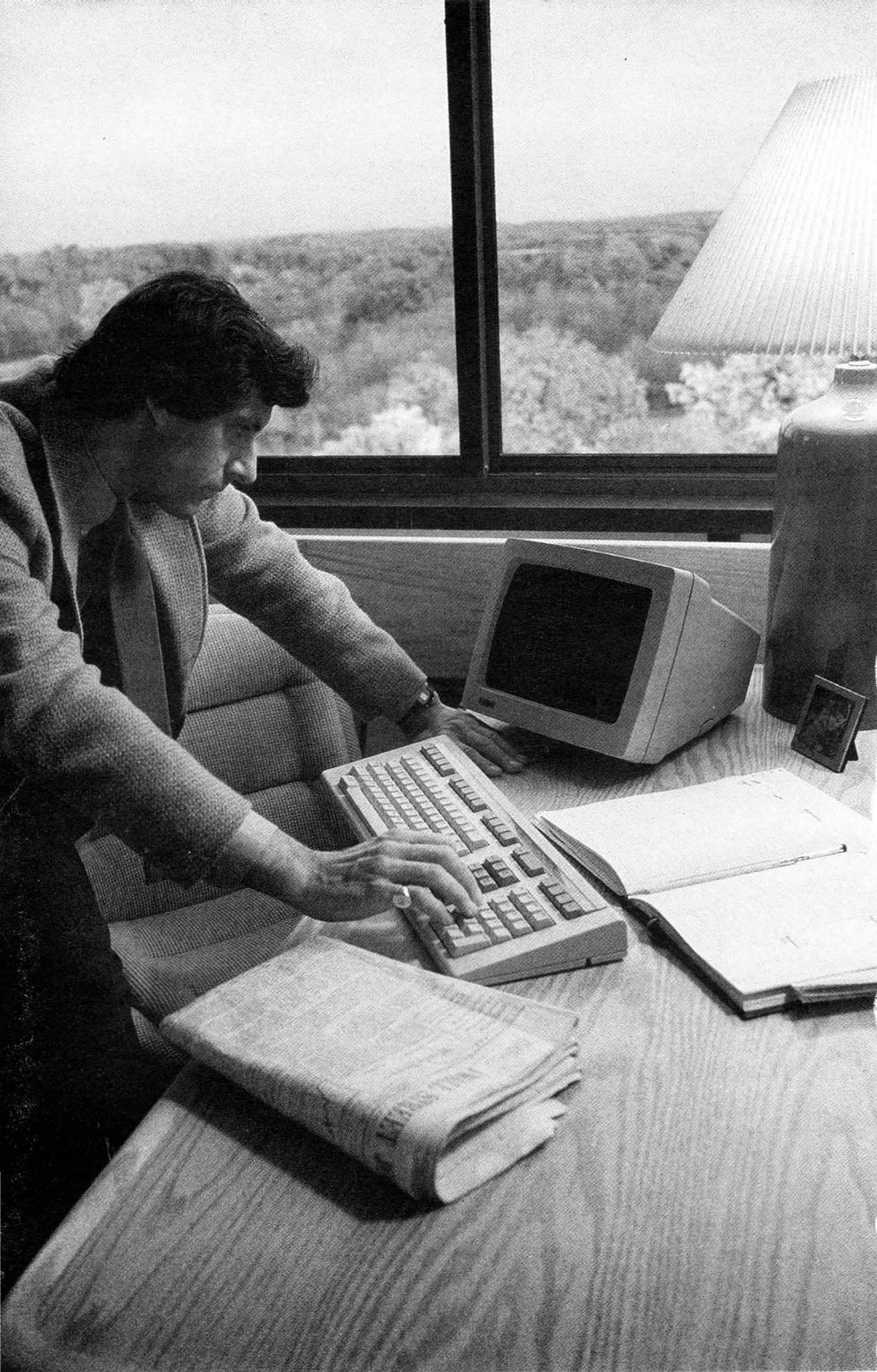
Forms (lines and boxes) may be defined for your letters allowing easy generation of letterhead and invoice-type letters.

Some simple graphics can be added to your letters to make them easier to read.

Accounting Information

Accounting information is kept for billing of letters. Accounting fields include VMS user name, charge code, date and time of submission, type of letter, number of addresses. A sample billing program is provided in source format to make customization simple.

Your E-COM user accounts can be kept up-to-date and accurate by the system, eliminating billing errors.



Section 4.
Calculation and Modeling

Engineering mathematical calculation, financial calculation, spreadsheets, and financial modeling products are often important capabilities for office workers. Digital provides several products to meet these needs.

Interactive Calculator

As an integral capability within ALL-IN-1, Desk Calculator is a simple, easy-to-use, convenient electronic calculator replacement. Available in both an engineering version and a financial version, Desk Calculator allows a user to interrupt a running application, perform interactive arithmetic calculations, and return to the application without affecting it. Basic arithmetic calculations are performed using either the keypad or the keyboard of the workstation or terminal.

Spreadsheet Products

Mathematical calculation and information handling, using the spreadsheet format, have become extremely popular because of the widespread availability of "spreadsheet" programs on many models of personal computer. These spreadsheet products have various features that to appeal to different customers and markets.

Spreadsheet products serve an important need for a wide class of office workers: the organization, maintenance, and reporting of information that can be algorithmically organized or which lends itself to a row/column representation. They are easy to learn and easy to use. An important feature of Digital's spreadsheet products is the ability to "share" the spreadsheet data with other applications. One example is the inclusion of data generated by spreadsheet calculations in a word-processed document, which is then mailed to others via the electronic mail facility.

Digital offers a spreadsheet product for each hardware family. In many cases, a spreadsheet product was designed for a specific piece of hardware, but also runs on other Digital hardware families. Therefore, spreadsheet products can be selected based upon the primary hardware family upon which the products will be used, with secondary product families as a consideration.

DECalc

- Recommended for the VAX family
- Digital developed and supported
- Strong and complete feature "set"

MULTIPLAN

- Recommended for the DECmate family
- Runs on the Professional and Rainbow, as well
- CP/M-based product

SUPERCOMP-TWENTY

- Recommended for the Professional family
- Runs on the VAX and DECSYSTEM families

LOTUS 1-2-3

- Recommended for the Rainbow
- CP/M-based product

MAPS/PRO Financial Modeling

- Recommended for the Professional family
- Runs on the VAX family

If you want specific feature information, refer to the appropriate Product Specification.

Financial Modeling

Financial modeling is primarily used in financial planning and analysis operations. Historical data is used as the basis for projected financial performance. Because of the algorithmic nature of the available modeling packages, complex interrelationship can be established and "what if" scenarios can be built. By changing various parameters, the relationship of that parameter to others can be studied.

EMPIRE

There are many financial modeling packages available from third-party vendors. Each has unique features and supporters. EMPIRE, which currently operates on the DECSYSTEM and VAX families, allows "what if" scenarios to be developed with complex interrelationships. It allows multipass operation, with the next pass based upon the output of the previous pass. It is a good package for sensitivity analysis in the financial planning process.

ALL-IN-1 Desk Calculator

With ALL-IN-1, you have a built-in desk calculator at your fingertips. The desk calculator, a part of ALL-IN-1 Desk Management, has all the features you would look for in a separate, desktop calculator, but has the added advantage of being an integrated part of ALL-IN-1.

Integrated with ALL-IN-1

You can use the calculator whenever you're using the ALL-IN-1 system, whether you're preparing a document, answering your mail, or using any of ALL-IN-1's other extensive features. You can even insert the results of any calculation into your document or mail message, without retyping the results. And the desk calculator is available when you need it, even when you're performing another task.

Full Desk Calculator Capabilities

The desk calculator provides the standard arithmetic functions (add, subtract, multiply, and divide) plus decimal control, square roots, rounding, exponentiation, full trigonometric functions, and a formula mode. ALL-IN-1's desk calculator replaces a separate, desktop calculator with a top-of-the-line model within your system.

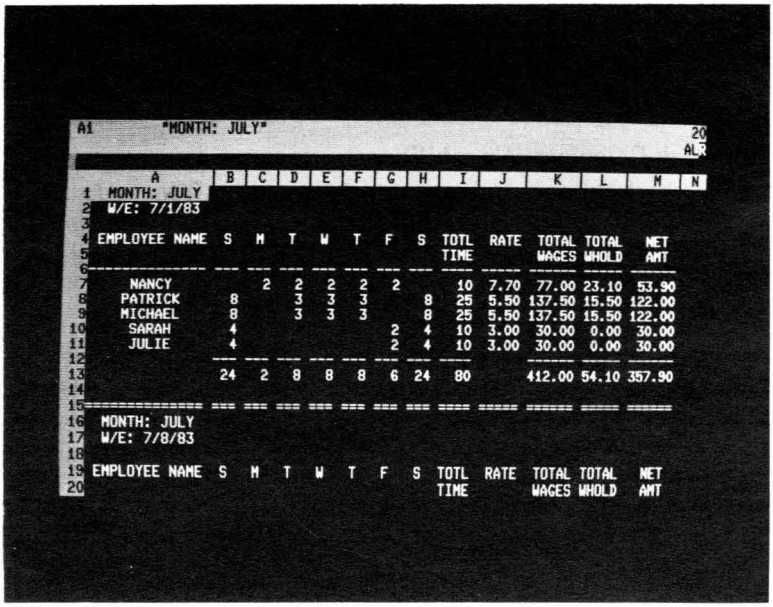
Keyboard or Keypad Data Entry

With the desk calculator, you can use either the keyboard or the keypad, whichever you're most comfortable with, to enter numbers and operations. If you're familiar with handheld calculators, you'll probably prefer the keypad. If you're familiar with typewriters, you'll probably prefer the keyboard. The desk calculator's flexibility adjusts to the way you work.

DECalc

DECalc, a powerful financial planning tool, is the electronic equivalent of an accountant's spreadsheet calculator. DECalc lets you create, edit, and manipulate models that provide the basis for your financial plans and budgets. It's self-teaching and requires little previous computer experience.

DECalc's screen-oriented spreadsheet gives you the tool you need to monitor the impact of changes—or potential changes—and to provide financial reports. DECalc runs efficiently on Digital's VAX/VMS.



Mathematical Functions

DECalc supports arithmetic functions (addition, subtraction, multiplication, division, and exponentiation) and various statistical and trigonometric functions. These mathematical capabilities eliminate the need for manual calculations.

Model Capability

You can construct models of up to 63 columns and 254 rows. So by using DECalc you can model complex functions and interrelationships.

Variable Expression Evaluation

You can specify that expressions be evaluated in standard algebraic order or strictly from left to right; you can also modify the order of evaluation with parentheses. This flexibility increases your control over your model.

Privacy Protection

With one keystroke, you can turn off the screen image, without affecting the contents of the grid that was displayed. In addition, grids can be stored in an encrypted form; not even privileged users can see them. This means you can protect sensitive information. You can make sure that information is released only when appropriate.

Help Key

You can quickly and easily get assistance in how to use DECalc, either about your current activity or about a topic you specify. With help available to you, DECalc is easy to use, whether you're new to the system or experienced with it.

Tabular Data Entry and Automatic Summation

You can enter numbers in successive grids and automatically sum the numbers. This feature both saves your time and reduces your chance of error by minimizing keystrokes.

Bar Graph Generation

DECalc can display your data in the form of bar graphs, a format often useful for highlighting information. By seeing comparative relationships, you can interpret the data more quickly and easily.

MULTIPLAN

MULTIPLAN is a powerful financial planning tool, also known as a spreadsheet calculator, for businesses of all sizes. It helps you generate financial plans and budgets, whether they be for a multimillion dollar operation or for your family business.

MULTIPLAN provides a screen-oriented worksheet that lets you construct a model within the confines of the available system memory. It is easy to use and learn, adapts to a wide range of planning and reporting requirements, and offers 132 columns for displaying a full 12 months of data along with totals and titles.

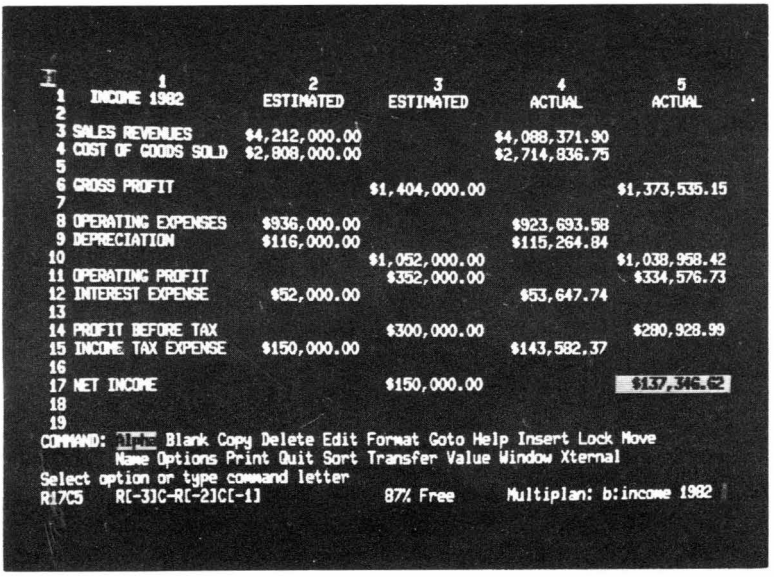
Written by Microsoft, Inc., MULTIPLAN runs under the CP/M operating system.

Command Line, Prompts and Submenus, and Help Function

With lists of options, reminders, and more information, MULTIPLAN is very easy to use. A list of commands (instructions) available to you is displayed on your terminal. MULTIPLAN's prompts and submenus guide you through data input. And if you need more help, you can quickly get information on MULTIPLAN's features or on the uses of any commands.

Model Capability

Through MULTIPLAN, you construct models of up to 255 rows and 63 columns; each column has a maximum width of 32 characters. With the ability to handle complex models, MULTIPLAN gives you the flexibility you need to solve problems and for market sensitivity analysis.



Linking of Separate Worksheets

You can connect several worksheets into the same model. This increases your capabilities because there are no limits on the size of your matrix.

Notification of Circular Referencing

MULTIPLAN automatically lets you know what calculations are dependent on others; for example, that Row 1 depends on Row 2, and Row 2 also depends on Row 1. This feature increases your awareness by helping you clarify and monitor the relationships within your model. It's easy for you to understand and correctly configure your model.

Format Capability

With MULTIPLAN, you can set a format (including width; right, left, or center justification; display $; and rounding) for the entire spreadsheet or for an individual cell. Because you have control over the form of presentation of your information, you can choose the format that will best highlight important points.

Mathematical Functions

MULTIPLAN performs all standard arithmetic calculations along with Boolean algebra and net present value calculations. These mathematical capabilities eliminate the need for manual calculations.

Control of Autorecalculation

You choose whether to recalculate the spreadsheet automatically whenever a change in data has impact, or manaully with one keystroke. The option is yours—you can have a model that always reflects the latest changes, or you can reduce processing time if you are making many changes and don't need to see interim results.

Independent Windows

You can subdivide the worksheet into a number of windows that operate independently of each other; you can then manipulate some portions of the matrix while keeping other portions constant. This helps you make faster and better decisions.

Locking of Cells

With MULTIPLAN, data can be protected against inadvertant modifications. This ensures that critical data is secure.

Supercomp-Twenty

Supercomp-Twenty, a powerful spreadsheet calculation program, features a large worksheet capacity for sophisticated analysis and advanced modeling techniques comparable to a financial planning language. Developed by Access Technology, Inc. to run on the Professional 350 personal computers, SUPERCOMP permits you to enter data, formulae, and labels directly onto the worksheet display.

An extra-large (1,000-by-1,000) worksheet handles your large, complicated projects, and can format columns from one character up to 126 characters each. For your "what if" questions, a recalculation feature lets you change the contents of one or more spreadsheet cells, so you can see the effects of any changes throughout the worksheet. SUPERCOMP automatically makes a backup of your original when you change a row or column, so your data is secure.

You can create labels that are up to 200 characters long, and right- or left-justify them for that professional look. And online help gives you instant access to tutorials and instructions.

If you need enhanced spreadsheet capabilities combined with a potent modeling language, SUPERCOMP is an ideal program package.

Lotus 1-2-3 Integrated Spreadsheet, Information Management, and Graphics

Lotus 1-2-3 combines the power of three programs—a spreadsheet program for "what if" analyses, database commands to organize and select the information you want, and a graphics program for visual representations of your data. 1-2-3 is so fast that you can call up information and graph the results in a matter of seconds. 1-2-3 is ideal for business people who need a powerful analysis tool, without spending a lot of time learning how to use it.

The HELP key provides on-screen instruction for any part of the program. The commands, which are free from computer jargon, are the same throughout the program, saving you the frustration of learning commands from three different sources.

1-2-3 is a 16-bit application program that runs on the Rainbow personal computer under the MS-DOS operating system. 1-2-3 takes advantage of many of Rainbow's special function keys. Since Rainbow's numeric keypad is separate from the arrow keys for cursor movement you can enter numbers easily. So you'll be able to do your spreadsheet work more efficiently.

MAPS/Pro Financial Modeling

With MAPS/Pro Financial Modeling, a financial modeling and reporting tool, you can develop and run operational, financial models. It features a menu-driven user interface and extensive online help.

MAPS/Pro Financial Modeling can produce up to 40 tabular reports per model. Extensive report formatting options make it possible for you to generate presentation-quality reports. MAPS/Pro also features a variety of "what if" capabilities, including Target Seeking and Sensitivity Analysis, for advanced data analysis. A spreadsheet-like visual data editor allows for easy entry and modification of financial information.

MAPS/Pro Financial Modeling can exchange models and data with a VAX or PDP-11 running compatible MAPS/Host software. MAPS/Pro's integrated capabilities include an interactive command language and editor, a financial database subsystem, a procedural modeling language, tabular report generator, and a financial function library.

EMPIRE

More and more, you've probably found that ever-increasing complexities in the decision-making process demand better, more effective planning and analysis tools, ones that can deal with the "real world." Intangibles like economic uncertainty, material and resource shortages, labor problems, regulation changes, and competition have all made careful planning for and consideration of alternative planning more important than ever before.

So Digital offers you EMPIRE, a cost-effective, easy-to-use tool to help solve "what if" problems. Developed by Applied Data Research, Inc., EMPIRE uses the ALL-IN-1 menu system to put one of the most powerful decision support tools at your fingertips.

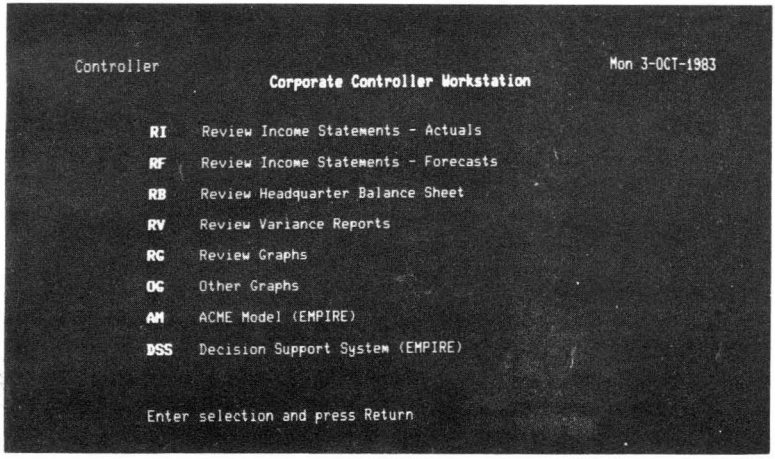
Simple modeling language

You're not restricted to predefined logic for your calculations. Instead, you define a business situation with a simple modeling language that includes descriptive names for model elements, a simple algebraic format for computations, a simultaneous equation facility, and grammar correction. You don't have to be a programmer to use EMPIRE's powerful modeling capabilities, because the language is easily learned, which saves you time and money.

Function library

You don't have to redefine commonly used formulae like depreciation, compounding, payback, tax credits, exponentials, and trigonometric functions every time you use them. These and many other algorithms are stored in a built-in financial, statistical, and mathematical function library.

This puts timely information at your disposal for better and more effective business control.



Graphics

EMPIRE's interactive graphics facility helps you display your charts, graphs, and other data from the model. Line or bar graphs, time plotting, and automatic scaling are all included.

Interactive Analysis

Sensitivity, "what-if," impact, and target value analysis capabilities allow you to test assumptions and evaluate alternatives, without your having to modify the original model logic or generate unnecessary reports. You save considerable time as well as gain better insight into the problem.

Monte Carlo Simulation

In many modeling situations, you have to consider "real world" uncertainty. Monte Carlo risk analysis lets you identify all elements, specify ranges of values, and select key items for observation—all interactively.

This information is then automatically integrated into model logic execution to create a composite profile. You can then store the data or display them as tables or graphs.



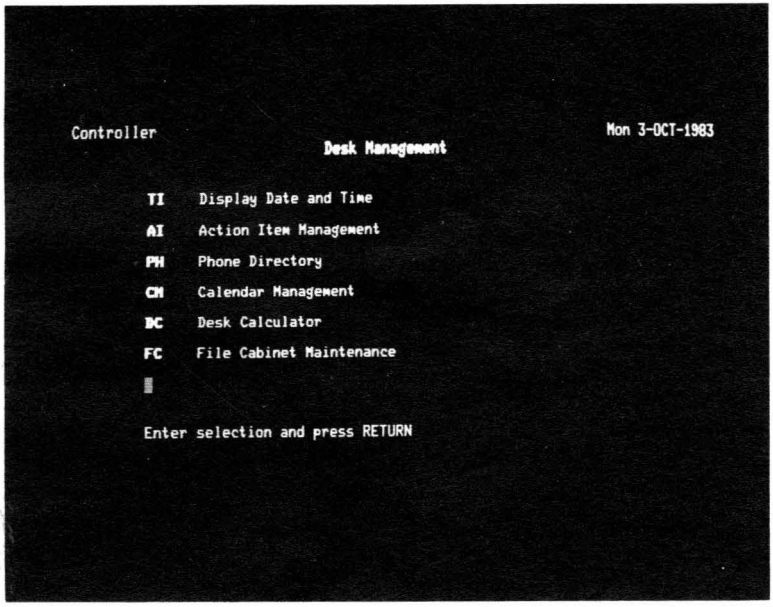
Section 5.
Time and Resource Management

The availability of a terminal or workstation in the office of the professional or secretary provides a convenient and powerful tool for time and resource management. Four abilities are included in ALL-IN-1 Office Menu:

- Personal Calendar
- Tickler List
- Action Item Management
- Telephone Directory

Not having to use paper to accomplish these four functions is in itself extremely useful. Calendars, Tickler Lists, and Action Item Lists can be easily generated, updated, and displayed. Changes are easily made using a simple editor.

The time and resource management functions are fully integrated with ALL-IN-1 Office Menu and supporting software, making them easy to use and easy to remember.



However, the fact that other ALL-IN-1 functions can be used in conjunction with ALL-IN-1 Time and Resource Management that gives them their unique power. Using Electronic Mail, for example, meetings can be scheduled or action item lists can be mailed. Although maintained electronically, daily calendars can be printed to carry where a terminal is not available.

The most dramatic advantage is in the area of meeting scheduling. Consider the typical scenario of secretaries, professionals, or managers setting up a meeting with other busy individuals by telephone. "Are you available at 2:00 p.m.? Good, I'll check with Charlie and Joan to see if they can make it." After a few more telephone calls: "Well, Joan is not available until 3:00 p.m. Can you make it then? No. OK. How about 4:00 p.m.? I'll get back to you." And so on.

Using Calendar Management with its meeting scheduling feature that uses electronic mail, a meeting is requested of all participants within specified time periods. Without the typical "telephone tag" of the former scenario, the meeting can be scheduled, within seconds, at times convenient to all.

Another important feature of the time and resource management is its flexibility. Everyone wants the calendar or operating procedure to be slightly different to fit their personal style, to match the way they work. With ALL-IN-1's Flow Control, it is easy to do and does not require a systems programmer.

If you have to use the telephone, ALL-IN-1's telephone directory can give you the phone number you need, from your personal phone directory, the ALL-IN-1 users directory, or even your corporate phone directory in a matter of seconds.

ALL-IN-1 Calendar Management

The ALL-IN-1 calendar management system is an extremely easy-to-use tool to help you manage your personal time more effectively. It helps you maintain your personal calendar for workday activities, schedule your own appointments, arrange meetings with other system users, and maintain system-wide tickler files.

The calendar management system maintains all records of appointments and meetings in special files inaccessible to others. You don't have to worry about any unauthorized readers of seeing personal records.

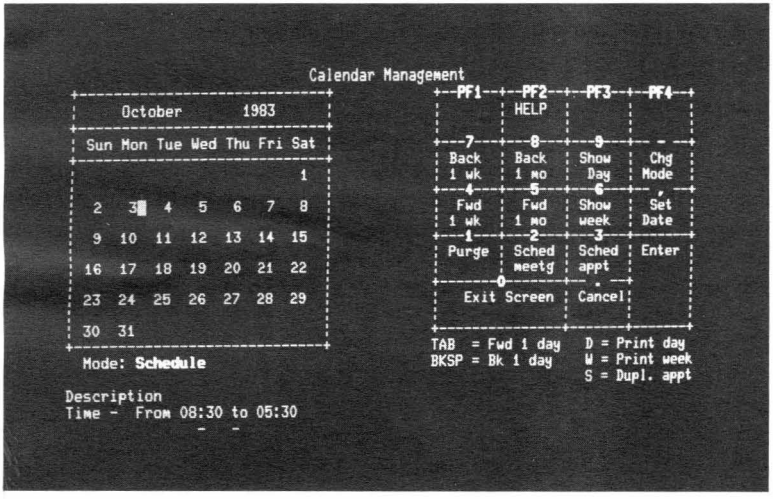
These advantages, combined with outstanding ease of use, make the ALL-IN-1 calendar management system the best solution to your time management needs.

Appointment Scheduling

You can schedule an appointment in any time slot on the day you choose, so your productivity is improved through better control of your time. You know how much time has to be allocated for your own tasks and appointments, and you have the flexibility to arrange it accordingly.

Meeting Scheduling

You can schedule meetings with other calendar management system users. You stipulate acceptable dates to meet, and the system automatically searches the participants' calendars for a mutually available time slot. An electronic mail message is automatically sent to the meeting participants to confirm attendance, and a time slot is tentatively reserved on their calendars. You can save significant amounts of time by eliminating the traditional game of "telephone tag."



Confirming Attendance

Each participant confirms attendance; if the participant's response is "no," the meeting is removed automatically from his calendar; if "yes," the meeting is automatically scheduled. Your time is too valuable to be wasted; and you can save it by knowing beforehand who is available to attend your meetings. As a meeting participant, you retain control of your own time; you decide whether or not to confirm a meeting request.

Checking Confirmations

As the originator of a meeting, you can check the confirmations of the other participants. You retain control of your meeting and your time.

Canceling a Meeting

You can cancel a meeting you've called, and the calendar management system automatically notifies the other participants.This too is a big time-saver, because the time-consuming task of contacting meeting participants is handled for you.

Calendar Viewing

You can see in detail for an entire day or week all scheduled items like meetings and appointments, so you know exactly what's in store for you during your business day.

Tickler File

You can be reminded of important items, so you won't forget to attend an important meeting or prepare a time-critical report.

File Printing

You can print both your calendar and tickler file; when you're away from your desk, you can take reminders with you.

Integrated with ALL-IN-1

You can access calendar management while you're doing something else on your system, like creating or editing a document or mailing a message. You can interrupt the task at hand and schedule a meeting or appointment, write yourself a tickler, or respond to a meeting request. You can then return to the exact point where you left off. Simple put, with ALL-IN-1 you'll continue to work the way you've always worked—only more efficiently and more productively.

ALL-IN-1 Tickler Lists

An important component of the ALL-IN-1 calendar management system is the tickler list. It's a way to remind yourself of tasks that you have to do today or this week. It's a substantial resource when you must set priorities to use your time effectively.

The ALL-IN-1 menu gives you three choices when you enter your tickler: you can enter an item, review your list for any particular day, or review the weekly list. In fact, it works in the same way as your desk calendar and scratch pad—only faster and more efficiently. You can lose, misplace, or simply forget to look at your notes and calendar. But with the tickler files at your fingertips to remind you automatically of appointments and action items, you can plan your day or week more effectively—with the push of a key.

Action Item Management

Action items are those daily personal memos or reminders for the tasks you want to perform that day or week, and the action item management subsystem helps you keep track of them.

With the ALL-IN-1 action item management subsystem, you can enter, completely describe by name, project, scheduled completion date, and priority what you have to do and have the information automatically displayed on your terminal's screen. And when you complete an action item, the system marks it as done.

Action Item Entry and Update

A command prompts you to enter the action name, description, priority, project name, scheduled completion date, and completed date. Also, you can change data in an action item at any time.

By keeping a work list organized by priority, you can better organize your work and better manage your time.

Action Item List

This lists all your action items for the day, or lists certain items to your specification. You can retrieve action items according to the parameters you set, for instance, by priority, project, or date.

This helps you plan your time more effectively by having the system display those items most important to you.

Action Item Completion

You can mark items as completed; you enter the name of the item and the system does the rest. In this way, you can keep an accurate record of your work. An audit trail of scheduled completion dates along with actual completion dates can help you analyze your workflow and increase your productivity.

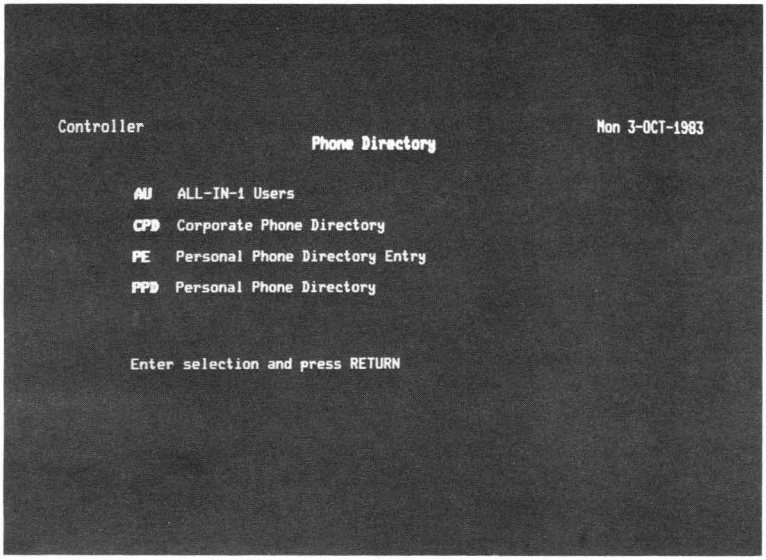
ALL-IN-1 Phone Directory

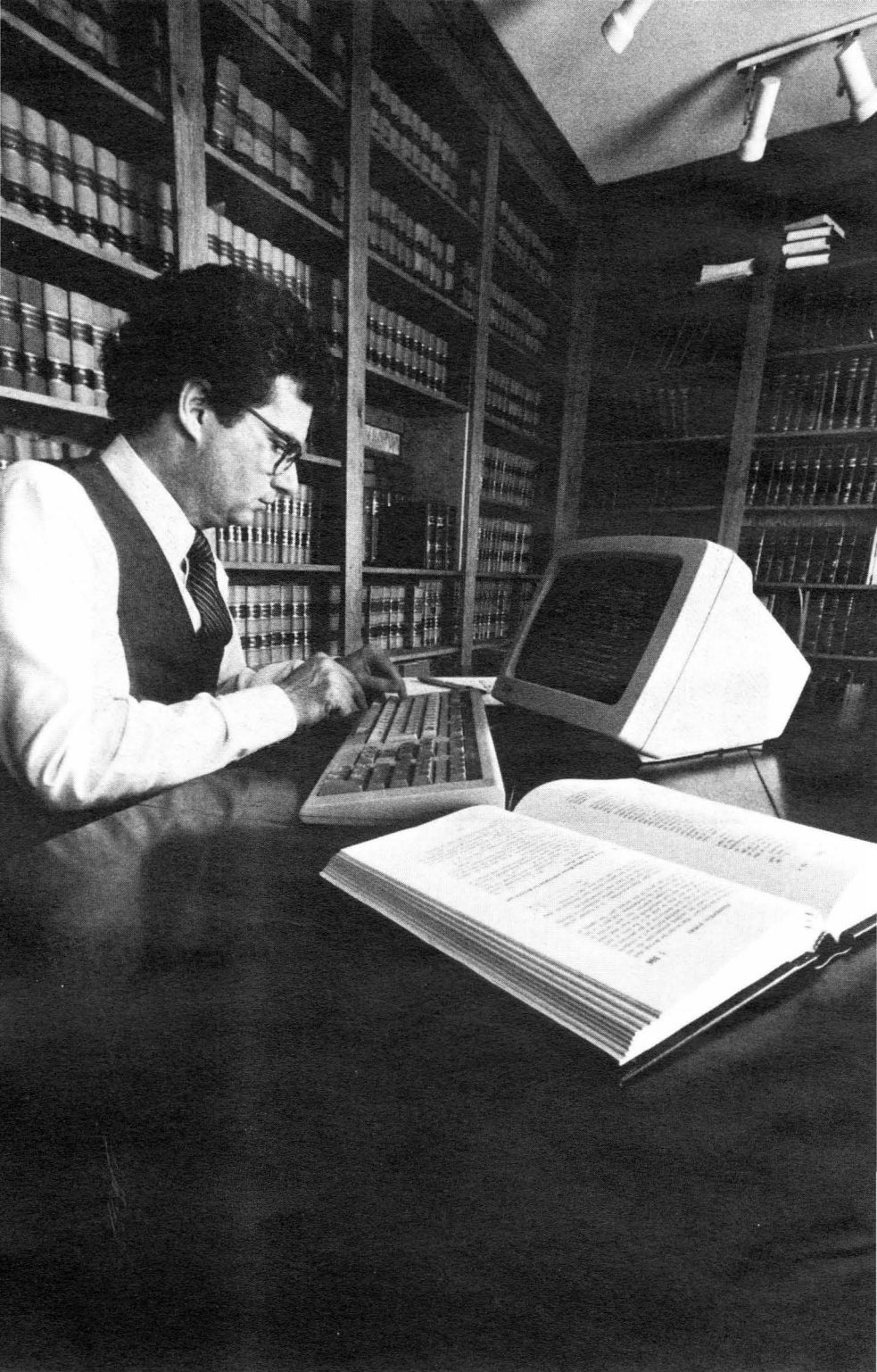
The ALL-IN-1 phone directory is your personal and corporate electronic telephone book. With it, you can locate a person's phone number and such other information as address, electronic mail address, or computer node in a much shorter time than it would take you using a paper directory or telephone book.

The ALL-IN-1 phone directory has three divisions: ALL-IN-1 users, corporate personnel, and personal entries.

- ALL-IN-1 users. You use this command (AU) to locate phone numbers and other information about ALL-IN-1 users. You specify a person's name, department, or account name; the system displays the appropriate data.

- Corporate phone directory. The corporate phone directory works in much the same way as a regular directory. You enter a name and receive the appropriate phone number, address, and computer node.
- Personal phone directory. If you select your personal phone directory on the menu (PPD), you can look up numbers and other data that you've entered for your convenience. With the personal phone directory, you can add comments or other useful information, such as a nickname or title.





Section 6.
Filing and Retrieval

File systems are the actual tools that provide each user with the information storage and retrieval they require. Under ALL-IN-1, the electronic filing systems are very much like the traditional manual paper systems, with named file cabinets, named folders within the cabinets, and named documents within the folders. But, now information is handled electronically within the system.

The VAX Information Architecture, with its many software elements, does the organizing, maintaining, storing, retrieving, and manipulating of data efficiently and effectively. But, its operation is completely invisible (as it should be) to the ALL-IN-1 user. Details of the VAX Information Architecture are included in the "Information Management" chapter of this Handbook.

The important thing to know is that the VAX Information Architecture handles the complex business of assigning file names, numbers, and physical areas. Because the filing systems provide an interface that works the way you do, data is available from cross-files, under several different categories, without misfiles. If you use the DECmate word processing workstation, The document diskettes themselves provide the file management functions. DECmate has the added feature of being able to transfer files to an ALL-IN-1 system and maintain them electronically on that system, as well.

Digital's set of compatible data handling products help ALL-IN-1 users effectively manage their total information resources. Your word processing files, application programs, electronic mail messages, memoranda, reports, graphics, spreadsheet data—anything you can create—can be easily and quickly stored and retrieved.

Personal Filing

Individuals using ALL-IN-1 or floppy-disk-based personal computers have to file and retrieve information that they personally "own"—that is, information they have generated or has been sent to them. The user must have control over the storing and retrieval of that information. The ALL-IN-1 filing system provides this capability for ALL-IN-1 users. From a workstation or terminal, when properly logged into to a user account, information can be created and stored; retrieved and viewed or printed; sent to another user via electronic mail; and manipulated (appended to other information, separated into segments that are then filed separately, edited, removed from the filing system, and so on.)

Taking advantage of the VAX Information Architecture, the ALL-IN-1 filing system is reliable, secure, easy to use, flexible, and efficient. Key features are:

- Anything you create, you can file.
- You can retrieve a file based on the name you gave it or on a keyword search.
- The named folder concept makes it even easier.
- Nonrestrictive file naming and identification allows a wide range in naming style.
- A directory of all files in a particular user's area can be completely or selectively viewed or printed at any time.
- No one can access your files unless you give them that privilege or they are properly logged into your account.

The personal computer floppy-disk-based filing system has many of the features of a large system. Security is enforced by providing access to the floppy disk itself. A named-file implementation makes information retrieval easy. You don't have to remember the "number" of the file and certainly don't have to know where on the disk it is stored. The index may be viewed or printed and provides important information about the information on the disk: size of the file, when it was created, and the last time it was updated, amoung other information to enhance the information management process.

Departmental Filing

In addition to personal filing, the ALL-IN-1 system provides essential capabilities for departmental or organizational filing. There are situations in which shared information is key to the success of the organization. Departments may wish to establish a library area, where important information is stored, maintained and updated for use by the entire department. This ensures that everyone in the department will make decisions using the same information. The information may come from individuals within the department or from external sources. The important features of this type of storage design are controlled access, data integrity, and access by many individuals.

BASIS-OA is a data management system that supports these features. It is a complete general purpose text storage and retrieval database system used to address a wide range of storage and retrieval needs. It's used in technical libraries, personnel/administration, publishing, education, sales tracking, scientific applications, and many more.

For personal filing, documents are filed by name, since that is the way traditional filing systems are organized. However, to use a departmental or organizational database, the user may not know the name of the document. Nor does the user care, in all cases, what document contains a given piece of information. The user is concerned with the information, not how or where it is stored.

With BASIS-OA, you have extensive and flexible search (keyword retrieval) capabilities. You use a simple query language to search and analyze online databases. Information is accessed through the use of commands such as FIND, LOOK, SCAN, DISPLAY, PRINT and ADDRESS. BASIS-OA supports not only text, but numeric data as well. An ALL-IN-1 user can quickly learn how to use the system without learning how to "program". As an added feature, documents generated by Digital word processors can be included in the BASIS-OA database.

Archival Storage

Archival storage is typically addressed by the Data Processing Department and is usually not the concern of an office system user. The user need only know that information no longer maintained in the active information management system is available in some form. Printing this information and storing it in file cabinets reverts back to the age-old problem of physical file cabinet proliferation. Electronic archiving is a much better solution to the problem.

For ALL-IN-1 users, the VMS operating system can store information on magnetic tape. Traditionally used to "back up" (fail-safe) disk storage systems in case of failure or inadvertent deletion of information, tapes are also used in many installations to maintain, for future reference, periodic "snapshots" of the information stored on the system. DECmate users can set up an "archival" information storage system using floppy disks.

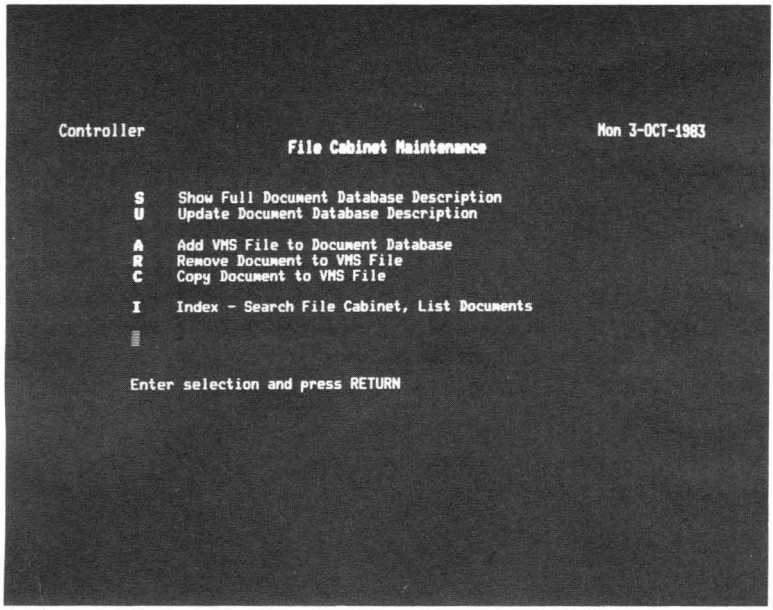
Many manufacturers of microfilm output devices interface their products to VAX systems. As a result, there is a wide range of third-party offerings that can be easily connected to an ALL-IN-1 system for archival storage of information.

The ALL-IN-1 File Cabinet

Information filing and retrieval is a time-consuming and expensive chore for any organization. Studies show that for the average office, it costs about $23,000 to set up a single conventional file cabinet, $5,600 to maintain it for a year, and about $80 to retrieve a misfiled memo or letter. That's a considerable expense, especially when you consider that only 30 percent of stored information is ever accessed during the year.

With the ALL-IN-1 Filing Cabinet, you can locate the information you need at electronic speeds. Documents and messages are stored and retrieved easily and quickly from a folder system that's similar to the one you use in your conventional paper-filing cabinets. The ALL-IN-1 Filing Cabinet comes complete with all of the features you expect in an office filing system. With it, you can

- Store a document in one folder, or many folders
- Display an index listing for all documents and messages that you've stored
- Display a listing of documents stored in a particular folder
- Copy documents from one folder to another
- Print and delete documents

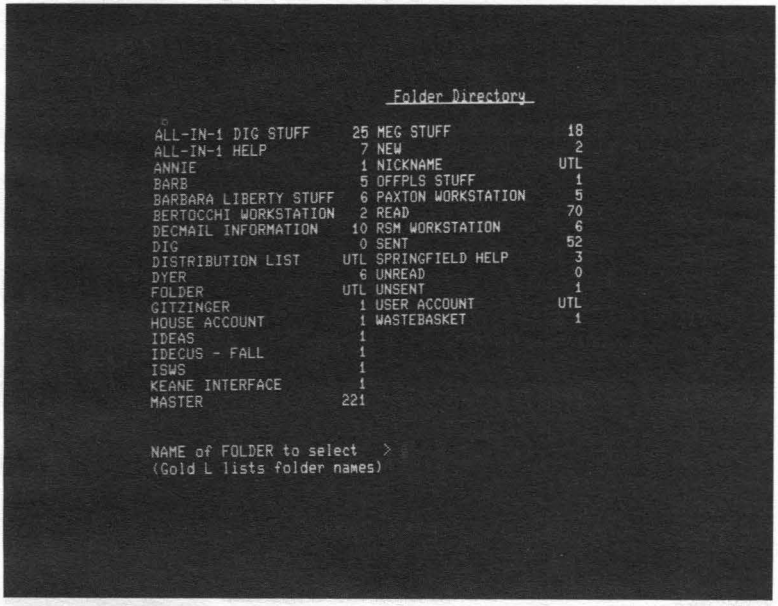


You assign the document name and subject

When you create a document, you assign it a name of up to 30 characters, and a subject name of up to 60 characters. These names allow for meaningful, precise document descriptions. You spend less time searching through files because you don't have to remember cryptic abbreviations.

You assign folder names

Related documents and messages can be grouped together under a folder name you assign. With this feature, you can create folder names that reflect the way you work. It's easy then, to locate and retrieve documents.



Automatic cross-referencing

You can search for a document by entering any one or more of the following pieces of information contained in the document: subject, author, document name, file folder, type, keyword(s), or phrases (up to five). You don't have to know about how or where the document is stored; whatever information about the particular file is easiest for you to remember is enough to locate your document.

Your documents are easily used by VMS

ALL-IN-1 automatically provides a VMS file name for ALL-IN-1 documents or mail messages. You can move these yourself from the ALL-IN-1 filing cabinet to VMS. This means that every document is available to you if you wish to perform additional VMS functions. You can extract data contained in an ALL-IN-1 report, for example, and copy them into a VMS file for processing by an application program, or you can store the data in a database.

You can access VMS files through ALL-IN-1

You can move VMS files or documents into the ALL-IN-1 Filing Cabinet. If you wish to include DATATRIEVE-created graphics in a report generated by your word processor, for instance, and then distribute this report via electronic mail, you can perform these ALL-IN-1 functions on information retrieved from a VMS database or generated by a VMS program or application.

You can easily tailor ALL-IN-1 to include applications that provide access to data or files stored by VMS without having to learn conversions or VMS itself.



You can store DECmate documents

If you use a DECmate system, you can transfer WPS documents to the host processor for central storage, or print on the host's lineprinter. In this way many users can have access to a common document library. You can store lengthy documents on disks available on the host systems, and you can print draft copies on high-speed lineprinters. If your DECmate document is converted to VMS format, you can distribute it by electronic mail, or use it as input to application programs.

You can convert ALL-IN-1 documents to DECmate format

If you're a DECmate user, you can convert files, transfer them to DECmate, and print them on a DECmate's printer. You then have the advantage of a large central library and ALL-IN-1 power, yet retain your DECmate for processing and printing.

BASIS-OA

BASIS-OA is a general purpose full-text storage and retrieval database system used in a wide variety of markets, in a wide variety of applications, including technical libraries, litigation support, personnel/administration, publishing, education, sales tracking, and other scientific and industry-specific applications.

BASIS-OA is ideal if you need extensive text-searching capabilities on your office database and if you need to access the text using more than one search strategy. It supports an unstructured approach to searching and analyzing your online databases using a simple query language. BASIS-OA not only supports textual databases, but supports numeric data as well.

Automatic Full-text Storage and Retrieval

You can define your databases to BASIS-OA. As information or text is added to these databases, it is also added to the BASIS-OA library.

You don't have to spend extra time moving information from one place to another or keep multiple copies of your information. BASIS-OA lets you do better things with your time and your disk space.

An English Query and Retrieval Language

Using simple commands like FIND, LOOK, SCAN, DISPLAY, PRINT, and ADDRESS, you can use BASIS-OA to retrieve your stored documents.

You can quickly learn how to use the system and increase your productivity, without learning a complex programming language.

Full Boolean Query Support

Using Boolean terms, such as AND, OR, and AND NOT, you can retrieve specific information you need fast and efficiently.

With only a single command you can search for different pieces of information and put all of the information together in one report.

Extremely Fast Response Times

BASIS-OA uses datebase techniques for accesssing information stored on your system.

BASIS-OA doesn't have to search for information one piece at a time. It goes straight to the information you requested, saving you time and expensive CPU time.

Built-in Security

Not every user can access BASIS-OA. You can set your system up so that an additional identification code and password from your system manager is needed to login to BASIS-OA.

Your information, available from the BASIS-OA database, is secure from those individuals who shouldn't have access to it.

ANSI Standard Thesaurus

When you request information on a topic and that topic could be defined by other terms, BASIS-OA will substitute additional terms or prompt you for the specific term of the information you need. If you were trying to access information about the United States for example, you would probably also want information about AMERICA and the U.S. BASIS-OA can substitute these terms for you.

This can save you from wasting your valuable time searching for information using the wrong term or not getting enough information because you didn't know what term it was stored under. BASIS-OA helps make you more efficient in your job.

Powerful Report Writer

You can retrieve your information, manipulate it, and then organize it into your specific report formats using the report commands of BASIS-OA. Standard report command procedures can be stored away and recalled using a single command line.

Reports can be generated quickly using the smallest amount of effort. Standard reports that used to take hours to create, now may only take minutes.

User Profiles

These are command sequences, which you can set up, that can be accessed by a single command. These profiles make BASIS-OA a very powerful tool when combined with the ALL-IN-1 Office Menu system.

These command sequences, when combined with the menu system, allow you to set up specific search strategies, making your job faster and more efficient.

ALL-IN-1 Archival Backup

Archival backup routines store information on an output medium—either disk or tape—for later recovery. In this way, your files can be used for archiving, which is offline or offsite storage for infrequently accessed documents, to meet legal requirements, or to protect your files against loss by a catastrophe like fire or flood. How often you back up a file depends on the nature of the data. How critical is your information? If it can't be replaced easily, back it up. How volatile is it? If it's changing constantly, back up frequently. The ALL-IN-1 menu system allows you to protect your valuable data without the least trouble and without any programming experience. To meet your archive and backup needs the following utilities and procedures are available.

- Backup is a VAX/VMS utility. Backup can be used to copy files from one disk to another or to magnetic tape for archiving. Backup can also be used to restore files damaged or destroyed.
- Both the DECmate and Professional Series computers have easy-to-use, menu-driven backup modes that copy diskettes or disk to diskettes.



Section 7.
Movement of Information

Digital understands that simply having word processing and other office administration tools is not enough to meet the needs of our office customers. They must also be able to simply and easily move information between users and between computer systems, and to merge information obtained from many different sources. For many years Digital has been an industry leader in communications technology. The Digital Network Architecture and the VAX Information Architecture are a complete framework of information management and exchange capabilities that we have used to build flexible office applications. Technical details about these architectures and the elements that comprise them are provided in the "Information Management" and "Networking" sections of this Handbook.

For the office user, these products provide extremly powerful and flexible tools to meet a wide spectrum of information movement needs. But more important, users can perform these functions using simple menu commands. That's because our various communications capabilities have been tightly integrated into the ALL-IN-1 Office Menu. Thus, what could be a very difficult and complex task becomes a simple matter of menu selections. The underlying technologies that actually perform information management and exchange are obvious to the office system user.

An example is perhaps the best way to illustrate this process. Let's suppose a District Sales Manager in Chicago needs to put together a monthly report. The outline of the report and most of the text will be entered directly by the manager. However, she also needs to incorporate into her report:

- The latest economic forecast data
- The latest District sales data stored on a corporate IBM database
- Sales expense data for all her sales managers, which must be retrieved from every remote office.
- A summary of a new set of Terms and Conditions that is maintained in boilerplate form on a word processing typing pool system.

The final step will be to distribute the report to her staff and her Regional Sales Manager, located in Chicago, and to corporate headquarters in New York City.

How are these various tasks accomplished? For the sales manager, simple ALL-IN-1 menu commands are used. For the system to accomplish these commands, however, a number of different capabilities are used.

Let's take a look at each step:

STEP	WHAT THE USER SEES	WHAT THE SYSTEM USES
After typing in the initial text for the monthly report on her DECmate II, the manager types a single command to log onto ALL-IN-1 Office Menu.	DECmate Easycom main menu command	Easycom CX communications
The manager types in the name of the document containing the monthly report and transfers it to an ALL-IN-1 file cabinet.	DECmate document transfer menu	DECdx
To incorporate the economic forecast data, the manager accesses the Dow Jones information service via an ALL-IN-1 menu and copies the forecast data into the report.	ALL-IN-1 Office Menu, Dow Jones Service, ALL-IN-1 word processing	VAX Dow Jones Access
The manager next compiles a summary report of expense data, stored on various systems in each of the remote sales offices, and adds that to the report.	ALL-IN-1 Office Menu, Datatrieve procedure, and ALL-IN-1 word processing	Distributed DTR CDD DECnet
From the DECmate the manager logs onto a central IBM system and browses through the database to find the necessary sales data file.	ALL-IN-1 Office Menu and IBM host system software	DECnet/SNA Gateway or 3271 PE
The manager locates the data and transfers the file to ALL-IN-1 and merges it into the document.	ALL-IN-1 Office Menu, RJE transfer, ALL-IN-1 word processing	DECnet/SNA Gateway or 2780/3780

STEP	WHAT THE USER SEES	WHAT THE SYSTEM USES
To obtain the boilerplate for Terms and Conditions, the manager next requests a document stored on a Wang/OIS system, which is then merged into the report.	ALL-IN-1 Office Menu, Wang Document Exchange, ALL-IN-1 word processing	Wang Document the new Exchange 3780
The report complete, the manager transfers the document back to the DECmate, and the manager's DECmate . . .	ALL-IN-1 Office Menu, DECmate menu	DX or DECdx
. . . then transfers it to the corporate staff in N.Y.C. via electronic mail . . .	ALL-IN-1 Office Menu, DECmail	Message Router DECnet
. . . and then transfers it to some people who do not have even have access to an electronic mail account.	ALL-IN-1 Office Menu, E-COM	3780

This simple scenario illustrates just one office task made possible by Digital's information exchange products, the Digital Network Architecture, and the ALL-IN-1 Office Menu. Users are freed from having to try to learn many different kinds of communications products. They are also freed from having to know the details of where other users and information are located. For instance, in sending the final report to the corporate staff, the manager simply references them by name, and does not have to worry about their physical address.

A brief summary of some of the capabilities discussed above follows.

Easycom and CX	Lets the DECmate user quickly and easily access host ALL-IN-1 Office Menu systems.
DX and DECdx	Lets the user transfer documents amoung DECmates, ALL-IN-1 Office Menu systems, and host systems.
VAX Dow Jones Access	Allows access to the Dow Jones Information service from ALL-IN-1 Office Menu, including the ability to merge Dow Jones information into a word processing document.
Wang Document Exchange	Lets the user perform two-way conversion of Wang documents into Digital's word processing format.
E-COM	Translates names, address, and form letters into the format required by the U.S. Postal Service's E-COM service, and transmits the data to E-COM.
DECmail	Provides complete electronic messaging and document distribution on ALL-IN-1 Office Menu.
Message Router	Automatically routes electronic information to any user in the network, without the sender having to know a person's location.
VAX 3271 Protocol Emulator	Allows ALL-IN-1 terminals to function as 3271 terminals on an IBM host system.
VAX 2780/3780 Protocol Emulator	Provides batch file transfer between an ALL-IN-1 and an IBM system.
DATATRIEVE/CDD	Stores and retrieves information stored on distributed Digital systems, without the user having to know on which node the information is located.
DECnet	Handles the basic communications and network functions, including the ability of any terminal or workstation to function as a terminal on any other computer in the Digital network.

The remainder of this section contains further user-oriented information about each of Digital's information exchange products. For more technical detail, please refer to the sections on Information Management and Office Networks.

Easycom

Easycom lets you communicate quickly and easily with host systems (both Digital and non-Digital devices) using character transfer (CX) communications from your DECmate II. The repetitive steps for communicating with a host system can be eliminated. Using an Easycom logon file, your DECmate can access a computer, send electronic mail, use another printer, typeset documents, or do any other job you can do with CX, automatically. Easycom lets you go straight from word processing on your DECmate to using application programs on a host system.

Easycom sets up communications for you automatically

By using a logon file stored on your DECmate, you can skip all of those repetitive steps needed to connect your DECmate to a host system. A logon file is a document containing a list of commands. These commands tell the DECmate how to start communications and log onto the host system for you. The logon file duplicates the commands you would ordinarily type if you wanted to do the same thing manually.

Easycom helps you save valuable time when logging into those systems you frequently access.

Transfers Documents Automatically.

Easycom can set up your Digital host system for AX/DX document exchange communications with your DECmate. If your DECmate is running Easycom, it can be set to AX or DX by the host system to send or receive documents, and then be switched back to character transmission mode.

The entire process of initiating and transferring documents between your DECmate and a host system can be simplified using Easycom. You'll save time and steps using your prestored command files.

Easycom logon files are easy to create.

You can create logon files for all of your specialized communications needs. To write a logon file you must learn a few simple things:

- How to write a simple program
- How to use the CX options
- How to log onto the host you are writing the file for
- How to initiate the desired application, document transfer, and so on, on the host.

Or you can copy logon files that other users have created, which is as simple as copying a document from disk to disk.

You can easily write logon files that can put you in touch with the information you need when you need it. Once a logon file has been created by anyone in your group, office, or department, it can be copied easily and used by anyone who needs it.

MESSAGE ROUTER

The Message Router is Digital's powerful communication's software offering that provides your office with a new dimension of office communications capabilities. The Message Router can bring to your office the exciting and valuable concept of "universal document interchange". As the name implies, "universal document interchange" transfers documents or messages across previously impenetrable systems boundaries. Transfer of information, documents, or messages across systems with different operating systems, across multiple nodes of the same operating system, and across systems from different computer vendors were, before Message Router, impossible or unwieldy. This prevented the "total information access" needs for maximum effectiveness in the office from being satsifactorily met. Message Router, however, supports major complex communication networks and greatly enhances the feasibility of truly effective multinode office automation applications.

Message Router conforms to communications standards

Its design strictly conforms to the existing Draft Standards for Network Protocol, Interface, and Formatting developed by the National Bureau of Standards (NBS) for message handling.

Message Router's conformity to these accepted standards provides you with total flexibility in communicating or exchanging messages and documents amongst other conforming systems.

Message Handling in a DECnet network among different operating systems

Message Router is the analog of the post office. It provides the office message handling services necessary for distributing information in a DECnet network environment. It runs on the VAX/VMS, RSTS/E, and RSX/11M-PLUS operating systems. With Message Router, applications—like electronic mail—can exchange information with other applications running on office computer systems connected by DECnet.

Communicating with other systems in a network gives office systems users access to more information, and lets them "talk" to a greater number of other users. This means better, faster decisions.

Message Store and Forward Capability

Message Router stores messages awaiting transport across DECnet communication links and forwards them when the network becomes available. Message Router makes it possible for users to send messages in a network environment without concern for the status of the network communications links. It eliminates the need for you to continually resend messages due to busy or unavailable communications links. It eliminates the need to tie up a terminal when sending lengthy documents or messages. Message Router stores your documents or

messages, and forwards them across the communications links to the designated receivers when the network becomes available.

Message Tracking Information

Message Router provides message tracking features necessary for moving information through a network. It provides information for the system or network manager, such as when a message was received by another node, who sent the message, and size of the message. It also sends a confirmation of delivery message back to the orginating system when a message has reached its final destination. The benefits of this are twofold:

- Message delivery is extremely reliable because of the Message Router's knowledge of the whereabouts of a message in the network
- The network or system manager can trace messages and analyze network traffic.

Interface to Applications

Message Router is a tool that can be used to send messages between many different applications and can be linked into other mail systems, messaging services, or public data networks. Users can write their own "User Agents" or "Gateways" to exchange information using Message Router.

The ability to communicate with other vendors, to connect to external mail systems, public networks, or customer-written applications provides unmatched flexibility in office communications.

VAX CDD Common Data Dictionary

VAX Common Data Dictionary can make the location of information transparent to your users. The VAX Common Data Dictionary stores information about your data, including where it is physically located. This means that when you ask the system for information, it can find your data wherever it is located. This includes data that may be located on other DECnet nodes connected to your system.

VAX Common Data Dictionary (CDD) is the keystone of the VAX Information Architecture. The CDD is essential to the operation of VAX DATATRIEVE, VAX Database Management System, VAX Application Control Management System and VAX Terminal Data Management System. It provides you with a single logical data dictionary for a VAX/VMS system. For more information on VAX CDD's capabilities refer to the Infomation Management section.

Central Data Storage

In the past, data that was needed on more than one system was kept on one central system and copies were sent to all of the other systems needing that information. Depending on the updating frequency of those files, those files would be copied weekly, daily, or even hourly.

VAX Common Data Dictionary lets you keep those files on one system in your network. You don't have to make multiple copies any more, the CDD allows your users to access that information from any system in your office network. Updating information on one system now keeps all of your users up-to-date, iliminating the need to copy files between systems.

Simplified Programming

Applications written to use the VAX Common Data Dictionary, for data access, are simplified. The application doesn't have to keep track of where the data is stored. If the location of the data changes only the VAX Common Data Dictionary needs to be updated, your office applications can remain the same.

Your programming staff can save time writing their applications, because the VAX Common Data Dictionary keeps the locations of where the data is stored and how it is structured.

VAX Dow Jones Access

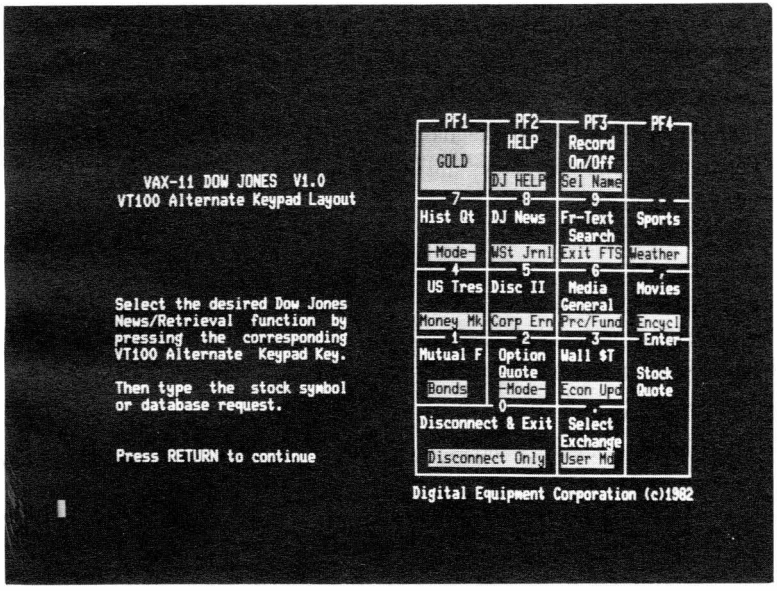
Dow Jones News/Retrieval is a business information service specifically designed for the busy executive. Initially this service allowed "dumb" terminals or microcomputers to access a wide range of financial business data. But the limitations of these small systems prevented many people from having easy access to this data. VAX Dow Jones Access gives you, your group, your department, or your firm easy access to Dow Jones News/Retrieval through a VAX computer and any Digital workstation.

Automatic Autocall and Login Procedure.

VAX Dow Jones Access will dial a predetermined telephone number to a local packet switching network vendor (Tymnet or Telenet). After the connection has been established, the network will prompt you for login information, passwords, and other information. But all you have to do is press the return key in response to each of these questions—VAX Dow Jones Access automatically answers them for you.

Enhanced User Interface

You don't even have to remember the various codes and symbols needed to access information from the Dow Jones service—VAX Dow Jones lets you use the alternate keypad of your Digital workstation instead. This saves you valuable time when searching for important quotes or data.



Data Retrieval and Storage.

VAX Dow Jones can record any or all of the information you receive from the Dow Jones service. If you are using ALL-IN-1 Office Menu, that information will be left in your paste buffer so you can add it to a document or mail message. If you don't have an ALL-IN-1 Office Menu system the information will be put into a file on your VAX for future use.

You can save valuable time and trouble by capturing the information as you see it and simply pasting it into a document or mail messsage.

ALL-IN-1 Office Menu Integration

VAX Dow Jones can be easily added as a menu selection to any of the ALL-IN-1 Office Menu System menus so all users can access it. Integrating the VAX Dow Jones package also allows the paste feature to be used to capture data from the Dow Jones service.

Your office can have easy access to the Dow Jones service through your ALL-IN-1 Office Menu System. You can also easily transfer information retrieved from the service into your documents or mail.

Online Help

Pressing the help key gives you a look at the workstation alternate keypad layout. By pressing the gold key and then the help key you can get specific information about the Dow Jones function you currently have selected.

You don't have to keep a users manual close at hand or memorize key strokes. Help is just one key away.

The following services are available from the Dow Jones News/Retrieval, implemented by using the alternate keypad.

Current Quotes

You can request current quote information for:

- Common and preferred stocks and warrants
- Corporate and foreign bonds
- Options
- Mutual funds
- U.S. Treasury issues

Using the workstation at your desk, you can keep up-to-date with the latest quote information from the stock exchanges.

Select Exchange

The Select Exchange key allows you to select the following exchanges:

- Composite/Over the counter
- New York
- American

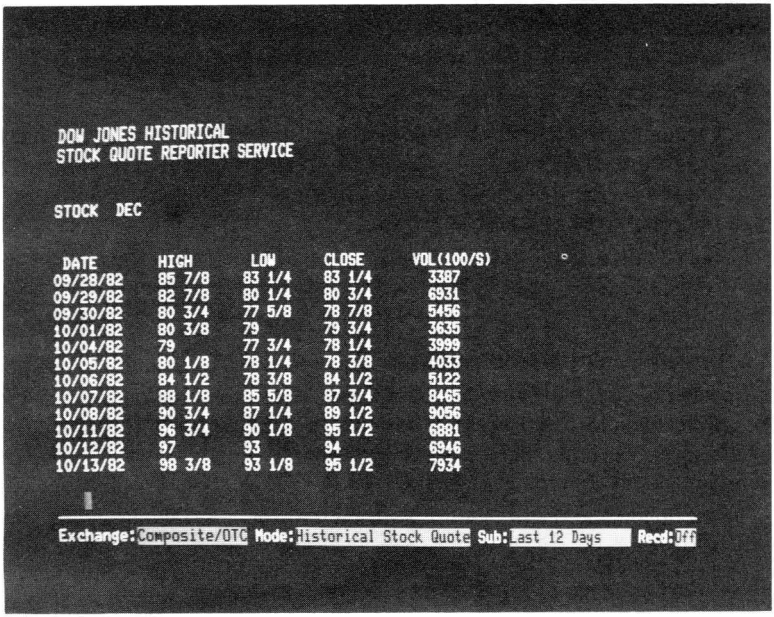
- Pacific
- Midwest

Without leaving your office, you can stay up-to-date with what's happening on each of the exchanges.

Historical Quotes

Historical quotes are available for common and preferred stocks and warrants from each of the exchanges. Composite quotes are available starting with 1982's second quarter. Quarterly summaries begin with 1978, with quarterly and monthly summaries available for 1979 to the present. Daily historical quotes are also retained so that quotes for up to 264 prior trading days will be available.

You can review market trends for the past few days or the past few years. The information is at your fingertips with VAX Dow Jones.



Dow Jones News

The Dow Jones News database gives you news from the pages of the Wall Street Journal, Barron's, and the Dow Jones News Service (the "Broadtape"), as recent as 90 seconds ago or as far back as 90 days.

You can be kept up-to-the-minute with the latest financial news or review what happened last month. The information is available at your workstation.

Weekly Economic Update

In this five-part database, you can find statistics and analyses of the past week's economic events and a look at the month ahead compiled by the editors of the Dow Jones News/Retrieval Service.

You can see how the Dow Jones editors felt about last week's events and how they view the future, giving you another opinion to help you make better decisions.

Wall Street Journal Highlights

You can view the headlines and summaries of the major stories in the Wall Street Journal as early as 7 AM (Eastern Time) each morning. You have the option to select one section of interest to you or the entire online edition. In addition to the current day's edition, you can review the past four editions.

You can keep current with all the latest daily news, as if the Wall Street Journal were delivered to your office daily. You can also use this information to make business decisions from a reliable source.

Disclosure II Financial and Descriptive Data

Disclosure II lets you draw on a wide range of composite corporate data filed with the Securities and Exchange Commission. You will find everything from company profiles, balance sheets, and line of business segment data to the names of the officers, directors, and subsidiaries.

Financial information about all of the firms on the stock exchange is immediately available at your workstation. No need to wait for statements to be sent through the mail.

Corporate Earnings Estimator

Updated weekly, this feature provides consensus forecasts of earnings per share for 2,400 companies based on estimates provided by 1,000 research analysts at 45 major brokerage firms. For consistency, estimates are converted to primary earnings before extraordinary items.

You can follow and keep up-to-date with how the experts feel about any firm you may be tracking.

Free-Text Search of Dow Jones News

The Free-Text searchable database contains news stories dating back to June 1979 compiled from the Wall Street Journal, Barron's, and the Dow Jones News Service. This is separate from the regular 90-day news database, which is accessible using company stock symbols and various industry and government agency categories.

The free-text search feature lets you search the news database using any words, phrases, dates, or numbers that are contained in the headlines or in text. Specialized search statements can be designed by linking several words or phrases together.

Free-Text search means that you don't have to clutter your files with all those articles you think are important. Instead you can access those articles easily using VAX Dow Jones—whenever you need them.

Media General Financial Services

Detailed corporate financial information is available using the Media General Financial Services database. With it you can get access to information on 3,200 companies in 170 industries.

Here is another source of specific financial information available to help you make the best informed decisions.

Sports

This information is assembled from the wires of United Press International. It offers current news stories and statistics on professional and top amateur sports. The type of sports information available will vary depending on the season. Statistics are updated every morning, Monday through Friday.

It's an easy way to find out how your favorite team, your boss's team, or even your client's team did last night.

Weather

This feature provides a complete package of weather statistics broken down into three separate sections:

- Temperature Tables
- National Weather Forecast
- National Weather Wrap-up

The temperature tables are forecasts by city showing the city name, the high and low temperatures from the previous day, and the predicted current day weather conditions. The National Weather Forecast is a regional summary of current-day weather conditions for the United States. The National Weather Wrap-up is a regional summary of the previous day's major weather developments.

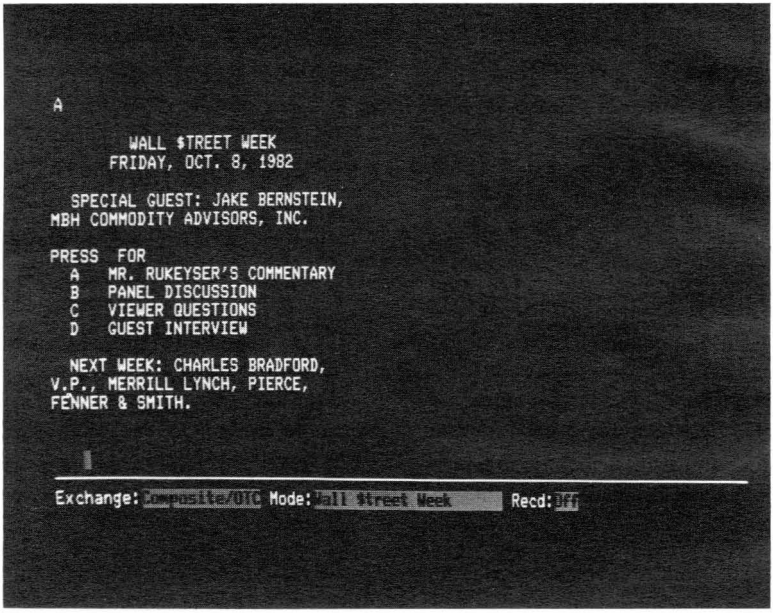
This information is updated twice daily, Monday mornings through Friday afternoons.

If you do a lot of traveling, this feature will help you plan for your trip.

Wall $treet Week

A full transcript of the well-known PBS television program, "Wall $treet Week," the text is broken down into four sections so that you can review an entire program or any portion that interests you.

Now if you want to review or save any of the information presented to any of the four most recent Wall $treet Week shows, you can—through VAX Dow Jones.



Cineman Movie Reviews

These reviews of approximately 50 movies is updated each week. Reviews cover the week's top new releases as well as those currently showing across the nation.

Cineman Movie Reviews keep you abreast of the major films and how the critics view them.

Academic American Encyclopedia

The entire 20-volume Academic American Encyclopedia is available online on Dow Jones News/Retrieval. The electronic encyclopedia is updated twice a year by Grolier Inc. and contains more than 28,000 current articles.

You now can have immediate access to an encyclopedia when you need it.

User Mode

When new functions are added to Dow Jones News/Retrieval, new features will have to be added to VAX Dow Jones. The User Mode feature allows you to access a new function before it is added to VAX Dow Jones.

You can have immediate access to the new functions of the Dow Jones Service as they are added. You don't have to wait for your software to be updated before you can use a new Dow Jones function.

DECdx

DECdx, a family of software products, resides on your PDP-11, VAX/VMS, or DECsystem-10 or -20 computer system. With it you can connect your standalone and shared-resource WPS-8 systems to a host system for better system utilization, document exchange, and information and data sharing.

Using DECdx, you transfer documents between DECmates and host systems over a serial communication or telephone line. All of your document print-control characters and special formats are retained during the transfer.

All of the communication done between your WPS-8 and host systems is done using the Digital Standard Document Exchange Protocol (DX), which detects transmission errors and corrects them.

Compatibility

All of your documents transferred by DECdx are stored in DX format, Digital's Standard Document format.

If you need to take a document from one system and use it on another, you won't loose any information or document characteristics. Your documents are transferred between systems without any changes.

Shared Access

With the appropriate privileges, users can share documents.

More than one person can work with a document at the same time. This lets you use your people and system resources more effectively.

Transfer Documents

You can transfer documents from your DECmate to your host system, or from your host system to your DECmate. Using the host system as a central storage system means you can access a greater number of documents, from a central location.

You save time by having large or important documents stored on your host system and then using DECdx to get them when you need them. This also allows anyone with the correct privileges to retrieve those documents when they are needed.

Index

A directory of documents stored on your host system in DECdx format can be displayed on your DECmate workstation. The DECdx index has the same appearance as the document index of your DECmate.

No retraining needed for your DECmate users to identify documents stored on your host system.

ADD Document

Using the ADD function you can add DECmate documents to your DECdx document index.

With simple commands, you can use this product the very first day to create a document directory on your system quickly and easily.

Conversion

Three conversion utilities come with DECdx.

If you are currently using the current DX product, an OLD-to-NEW utility is useful. It takes your old files and updates them to the new DX format.

If you have a need to take files in ASCII format, that were created by some other program, application, or editor, you can add those files to your DECdx index using a FILE-to-DOCUMENT utility. Once you have these files in your document directory, you can send them to your DECmate and edit them using the sophisticated WPS editor.

Some applications and editors on the host system require the document they are working with to be stripped of most of the special document format and print features, and to be stored in an ASCII file. Using the DOCUMENT-to-FILE function, you can convert a document from DECdx format to ASCII format.

No matter which conversion function you use, the resulting document or file will be structured to appear as close to original as possible.

The tools have been put in place to help make your job easier. Since not all of the information available from your host system is available in one format, these tools make it easy for you to get the information you need when you need it.

Print Utility

With DECdx you have the choice of printing your documents on the host system printer. Or you can transfer a document to your DECmate and print it on your letter-quality printer.

You can use the speed of your central host system's impact printer for printing large documents, or you can use a letter-quality printer attached to your workstation—the choice is yours.

Read Document

You can read documents stored in your DECdx directory without transferring them to your workstation.

You can find information stored in your directory without printing, converting, or transferring a document.

Online Help

Extensive online help is available to help you when you need it, where you need it.

You don't have to consult a copy of the user's manual each time you use DECdx. If you have a simple question, the system can give you the answer, making your job just that much easier.

3271 Emulation and RJE Access

Our Internet protocols enable Digital systems to be connected with mainframes from IBM, Control Data Corporation, and Sperry Univac and with other processors that use the same protocols. Digital's IBM Internets support Batch BISYNC, Interactive BISYNC, and SNA (IBM's System Network Architecture) communications. Internet products give you the greatest possible opportunity to match different types of processors to different types of jobs without compromising your overall networking effort.

In a manufacturing environment, for example, Digital systems that maintain local parts inventories can update and request information from a central mainframe database via Digital's Interactive BISYNC 3271 or SNA protocol emulators. These same two Internet products also allow programs on Digital and IBM systems to work together interactively to solve applications problems. Development engineers engaged in transaction-oriented processing at test stands can forward data to a mainframe for further analysis and receive final results in return. Data from the shop floor in the same company can be collected by local Digital systems and held for periodic transmission to an IBM mainframe via our Batch BISYNC 2780, 3780, or HASP protocol emulators.

External Document Exchange

If you currently use a Wang/OIS system to do your word processing and want to transfer documents to Digital's more powerful ALL-IN-1 Office Menu System, you can with External Document Exchange. External Document Exchange, a special two-way conversion option, converts a file transmitted from your Wang/OIS word processing system via 3780 communications into a form compatible with your Digital office system. You can then use any of the many features available on ALL-IN-1 on that document. After you complete your work on the document, you can convert it back to the Wang format. This facility also works in reverse. You can first create your letter, memo, or other document on any of Digital's word processors and then translate it to the Wang/OIS format.

ALL-IN-1 Interface

External Document Exchange uses a standard ALL-IN-1 menus, so the utility is extremely easy to use. Conversely, if you're concerned about ease of use for those in your office using Wang/OIS, the interface involves only one menu entry. It's easy to use, and easy to increase your document processing power.

DX File Compatibility

Files transferred from the Wang/OIS system are converted into Digital's standard DX document format. You can then use such other products as WPS-PLUS (for editing) and DECpage (for high-quality printing).

Enhanced Reliability

External Document Exchange has been tested for consistant conversion; any document characteristic transmitted by 3780 is fully converted to eliminate tedious reformatting. A word of caution, however, some document characteristics, such as bold and underline, are stripped from the document by the Wang system before it's transmitted via 3780 communications. These characteristics, therefore, can't be converted.

Built-in System Manager

An ALL-IN-1 system manager form for controlling the interconnect software in both directions is included in Wang Document Exchange. Your system is then easier to manage.



Chapter 3.
Data Processing Capabilities

In an office automation environment, end users have a single workstation, either terminal or personal computer, on their desk. This workstation is the single window into the electronic systems that help users do their jobs more effectively.

As you go through a typical day at work, you'll use many ALL-IN-1 office applications—mail, word processing, business graphics, office administration, time management, and spreadsheets—through a flexible, consistent, integrated user interface.

However, to solve many specific business problems, you also need to use such custom applications as corporate mainframe inventory systems, sales analysis systems, department-level personnel systems, office inventory, and others. Many of these applications fall into the traditional data processing model of information systems.

These custom applications typcially are either purchased as third-party packages or developed internally by the MIS staff. Sometimes, the simple or ad hoc applications can be developed by nonprogramming staff. In any event, it is important that the office worker can easily access these custom applications using the *same* user interface that they used for the generic applications. This means you can run standard sales reports using a simple ALL-IN-1 command.

Further, because the information you need may be located anywhere in the organization, the job of "finding" data and guaranteeing its accessability, while still protecting the needs of the organization through controlled access, must be managed by the system.

Digital provides the environment that allows you to easily extend your workstation beyond the generic office applications into the realm of custom information processing. Even into distributed information processing. And all from one workstation, all using the same user interface, all tied into the office capabilities provided by Digital's workstations and ALL-IN-1!

Of course, office systems must address the needs of implementers as well as end users.

Often, development teams must work with primitive development tools and become data communications and networking or database management experts before they can successfully implement even simple information- or communication-intensive applications. They must make painful trade-offs between flexibility and integration. In traditional data processing environments, expansion or the changing of a single parameter may require code modifications or complete rewrites. The programming effort to take advantage of a new

technology may erase any cost savings or efficiency that the new technology offers. As the number of applications grows and becomes intertwined with data and communications functions, the changes required in a single application may "break" the entire system, due to these interdependencies.

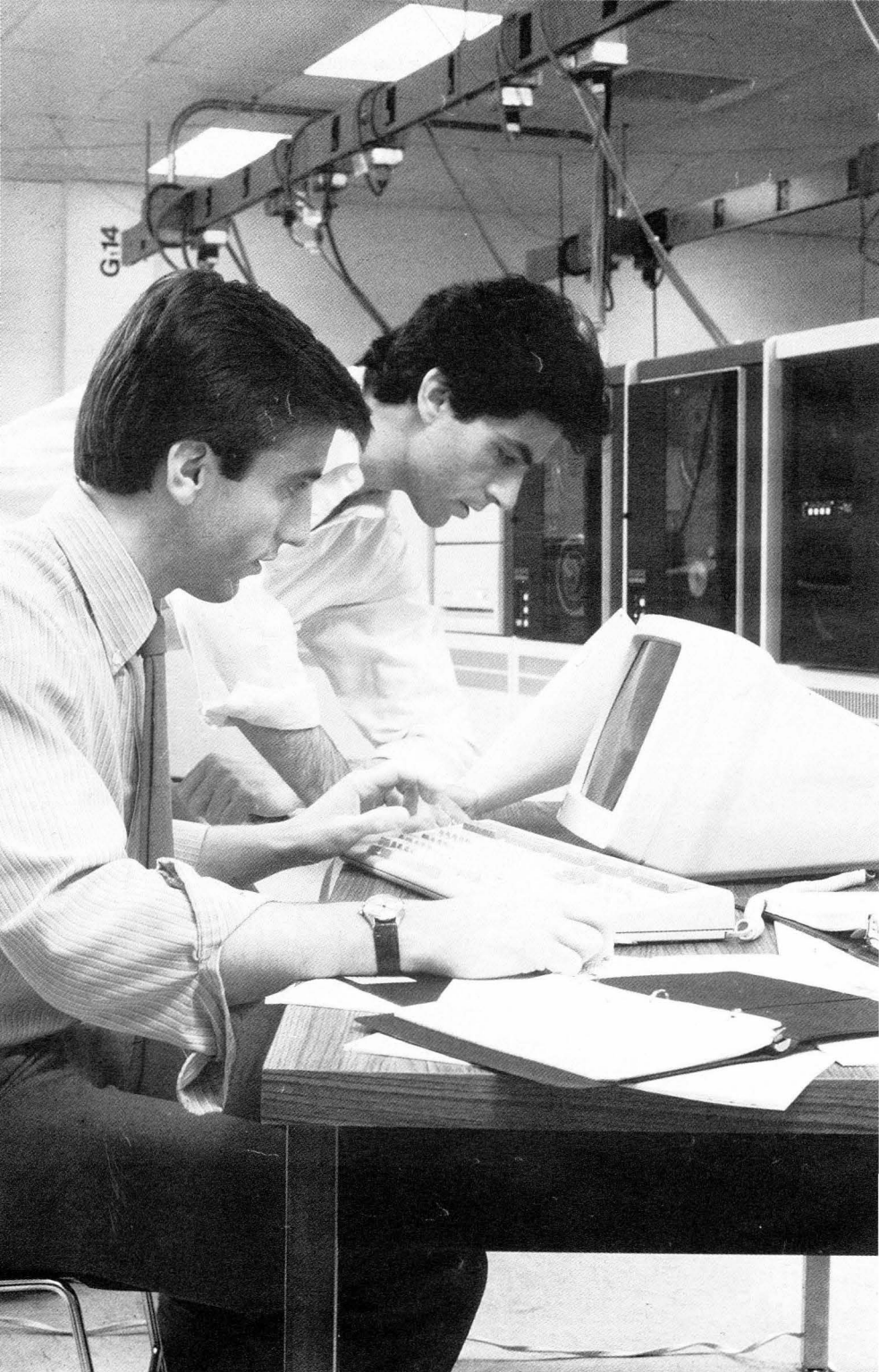
The foundation for Digital's integration of the *office* system with the *information* system is built on four major capabilities:

- VAX/VMS application development for programmer productivity
- ALL-IN-1 application development for easy application integration
- VAX Information Architecture for distributed information management
- Digital Network Architecture to build the office network

Because of the ALL-IN-1 concept, the Digital Network Architecture, the VAX Information Architecture, and the user interface form a complete set of powerful, easy-to-use, proven, application development and management tools available to the applications developer. Specific custom applications programs can use the same facilities as the generic office capabilities provided by Digital. These tools can even be used to integrate third-party applications.

Using the complete set of powerful ALL-IN-1 integrated system tools, application development and operation is significantly enhanced. Integration is straightforward. High-level, consistent language interfaces are provided to manage information or use networking and communications functions. Applications can be added to the system without affecting other applications. The physical system configuration can be changed, without changing one line of applications code. Data can be located anyplace within the network to which the system is connected. Communications and database management code is separate from the applications code to prevent interaction or traumatize growth or change. And much, much more.

This chapter discusses the ALL-IN-1 applications development environment that is supported by the VAX Information Architecture and Digital Network Architecture. It provides important information for the business manager or executive who may be considering an office system and technical information for the development manager or application development team member.


G14

Section 1.
Applications Development

Although applications development, per se, is typically not an issue of concern for the office systems user, the availability of useful and easy-to-use applications programs is often a key element in the user's perception of the usefulness of the system.

Applications packages or programs are available from many sources: computer manufacturers, software houses, application houses, service bureaus, systems houses, users' societies, and other users. Considerable resources have been, and will continue to be, adapting available applications software to meet the unique needs of a given installation.

Digital has long been recognized as a leader in providing an applications development environment that gives programmers the tools to develop and customize applications quickly and efficiently. It was Digital that pioneered interactive program development. It was Digital that pioneered interactive, online, integrated debugging capabilities. Digital continues to pioneer the development of program/application development tools.

The VAX software system provides an unmatched selection of fully implemented languages for application development: BASIC, COBOL, FORTRAN, PL/I, PASCAL, C, BLISS, CORAL, DMS (MUMPS), and DIBOL. VAX also supports a Code Management System (CMS) that materially facilitates the management of the development effort. An applications programmer can select the language that best-suited to a given application, the language that has been used in the past for the application, or use some other criterion. It is the programmer's choice, not constrained by availability of a given language.

A Common Run-time System supports all languages for efficiency and ease of use. Interactive debugging facilities (DEBUG) are integrated within each language processor to provide a powerful debugging environment.

Digital's Applications Development Environment (ADE) makes the development of small, simple applications easy. Users don't have to learn programming techniques and languages or technical terminology to write their own programs.

The most important feature of the Digital's applications development capabilities is the information management, networking and user interface integration, available on VAX/VMS running ALL-IN-1. The Digital Network Architecture, VAX Information Architecture, and the ALL-IN-1 menu-driven user interface and flow control give the programmer straightforward interfaces to facilities that have traditionally required extensive knowledge and experience. The software that implements these capabilities does the difficult, time-consuming functions: establishing and maintaining disk structures and access methods, locating

information on distributed databases, establishing and driving electronic communications and networks, ensuring error-free transmission of data, providing a uniform user interface, and so on. The programmer can focus on the unique processing requirements of the application, rather than on information management, communications, and the user interface.

Details of each of the elements of the powerful and flexible VAX applications development environment are discussed in other sections of this handbook, The User Interface, Information Management, and Office Networks. More information on any of the languages supported by VAX/VMS is available in the Ordering Information and Product Specifications section of this handbook.

VAX/VMS Common Language Environment

An important feature provided by VAX office systems is a "common language" environment. VAX languages adhere to a specific set of standards. These standards mean programs written in any VAX language can share a common library of general purpose procedures, can call any other program on the system, can use a standard file handling service, and can use a standard set of troubleshooting tools. Combined with the ALL-IN-1 Office Menu's application development features, maximum flexibility is provided for developing customized, integrated office information system solutions.

Because of the common language environment, programs designed to do specific tasks can be called by other applications, no matter what language these applications are written in.

Some of the common language standards include the following.

Common Run Time Library

The VAX Common Run Time Library contains sets of general purpose and language-specific procedures. User programs can call these procedures to perform specific tasks required for program execution. All of the procedures in the Run Time Library follow the same programming standards and make no conflicting execution assumptions, allowing for a true language-independent common runtime environment.

This type of environment will encourage programmers to create programs, composed of procedures written in different languages, increasing programming flexibility.

VAX Calling Standard

The VAX procedure calling standard defines and supports the mechanism for passing information and arguments between modules of major VAX software subsystems such as languages, VAX Record Management Services, and the VAX/VMS operating system.

This standard allows programs written in one language to be called by programs written in another language. This can eliminate the need to write programs or procedures to do a specific task, if the program or procedure has already been written in another language.

Common File Handling

VAX RMS Record Management Services is the standard technique used to handle record I/O on VAX/VMS systems. All VAX applications that conform to the common runtime standards use VAX Record Management Services to accept new input information, read or modify data, and produce output in a meaningful form. The VAX RMS routines are an integral part of the VAX/VMS operating system and are consistent with the VAX Calling Standard, making it easy for programmers to use VAX RMS in their applications.

Debugging Utility

The VAX/VMS operating system, along with an application known as DEBUG, can assist with the troubleshooting and debugging of programs. DEBUG can be linked with a program to help the programmer control its execution during development.

Debugging commands start and interrupt program execution, so programmers can step through instruction sequences, call routines, set break or trace points, set default modes, define symbols, and deposit, examine, or evaluate virtual memory locations.

This utility helps your programmers troubleshoot their programs interactively and correct problems faster and more efficiently.

Traceback Facility

VAX/VMS supports a Symbolic Traceback Facility. This facility assists programmers, when errors occur, by describing the call sequences that occurred prior to the error. The traceback facility is automatic and does not require that any special qualifiers be included in an application.

Using information provided by the traceback facility a programmer can usually locate the source of an error in relatively short time.

VAX DEC/CMS

DEC/CMS (Digital Equipment Corporation Code Management System) will help software developers manage the files of their projects. Some of its capabilities include storage of text files in a project library; retrieval of previous file generations; report generation of modified files; merging concurrent or separately developed modifications; and storage of related files as a single element.

Each Code Management System command is invoked from the operating system's command level to perform the file management function. Users can edit, compile, and test in the usual manner when each command returns to the operating system's command level. All text files are stored in a project library, including source programs, command files, documentation and test data. Each project can have its own separate library.

VAX DEBUG

The VAX DEBUG program, a language-independent, interactive, symbolic debugger works with programs written in most of the languages supported by the VAX/VMS operating system. Currently supported languages are: VAX FORTRAN, VAX COBOL, VAX PASCAL, VAX PL/I, VAX BLISS-32, and VAX MACRO assembly language.

With DEBUG you can dynamically examine and modify contents of memory locations to help find errors in programs. With it you can set breakpoints in programs to stop execution at specific points, and critical code sections can be single-stepped (line by line or instruction by instruction) to verify correct execution. Since your program execution is controlled by DEBUG once it is invoked, modifications can be made to the program while it is executing.

VAX ADE (Application Development Environment)

Digital's Application Development Environment (ADE) is a software package that can be used to develop small, simple applications without having to learn programming techniques and languages or technical terminology.

ADE is of particular interest to small businesses because the number of installed computers continues to exceed the number of programmers available to program them. With VAX ADE you don't have to be a programmer to develop simple applications like keeping personnel records, doing order processing, building financial and forcasting models, or even just keeping mail or telephone lists. VAX ADE provides you with easy-to-use facilities and functions so you can create your own databases, add, change or delete data, produce simple bar graphs, or write reports without having to wait for formal programming or report generation.



Section 2.
Information Management

Information management is a critical aspect of an office information system. Digital's VAX Information Architecture is a set of information management products. When combined with our networking capabilities under DECnet, the products provide the tools to build and manage complex information systems across departmental, computer, even organizational boundaries, while retaining control of the organizations' information asset.

Further, the integration of ALL-IN-1 and the VAX Information Architecture product set produces a sum greater than its parts. Not only can traditional data processing information be managed, but through one integrated tool, the user can access text, graphics, even voice data.

Finally, the VAX Information Architecture product set directly addresses the "life cycle cost" of major MIS application development and maintenance. And, these products are also used to deliver the flexibility and end-user programmability to the department and the desk.

The following paragraphs discuss both the key challenges of information management and Digital's offerings that help you meet these challenges.

In selecting and implementing an office information system, you face five distinct information management challenges.

- Access
- Multiple information types
- Control
- Maintenance
- Distribution

Let's examine each of these challenges in detail, highlighting Digital's capabilities to address each.

Access

The office is where *you* are. That means that information must be accessible from a wide variety of workstations—from a telephone or a portable terminal, through a VT100 or VT200 terminal, or through your Digital personal computer.

Each user will have a terminal or workstation in his office. Perhaps a VAXstation for engineers, a DECmate for secretaries, a Professional for yourself. But you *all* need to access the information you share.

Multiple information types

One of the consequences of bringing computers to the office worker is the many new types of information office workers use every day. Formatted documents, business graphics, engineering drawings, electronic mail messages. All of these are in addition to the more familiar data processing records and files. But you need to manage *all* this information to get your job done, no matter how or where it was created or what form it's in—that's the system's problem.

Control

The very rapid increase in the number of personal computers and word processors means that a whole new class of users is creating information in electronic form. That information represents much of an employee's added-value, and, therefore, is as much of a key corporate asset as today's mainframe data processing databanks.

Information is one of a company's key assets, and, like all other assets, it needs to be managed and secured. Today the problem is small, but significant. Over the next few years the increased investments companies are making in personal computers and word processors will escalate the problems of information management to much larger proportions.

Maintenance

Keeping information up to date has always been a major cost of doing business. Traditionally, it was managed by the data processing centers, using powerful tools such as large mainframes. Increasingly, information is maintained with transactions entered directly from a terminal. But the spread of minicomputers, personal computers, and word processors has exacerbated duplication and maintenance problems.

Many of the newer users are unfamiliar with back-up and restore techniques. Since information creation is fragmented, updating it will also require an increasing amount of professional and management time.

Distribution

The increasing cost of computing has opened the question of how best to distribute computing resources throughout a company. Users now have, for the first time, the choice of personal, departmental, or organizational computing.

Initially, the decision is often made on cost alone—how much can my department's budget stand? But more and more users are left wondering about the *best* way to distribute *information* as well as computing.

Digital's VAX Information Management helps you face these information management challenges, with the following set of products.

- VAX Common Data Dictionary. Digital's central information storage facility for data definitions (information about data) used by VAX Information Architecture and language products.
- VAX DATATRIEVE. Digital's query and report writing language.
- VAX DECgraph and DECslide. Data plotting and graphics software.
- VAX TDMS. Digital's terminal data management package that displays forms and manages data on terminals or workstations.
- VAX FMS. Digital's forms management utility used to create and manage simple screen forms. It is extensively used in the ALL-IN-1 Office Menu.
- VAX ACMS. Digital's software for application management and development.
- VAX DBMS and VAX RMS. Digital's data management products.

VAX CDD Common Data Dictionary is the key to the VAX Information Architecture. The CDD defines and locates data definitions regardless of the data modelling technique used. All of the VAX Information Architecture products can use the same data and the same files because the definitions describing record structures are stored in the CDD. You can use a CDD record definition in VAX COBOL to read and process a file created by DATATRIEVE, for example. You do not have to write special programs to allow different products to work together, and you don't have to store redundant copies of data files, each suited to a specific product.

VAX DATATRIEVE is a popular and powerful query and applications development language that allows a VAX user or applications program to store, update, and retrieve data interactively. It can generate attractive reports and graphs, and retrieve data from other computers in a computer network as easily as you can from your own computer. It can combine data from two or more files, prototype and test new applications, and store often-used sequences of statements as procedures.

VAX DECgraph and VAX DECslide allow information to be displayed easily in graphic form for analysis or presentation support. These products are described in detail in the Graphics Section in the Office Capabilities Chapter.

VAX TDMS is a complete set of state-of-the art tools for reducing the life-cycle costs of developing and maintaining interactive, screen-based applications. TDMS expands the traditional concept of forms management to include control of all input and output. For example, instructions for input and output, checking value ranges, and for testing whether or not possible conditions are true are placed in the TDMS request. Traditionally, these tasks would have been included in applications programs. And, because it's totally integrated into the VAX Information Architecture (request, form, and record definitions are stored in the CDD),

TDMS provides a firm foundation on which future capabilities for system control and transaction processing applications can be built.

VAX FMS is a general purpose forms management system that provides a flexible way for interactive applications to talk to users on video workstations. The ALL-IN-1 Office Menu user interface, for example, is driven by FMS, making all of the Office Menu's screens easily customizable.

VAX ACMS is a powerful and flexible information management tool that let the applications programmer manage complex, multiuser, transaction-driven application systems. The typical ACMS application involves simultaneous access to a common database by users with little or no computer experience. Applications well-suited to ACMS include hotel reservations systems, personnel administration systems, and fund transfer systems. With ACMS, the programmer can easily create and modify applications menus, control which users can run which tasks, keep track of the volume of tasks run and who runs them, keep records of the operations of the system and the resources used by an application, and add new tasks to an application or new users to a task. ACMS can be used to control applications developed with any of the VAX languages or VAX Information Architecture tools. ACMS applications are easier to create, easier to understand, and easier to change than standard application programs.

VAX RMS (Record Management System) is a traditional information organization and management system with one important difference. It is tightly coupled with the VAX Information Architecture through the Common Data Dictionary, with all the benefits of such integration. RMS provides the important logical interface between applications programs, DATATRIEVE, and the VAX information storage system.

VAX DBMS is a full-scale CODASYL-compliant database management system. It provides the software to define, create, and manage data in simple or complex databases: for example, hierarchical and network. Tight integration of all the DBMS utilities within the VAX Information Architecture lets programmers step through database constructions and debugging with unprecedented ease. All DBMS database definitions are stored in the CDD, so whenever a new field, relationship, or record is added to the database, change is required only in the CDD and there is usually no need to rewrite the programs that use the database or to reorganize the database itself. Security of the database is enhanced through controlled user access, and integrity features protect data from errors due to software or hardware failures.

VAX CDD Common Data Dictionary

VAX Common Data Dictionary (CDD) is the keystone of the VAX Information Architecture. The CDD is essential to the operation of VAX DATATRIEVE, VAX Database Management System, VAX Application Control Management System and VAX Terminal Data Management System. It provides you with a single logical data dictionary for a VAX/VMS system.

VAX DATATRIEVE statements refer to data definitions in the Common Data Dictionary. The CDD is also used to store sequences of VAX DATATRIEVE statements as procedures that can be invoked interactively or from application programs. In addition, the CDD stores database definitions that the VAX Database Management System needs to create, access, and maintain databases. It also stores definitions for the VAX Application Control Management and VAX Terminal Data Management Systems.

Storage of VAX Information Architecture Definitions

Stores record-format descriptions and domain definitions for VAX RMS files and VAX DBMS database structures. It keeps form definitions and record-format information for VAX Terminal Data Management System. It also contains VAX DATATRIEVE procedures, tables, and graphic plots.

It is a central source for data definitions. You don't have to spend valuable time trying to figure out where this type of information may have been stored that last time it was used.

Storage of VAX Database Management System Definitions

The Common Data Dictionary stores database data descriptions. These definitions are used by the VAX Database Management System to build and later reference database structures.

VAX Common Data Dictionary is one central location for applications to find database descriptions. There is no need for database decriptions to be included with every program that must access a single database, saving your programmers valuable time when developing new applications.

Access Control List

The access control list specifies a class of user as well as the type of access to the directory or data description.

The Common Data Dictionary keeps track of which users can have access to what kinds of data. With this feature you can control the security of your information.

Common Data Definition Language

A utility that provides a generic facility to enter, modify, and display record definitions for the VAX languages.

Once a record definition has been entered into the CDD, it can be used by the language compilers or VAX DATATRIEVE. This means only one definition per record need be stored in the VAX CDD instead of having multiple copies of the same record defined in each application that may need it.

VAX DATATRIEVE

VAX DATATRIEVE is a comprehensive data management tool. You can work with it interactively and your applications can call on it to access data, (in record based files or in more complex, interrelated database structures). A query and report writer with full update capabilities, DATATRIEVE also includes an integrated graphics capability. Forms support is provided through VAX Forms Management System or VAX Terminal Data Management System. The VAX DATATRIEVE facility consists of four major subcomponents: a query and report writing facility and a business graphics capability at the user interface level and below that, the local and distributed High-level data access facilities.

VAX DATATRIEVE is easy to use. New users can learn how to use it and become more productive in their jobs very quickly.

Guide Mode

A self-teaching mode of operation for the novice user. You can be guided through your VAX DATATRIEVE sessions with a series of prompts.

Guide mode enables you to work productively with DATATRIEVE while learning to use it.

English commands

Commands are in simple English, for example declare, define, drop, edit, erase, find, help, modify, plot, and print.

There is no need for you to become a programmer to use it. You can learn how to use it as you use it.

Domains

Domains represent a relationship between physical data and descriptions of data. Through Domains VAX DATATRIEVE performs all of the data management associated with your data.

You don't have to be concerned about how the data is formatted in a record. VAX DATATRIEVE keeps track of that information for you.

Data Management

Data management involves creating and maintaining data in a current and correct state by adding, eliminating, and modifying records. The Store, Erase, and Modify statements are used to perform these tasks.

You don't have to aquire programming skills to update database information and you don't have to hire expensive programmers to develop specific applications.

Procedures

You can define commonly used sequences of steps as procedures and store them away for whenever you need them.

You can obtain the answer to a simple query or produce a long detailed report by issuing one simple command.

Reports

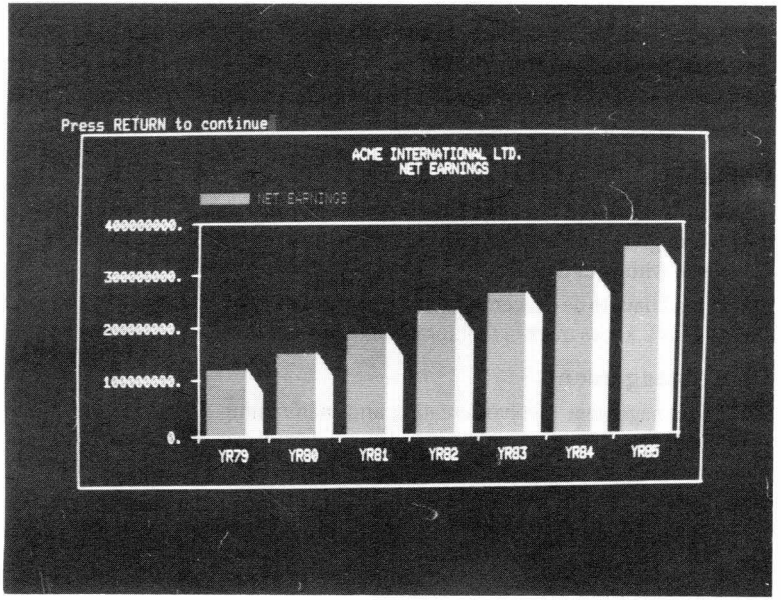
The print statement allows you to create simple reports. The report command allows you to use a comprehensive set of formatting options to create standard printed reports with page and column headings, page numbers, totals, and subtotals.

You can produce formal reports easily without the need to re-enter information into a document.

Graphics

DATATRIEVE can produce histograms, bar charts, pie charts, x-y scatter diagrams, and time series charts using the plot command.

You can create simple graphic representations of information easily and quickly without the need for special programming tools.



Forms

VAX Forms Management System or VAX Terminal Data Management System can be used with VAX DATATRIEVE to provide special screen forms for data input or output.

You can create specialized video screen forms easily to access specific information quickly.

Application Design Tool

A tool that asks you simple questions, the answers to which enable the system to create the proper information needed to define domains, record formats, and VAX files.

It simplifies the process of creating, maintaining, and managing your database relationships. You don't have to be a programmer to use VAX DATATRIEVE effectively.

View Domains

Allows domains to be defined that can be a portion of a record and can span multiple VAX Record Management System files or VAX Database Management System record types. Once these view domains have been established they can be used in the same way as simple domains.

You can access information in more than one file or even on more than one system. View domains give you greater access to more information while increasing your data security.

Callable VAX DATATRIEVE

Most DATATRIEVE functions can be called from all VAX application languages using the standard VAX/VMS call interface.

Using a higher-level language like FORTRAN or COBOL, complex operations or specialized reports can be created using data generated by DATATRIEVE.

Distributed DATATRIEVE

The data you need to access can be anywhere in a DECnet network of systems. The location and security is maintained and controlled by the Common Data Dictionary. The access path to your information is transparent to you when you request it.

You can access departmental or organizational information no matter where it resides as long as your account meets the security requirements for that information. This provides you, the office professional, with the best possible information environment to do your job.

Your programmers only need to keep the common data dictionary up-to-date to provide your office with this capability. You don't have to keep copies of your data on every machine in your office, guaranteeing the integrity of your office information.

VAX Terminal Data Management System

VAX TDMS Terminal Data Management System expands the traditional concept of videoscreen forms management to include control of all input and output.Form definitions and record definitions are associated by a new data structure called a request. VAX Terminal Data Management System screens, requests, and data definitions are stored in the VAX Common Data Dictionary, where they can be shared across many applications, eliminating redundant record definitions and programming errors.

With VAX TDMS you can create forms by designing them on your terminal screen—what you see is what you get. You don't need special charts or a special forms design language. After you have created a form you can modify it at any time without having to make complicated changes in your program code. You can also change your programs without having to modify your forms.

Typical VAX TDMS applications range from database inquiry and update to the periodic display of the status of an industrial process. With it, forms can be created to help clerical personnel enter data at their terminals easily. Menus for data entry or selection of different program options are other applications that can benefit from VAX TDMS.

Lower Programming Costs

Definitions for how data is to be exchanged between an application program and the terminal screen is all taken care of by VAX TDMS. It also handles all of the screen mapping and data type conversions.

The programmer's job has been simplified. VAX TDMS eliminates much of the code programmers had to write for every program in the past.

Data Independence

Programs taking advantage of VAX TDMS execute a series of requests and then transfer information to or from a database. The request takes care of connecting the data from the screen to the application. The primary function of the program now becomes a way to access a database and a way to handle errors so that your data does not become corrupted.

Applications can be made simpler and modular. Programmers spend much less time defining data in their programs.

Device Independence

VAX TDMS takes care of handling the different types of terminal screens. Programmers don't have to worry about what type of screen or terminal is on each user's desk, VAX TDMS does that for them.

Applications can be run from any Digital video terminal on your system. VAX TDMS takes care of any differences between them, so programmers don't have to.

Reduced Maintenance Costs

Interactive, screen-based applications typically involve many data-program interdependencies. Once a system is developed, a small change to the layout on a screen or a data record can mean a lot of time and money spent changing program logic and system design. VAX TDMS allows programmers to develop modular applications, screen definitions, data descriptions, and request definitions. Individual pieces can be changed without necessarily changing any of the others.

A system can be changed easily to meet the changing needs of the users, and applications can be enhanced to meet changing business needs.

Improved Management Control

Because VAX TDMS encourages a modular approach to designing applications, programmers can segment applications into programming tasks. So personnel resources can be more effectively allocated and progress monitored easily.

Many senior programmers are not needed to develop sophisticated applications. Most VAX TDMS programming skills can be learned quickly by junior people.

Interactive Screen Definition

Programmers create the forms they want to use on their own video terminals. They work with a screen editor to create and modify a form until they're satisfied with the way it looks. When they are through designing or modifing the form, it is stored in the VAX Common Data Dictionary.

By seeing the actual form as created, valuable development time is saved. Forms can also be designed by end-users instead of programming staff.

VAX TDMS is an integral component of the VAX information Architecture

All of the forms, requests and data definitions are stored in the VAX Common Data Dictionary. VAX TDMS can also use the standard Record Management Services, Database Management System, and DATATRIEVE data definitions.

The definitions created by VAX TDMS can be shared across many applications, eliminating redundant definitions and programming errors.

VAX Forms Management System

VAX Forms Management System is a general purpose forms management system that provides a flexible way for interactive applications to talk to users on Digital video workstations. While source data entry and inquiry/response/up-date are the most obvious types of forms-oriented uses, other types of programs can benefit as well.

ALL-IN-1's User Interface for example, was created using VAX Forms Management System. It allows you to customize the interface of your systems in a way that is practical for your job or pleasing to your environment. Almost any application which uses video terminals can be enhanced by using FMS forms to talk to terminal users.

Uses Advanced VT100 and VT220 Terminal Characteristics

VAX FMS uses many of the VT100 and VT220 video terminal features, including reverse video, bold, blink, underlining of characters, split screen, and scrolling capabilities.

Video screens can be formatted to make you more efficient when entering or viewing data.

Help

A help facility is available for forms as well as for fields within forms to provide on-the-spot assistance.

You benefit by being able to ask for assistance whenever you need it.

Field Protection and Validation

Extensive field protection and validation features ensure the integrity of data returned to the application program.

Information is checked when you enter it into a form, not after it has been sent to the application for processing. This limits the amount of time spent re-entering data to just a single field.

Validation of entered data is done by FMS so that your programmers don't have to spend valuable time writing validation code into their applications.

Interactive Forms Creation

Forms can be designed directly and interactively on the video screen, eliminating the need to lay the form out on paper, code the form language statements, compile, debug, enter corrections, and so on.

You see what you're creating. When the form meets your visual requirements, the job is done.

Independant Forms Storage

Forms are designed and stored independently of the application program.

If the information on a form must be changed and that form is used with many applications, you need only change one form and all of your applications will be updated.

Terminal Forms Driver

The forms driver handles both field- and record-level I/O calls and flexible manipulation of scrolled regions of the screen.

Your programs written using VAX Forms Management System don't have to include screen and data manipulation code, the forms driver takes care of it all.

Can Be Used With Many Languages

VAX Forms Management System supports the following languages:

- VAX BASIC
- VAX BLISS-32
- VAX C
- VAX COBOL
- VAX FORTRAN
- VAX PASCAL
- VAX PL/I
- VAX DATATRIEVE

Applications can be written in any of the preceding languages and share a common set of forms. Your programmers benefit by being able to write their programs in a language that best meets a problem definition.

VAX Application Control Management System

VAX ACMS Application Control Management System provides tools for developing and controlling complex transaction processing applications. These tools reduce the amount of time spent developing and maintaining applications. It does this by replacing large amounts of control and application code with definitions stored in the VAX Common Data Dictionary.

The VAX Application Control Management System consists of two parts: an application development tool that can help you design, develop, and maintain your applications, and another part that creates the environment in which to run these applications. The VAX Application Control Management System is also an integral part of the VAX Information Architecture. It uses the VAX Common Data Dictionary to store definitions and the VAX Terminal Data Management System for menu processing.

Tools for application programming

Two tools provided with VAX Application Control Management System assist with program development: a debugging utility and a system service utility. They provide the application programmer with a way to check out tasks before an entire application is complete.

When you start using new applications assigned to your workstation, those applications will have fewer bugs in them because your programming staff can exercise and debug them before they are complete.

Individual parts of a very large application can be checked out easily. This allows more time to be spent developing new applications instead of chasing problems.

User Definition Utility

You can define who can log into an Application Control Management System and what menus they will see.

Only those users authorized can gain access to your applications. Once users gain access, they are only allowed to use those menus that apply to their jobs.

VAX Application Control Management System controls the security of your files and applications. This saves your programmers time when writing applications, because they don't have to include code to handle security issues.

Device Definition Utility

You can define which terminals can access your VAX Application Control Management System applications.

You probably wouldn't want someone in your shipping area accessing your payroll information. The VAX Application Control Management System can control which terminals have access to your system and what they can access.

Operator Facilities

A full set of operator commands is included with Application Control Management System. These commands gives your operators the ability to start or stop applications, cancel tasks, enable or disable an audit trail facility, and display information about tasks, applications, users, and system components.

This gives you full control of your system. You can make changes when they are needed and monitor system activity. The major benefit is that you don't have to run your system and find out about problems after they happen.

Interactive Access to DATATRIEVE and VMS Commands

Even though the Application Control Management System can help you implement highly structured, well-defined transaction processing applications, it also can provide you with ad hoc interactive access to DATATRIEVE and to VMS commands for decision support and system utilities.

You have the widest range of system services available to you from one workstation. Tactical and operational information supported by your Application Control Management System is immediately available, along with access to stategic support information available elsewhere on your system(s).

VAX Record Management Services

The VAX RMS Record Management Services facility, the standard Digital data management services software, provides an interface at the application-program level to record/file management functions. VAX RMS facilitates the definition, creation, population, access, and general maintenance and management of files and records within files. It supports sequential, relative, and multikey indexed-sequential file organizations, on both local systems and remote systems across a DECnet network.

Data Access Tranparency

VAX Record Management Services gives you a wide range of file management techniques while keeping the physical location of your data on a storage device or another system in a network transparent.

You don't have to spend valuable time learning programming techniques just to access your data. Your programmers can write programs easily that can take advantage of storage-device independance as well distributed information processing.

Standard Part of VMS

VAX Record Management Services is included as a standard part of all VAX/VMS systems.

Programs written on one VAX/VMS system are easily transported to any other VAX/VMS system.

VAX Database Management System

VAX DBMS Database Management System is a CODASYL-compliant general purpose database management system based on the March 1981 Working Document of the ANSI Data Definition Language Committee.

VAX Database Management System provides multiple-user support with data security, integrity, and performance features that are required for your large-scale database applications that "run your business". However, VAX Database Management System is also easy to use, so it's equally suitable for implementing small and medium-scale applications.

Multiuser Support and Concurrency Control

The VAX Database Management System keeps track of any number of users trying to access the same data and automatically controls the access.

Your programmers don't have to worry about two or more users trying to access a single file at the same time. Their programs can be simpler and more efficient because the system takes care of file contention.

Transaction Backout

When information is entered into the system, it is not put directly into your database. Instead it's stored in a buffer until the system determines if the data is valid. If your terminal drops offline while you're entering information, the system doesn't put the data you were working on into your database.

Your database information will not be corrupted by hardware failures or invalid data. The VAX Database Management System verifies new data before your database is updated.

Journaling and Recovery

The VAX Database Management System can optionally keep record-level journals.

In case of a system or program malfunction the VAX Database Management System can restore your database using a backup copy of your database and the journal files kept on your system. In this way your database can be restored to its state just before the malfunction occurred.

Multiple Databases

More than one database to be online at the same time.

You can have two or more databases with totally independant data available on your system at the same time.

Performance Optimization

The VAX Database Management System uses optimized access methods to take advantage of the VAX/VMS system design.

Your programmers will spend much less time trying to optimize their programs when the system takes care of it automatcally.

Data Security

The VAX Database Management System provides many levels of security for your data. First, it uses the standard security features of the VAX/VMS system. Second, it uses standard CODASYL security methods. Third, it protects the data definitions stored in the VAX Common Data Dictionary.

You don't have to worry about unauthorized access to your valuable information. You have full control over who can access it.



Section 3.
Office Networks

The Digital Network Architecture products address a wide range of communications needs, from simple terminal connections to comprehensive multi-node information systems. It is also the foundation for departmental applications such as electronic mail, document exchange, information processing, and decision support.

Digital's Network Architecture is a comprehensive set of communications products for office networks. These products are highly integrated, to provide an unparalleled development and operating environment for today's office systems. The demand for effective office networks driven by the "terminal at every desk" nature of Office and Information Systems, has caused an explosion in both technology and the need for that technology. Users are demanding access to systems, and are demanding access to a wider variety of information that may be geographically dispersed.

In this section the Digital Network products can be separated into three major categories:

DECnet	Software products to support the distributed office information network.
Internet Products	Products to support a multi-vendor environment and Digital's "Open Systems Architecture". (These products are discussed under the headings Ethernet, Packetnet System Interfaces, and Internet Software.)
Physical Connections	Products that connect the workstations in the office area to the systems in the computer room. (These products are discussed under the headings Ethernet and Communications Interfaces.)

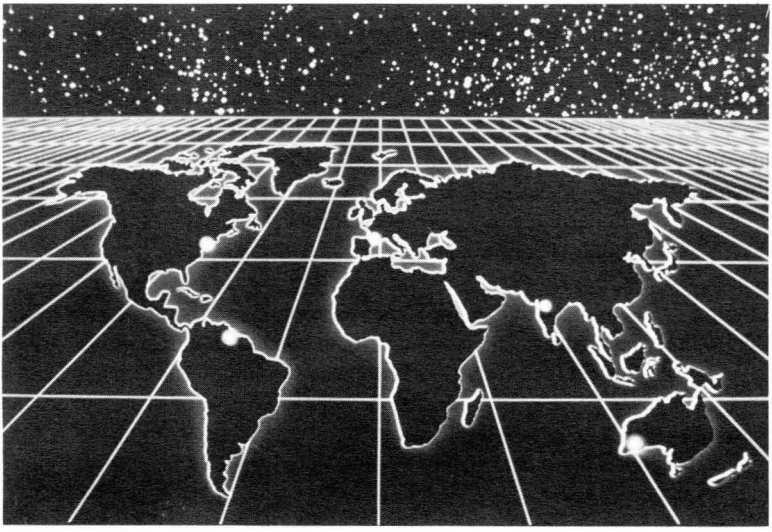
Network Services is also available to help plan, design, implement, and maintain an office network, making Digital's Office Networks offerings complete in every detail.

This section highlights Digital's Network Architecture and it's capabilities; for more detail on any of the hardware and software products discussed in this section please refer to the "Office Networks" section of the "Products Specifications" chapter of this book.

Digital's Network Architecture

The Digital Network Architecture (DNA) is more than a collection of communications software and hardware products. It can help you do more than merely transfer data among computers and peripheral devices. Modeled closely upon the International Standards Organization's Open System Architecture, DNA will help you create an integrated networking system from your present array of distributed computer resources. At once flexible and easy to use, a DNA system can help you increase productivity, improve organizational efficiency, and reduce data processing costs through savings in both equipment and operating personnel.

Digital was one of the first computer companies to develop a comprehensive set of compatible networking products to support an entire range of computer systems. Today, DNA DECnet software supports all Digital computer series—from Professional 300 personal computers, PDP-11 systems and VAX systems to DECsystem-10s & -20s—and all our major operating systems. This means that executives at personal computers, secretaries at word processors, and engineers at development workstations are not limited to the resources of their local computer systems. Instead, they have the resources of an extended networking system at their disposal to communicate with each other, to access central or distribute databases, and to share or transfer entire documents.



Links to other vendors' systems and networks

Equally as important, Digital's networks can accommodate other vendor's computers. The days of the corporate computer room supplied by a single manufacturer are largely past, as both large and small organizations buy different computer systems to match different needs and applications. As major commitments are made to deploy Office Information Systems in your organization, the ability to connect all the pieces together is even more important.

Digital recognizes this trend and fully supports the concept of cooperative computing. The Digital Network Architecture offers links between Digital's systems and other manufacturers' computers. In the case of IBM, DNA enables you to connect Digital networks with SNA networks. From personal computers to the largest mainframes, DNA can integrate whatever combination of realtime systems, timesharing systems, office and word processing systems, computational systems, and data processing systems you may have.

Local area and public packet-switched networks

It can connect these systems in whatever configurations best suit your organizational and networking needs. Ethernet, for example, is one communications choice available within DNA. It can provide low-cost, high-speed communication trunks among the various departments of an organization, whether they are located on several floors of one building or are scattered throughout a complex of buildings. Our Packetnet interfaces, another choice, extend your communications reach to include public packet-switched networks using the X.25 protocol already in use in many countries around the world. Digital can provide all the communications hardware and software necessary to implement a networking system that handles both local and remote communications over public networks, leased or private lines, or via satellite links.

The sum of these parts is impressive: a network architecture that conforms to the ISO model, that provides high-level communications functions among computers of widely varying size, purpose, and make, and that provides both local and remote links among networks, as well as among different computer systems.

Maximum flexibility for future growth

Most important, DNA can help you manage open-ended growth. Only Digital provides a range of networking products and compatible operating systems comprehensive enough to satisfy your communications needs along the whole continuum of network growth. Our terminal servers, for example, enable you to attach dumb terminals wherever they're needed on an Ethernet local area network. Intelligent terminals can also be added to the network when needed. As the number of attached terminals grows larger, DECnet Router Servers can relieve your computers of nonproductive routing work. And as greater concentrations of terminals are needed, clusters of terminals can be attached through a single Terminal Server to the Ethernet channel and thereby to all computers linked to the network.

Because DNA can connect all our major operating systems, computers and workstations can easily be added to your network as they are acquired throughout your organization. You can begin with a system of two nodes and grow to two hundred or even a thousand nodes encompassing a diversity of processors and applications. The addition of personal computers and increasingly intelligent terminals means that more and more network intelligence and application work can migrate from host-computer locations to the distributed locations where they're needed.

Similarly, various elements and capabilities of the Digital Network Architecture can be added as the need arises. You can, for instance, begin with point-to-point DECnet communications using dialup remote connections and progress to multipoint leased-line links as your network expands. With further growth, you may want to take advantage of DNA's X.25 protocol connections for low-cost long-distance communications. The Digital Network Architecture range of products provide even greater networking flexibility through microwave and satellite links and will adapt to other technologies, such as broadband or fiber optic links, with future product offerings. All such changes and additions can be accomplished without disrupting the operation of your network.

Digital recognizes that networking technology itself is an area of dynamic growth. We will include future technologies and changes in international standards as compatible elements of the Digital Network Architecture. With DNA, your present applications and network investment will be enhanced, not eroded, by future developments.

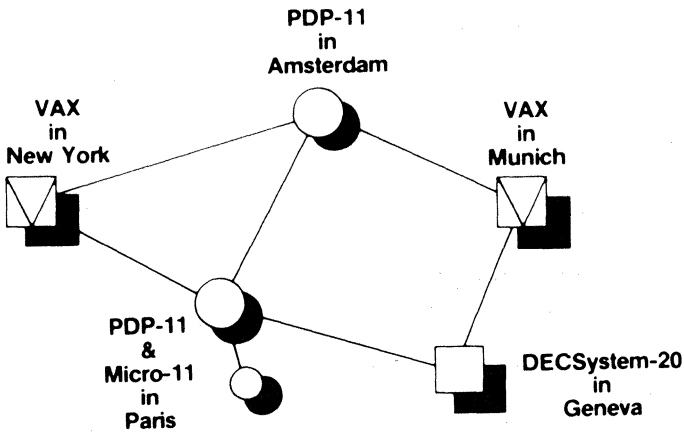
DECnet

DECnet networking software provides the high-level communications functions of the Digital Network Architecture. It's DECnet that enables people at terminals, workstations, or personal computers at any point in a Digital network to log in and perform network functions with a single set of commands, regardless of whether their computers are linked by Ethernet, public packet-switched networks, or Digital Data Communications Message Protocol (DDCMP) multipoint or point-to-point connections. As a result, network users don't have to concern themselves with the mechanics of communications, only with the job at hand.

The same concern for network ease of use and flexibility underlies all the major features of DECnet. One of the most important of these is DECnet's virtual terminal capability. It makes it possible for users at terminals attached to Digital systems to log onto other Digital systems in a network. Business professionals, data processing specialists, and clerical users can all make use of all your computer resources, not just the system to which they're directly connected.

Easy access to information management software

Using VAX/VMS and ALL-IN-1 Office Menu's program development features, users at DECnet nodes and terminals can transparently access data anywhere in the network using information management tools like DATATRIEVE and the Forms Management System, creating interactive solutions to specific tasks. Programmers taking advantage of the same virtual terminal capability can develop and execute programs on remote systems.



Programs can, in fact, be developed far from the site where the program will be used, giving you maximum use of your computer resources and avoiding costly hardware and software duplication. People working with small applications-oriented systems can do their program development on larger, remotely located systems with a full range of editing and other program development tools. Conversely, programs can also be developed at a central location and downline-loaded to distributed computers at other locations.

In a university environment, for instance, there are almost always more potential user of computer resources among the students and faculty that there are systems to satisfy them. At the same time, it would be exorbitantly expensive to try to meet that demand by adding processors and peripherals to increase local processing power. With DECnet software, however, the instructional exercises of students at different locations can be forwarded to a central computer for processing. Faculty can communicate ideas about ongoing research and take advantage of the resources of a central computer center from workstations or terminals in their own departments.

Adaptive routing and network management

DECnet's adaptive-routing capability makes DNA communications very flexible and easily available. Adaptive routing allows nonadjacent nodes to communicate and eliminates the need for direct physical links between all communicating nodes. Messages are automatically routed through a multisystem network over the most cost-effective path. Adaptive routing also ensures that if any line in the network is disabled, the data being transmitted are automatically rerouted through another path in the network. All this happens transparently to the user.

In addition, with DECnet software a network manager can, from any terminal in the network, interactively monitor activity on all network nodes, access statistical and error information, and isolate hardware and software problems. Together, DECnet's transparent rerouting and network management features greatly enhance network flexibility, reliability, and ease of use. They can also contribute to significant financial savings, since networks can be managed with a minimum of supervisory personnel, and the failure of one node won't disrupt the entire network.

Savings in time, effort, and money

DECnet can produce corresponding savings in time, effort, and money at every level for an organization linked by a DNA network. The simple fact that all you organization's departments are connected with each other can reduce paperwork and speed communications immensely. The resources of more than one computer on the network might be needed to support both memory and design requirements for a given job while other systems may be needed for marketing analysis. DECnet software can let you access whichever systems you need through entirely transparent network links and makes it easy to exchange information on the status of ongoing projects.

Documentation could take days to send through the mails to a branch office in another state or country, but with DECnet it can be transmitted much more quickly and efficiently. Alternatively, reference documents can be kept on the system for online network access whenever needed. In a geographically dispersed network, a group on one side of the country can take advantage of time-zone differences by executing jobs on a computer on the other side of the country before or after working hours there. The same advantage applies between continents.

Similarly, DECnet can eliminate the time, expense, and inconvenience involved in transferring data between systems via magnetic tape. A company's division offices may, for instance, be individually responsible for local sales order, inventory, and distribution processing, but still be required periodically to update a central database. Magnetic tape, the traditional way of doing such data transfers, takes a lot of both system and operator time. DECnet software transfers files directly at the operator's request, without tape handling and the system time and operator effort involved.

With DECnet, there is no rigid network topology and no prerequisite host processor. You choose the processors you need and configure them to reflect your organizational structure. Nodes can be added or deleted without disrupting network functions, so your network can easily be expanded or reconfigured to meet changing requirements. Digital' Network Architecture enhances network flexibility and growth in virtually any direction you may need.

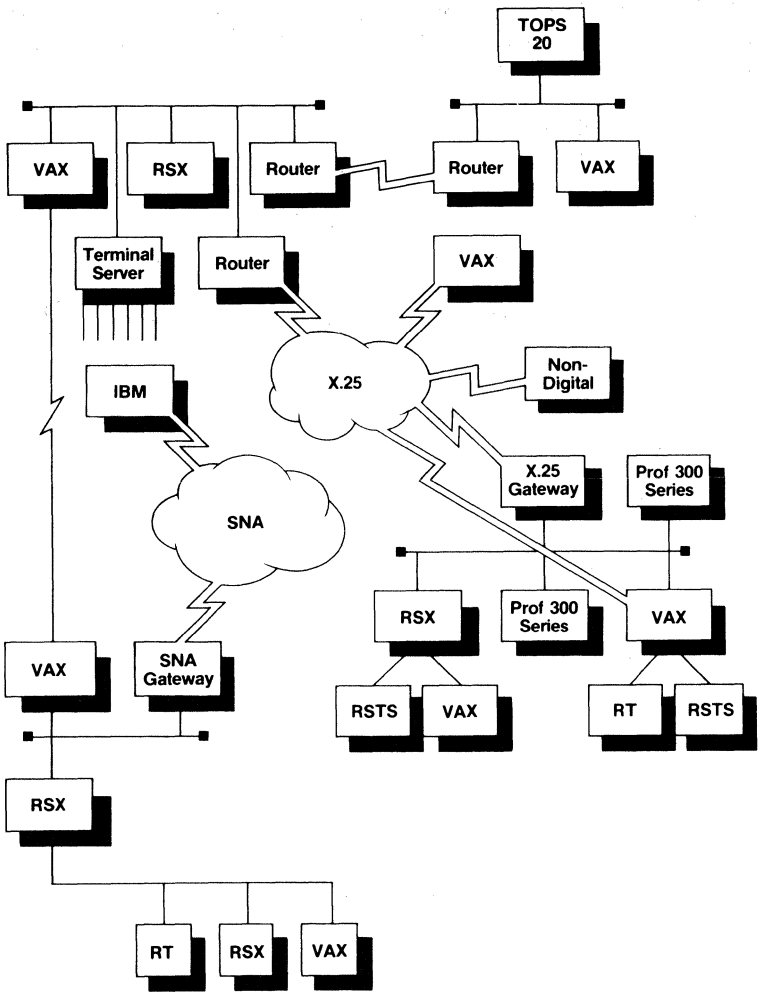
Ethernet

Digital's Ethernet is one method of handling high-speed local DECnet communications. It was designed specifically to answer your local area network requirements. The Ethernet coaxial cable lets you wire a building or a complex of buildings for high-speed local communications that can support all of the high-level DECnet functions. Ethernet is thus an integral part of the Digital Network Architecture, one that extends and intensifies DNA capabilities on a local level.

The rationale behind such a local network extension is simple. Because of rapid advances in microprocessor technology and the widespread acceptance of personal computers, organizations that only recently evolved from centralized mainframe computing to distributed departmental computing will soon be able to justify putting a computer in every office, a terminal or personal computer on every desk. The complexity and expense of point-to-point physical connections among all such equipment would be overwhelming. Ethernet provides a common communications path by which systems and associated terminals attached by a single connection can communicate with all other attached nodes at speeds comparable to those on the bus that links devices within a single system.

Communications across organizational boundaries

The resulting local area network can support information exchange within and among all levels and departments of your organization, from administration to engineering. Information that must be shared across organizational boundaries is available to all who need it. The same communication services can help managers monitor and coordinate the progress of a project. Scheduling and deadline information, for instance, can be transferred within a group or among different groups in the same way that technical data is exchanged by engineers—quickly and efficiently.



In fact, a local area network's impact on your office operations could be particularly dramatic. Used in conjunction with Digital's Professional 300 Series personal computers and our ALL-IN-1 office products for electronic mail, word processing, and text management, Ethernet local area network can give all the people in your office, from secretaries to executives, reliable access to the information management tools and information they need, eliminating redundant hardware and software purchases.

Because Ethernet is simply a local extension of DECnet software capabilities, you can begin with an existing DECnet network and add Ethernet for local communications. DECnet application programs can be run without modification on Ethernet local area networks. A single Ethernet network can support up to a thousand nodes, but you can start with as few as you wish and add more as they're needed. Ethernet gives you the flexibility to add or remove nodes quickly and easily, without disrupting ongoing communications and without redesigning or reconfiguring your entire network.

Packetnet System Interfaces

While the Ethernet protocol can help you establish flexible and efficient local area networks, the X.25 communications protocol, also incorporated in the Digital Network Architecture, can help you reduce the cost of communications with remote systems and networks. X.25 is the international standard upon which various public packet-switched networks (PPSNs) are now based. In the United States, these are privately owned networks—Tymnet and GTE's Telenet are examples. In other countries, they are owned and operated by the national telecommunications authorities.

Digital has already developed and implemented Packetnet System Interfaces (PSIs) for use in many national networks in Europe and North America. Countries for which Digital's PSIs are currently available include the United States, Canada (Datapac), France (Transpac), the United Kingdom (PSS), Germany (DATEX-P), and Holland (DN1). We are committed to support other PPSNs (such as Switzerland's Telepac) as they become available to the user community, as well as private networks that use the X.25 protocol. Digital has extended the reach of the Digital Network Architecture across the country and around the world.

Low-cost multivendor communications

The major advantage of public packet switched networks is savings. Leased telephone lines are prohibitively expensive for all but the most high-volume users because cost is based upon connect time and distance, regardless of how much or little data is transmitted. PPSNs, on the other hand, charge chiefly on the basis of volume of data sent. Tariff rates are relatively independent of distance. This makes them a much more cost-effective means of moving low-volume to medium-volume traffic throughout different branches of an organization or between different companies.

An additional advantage is that computers built by different vendors and operating at different input/output speeds can communicate over PPSNs. This allows potential users to choose from the different vendors whose equipment supports X.25. Large institutions can buy the computers best suited to each job and location.

You don't have to be concerned with how messages are actually sent over the networks to their correct destinations—that's the responsibility of the Public Carrier operating the PPSN. Still, it's important to realize that PPSNs only transfer data among various systems. Once data arrives at a destination over a PPSN, it's up to application software to translate that data and make it intelligible.

X.25 plus high-level DECnet functions

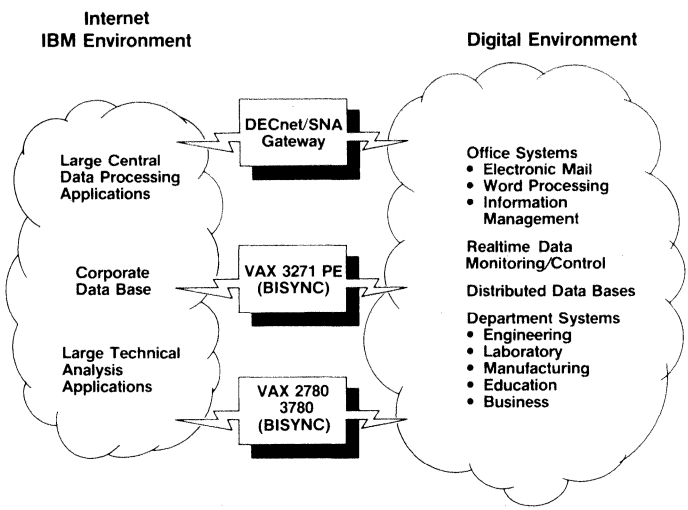
Digital's Packetnet System Interfaces do just that. They extend the high-level DECnet functions of DNA to Digital computers communicating across public packet-switched networks. Packetnet System Interfaces are a cost-effective way to get data from system to system over X.25 networks. DECnet then gets the data to particular programs within systems to help solve application problems.

This could mean, for example, that an international bank's Digital systems in New York, Paris, and Los Angeles could access and update remote records and share and exchange programs as if they were locally connected. At smaller branches of the same bank, employees could use their interactive terminals and the X.3 and X.28 or X.29 protocols to communicate with Digital systems in the main offices via PPSNs.

Internet Software

Digital's Network Architecture encompasses a range of high-level networking functions, provides for their implementation in high-speed local area networks, and enables low-cost worldwide communications via PPSNs. To complete the picture, Digital offers networking software products called Internets to link your mainframe computer with distributed Digital systems that capture, organize, retrieve, process, and exchange information.

Our Internet protocols enable Digital systems to be connected with mainframes from IBM, Control Data Corporation, and Sperry Univac and with other processors that use the same protocols. Digital's IBM Internets support Batch BISYNC, Interactive BISYNC, and SNA (IBM's System Network Architecture) communications. Internet products give you the greatest possible opportunity to match different types of processors to different types of jobs without compromising your overall networking effort.



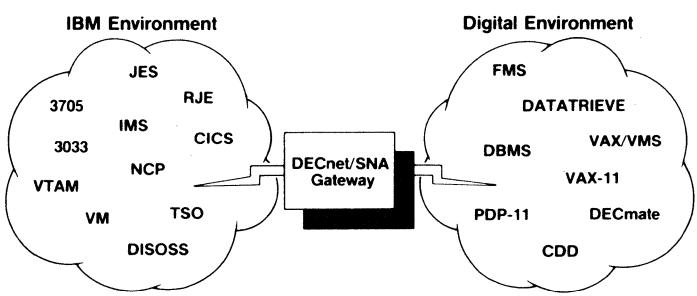
In a manufacturing environment, for example, Digital systems that maintain local parts inventories can update and request information from a central mainframe database via Digital's Interactive BISYNC 3271 or SNA protocol emulators. These same two Internet products also allow programs on Digital and IBM systems to work together interactively to solve applications problems. Development engineers engaged in transaction-oriented processing at test stands can forward data to a mainframe for further analysis and receive final results in return. Data from the shop floor in the same company can be collected by local Digital systems and held for periodic transmission to an IBM mainframe via our Batch BISYNC 2780, 3780, or HASP protocol emulators.

Network-to-network communications

The proliferation of networking and distributed processing in the past decade has produced a need for a level of cooperative computing that often exceeds the capabilities of single-function communications emulation. To answer that need Digital developed the DECnet/SNA Gateway. It links Digital and IBM network environments, rather than merely providing single-function communications emulation between two computers. And it frees you to expand either the SNA or the DNA side of your total distributed processing operation without jeopardizing your present hardware and software investment.

In effect, the DECnet/SNA Gateway extends the reach of your Digital network to include IBM systems connected by an SNA network, allowing you to take advantage of the complementary strengths of both environments. It does so by combining three essential translator functions (remote job entry, 3270 terminal emulation, and applications program interface) and network management software into a small packagaed PDP-11 front-end processor that's attached as a DECnet node.

The Gateway enables you to access or update your IBM mainframe database, perform remote job entry tasks, and initiate program-to-program communication, without sacrificing the flexibility and ease of use of your Digital network. Like DECnet itself, the Gateway functions are tarnsparent to end-users. The gateway enables you to perform many tasks from Digital's workstations as if they were integral parts of an SNA network without giving up the unique advantages of your Digital systems.



Banks, insurance companies, or any large organization can use the DECnet/SNA Gateway as a means of maintaining direct contact between a widely distributed Digital network of systems at branch offices and a headquarters-based SNA network. Database access and file transfers among various systems within the two networks can be accomplished as if they were taking place within the Digital network alone. With the gateway, you can connect these two previously isolated, but clearly overlapping, environments.

BISYNC Terminal Support

Digital realizes that many of our customers have invested in BISYNC block-mode terminals, such as IBM's 3270s or Teletype's 4540s. With VAX BISYNC Terminal Support (BTS) these terminals can now access the office features on Digital's VAX/VMS office systems. If you own bisync terminals, have the need for an office automation package, require a system to offload mainframe applications, and the ability to communicate with a host system with just a few simple commands, or any combination of these features, then VAX BISYNC Terminal Support is designed for you.

As part of block-mode terminal support, VAX BTS gives you three capabilities.

First, VAX BTS supports bisync terminals by making them look like printing terminals to the VMS operating system. This means that any utility or layered product that runs on a Digital printing terminal, like a DECwriter III or Letterwriter 100, will run on your bisync terminal—without any modifications.

Second, VAX BTS supports VAX FMS Forms Management System applications. VAX Forms Management System checks forms to be sure that they can be displayed on bisync terminals as well as on Digital's video displays. You now can effectively use your BISYNC terminal to run these forms applications.

Third, through VAX BTS, your BISYNC terminal can access programs running on a IBM or IBM-compatible host. Data received from an IBM host is passed through to the BISYNC terminal and data from the terminal is passed through to the host. During normal operations "pass-through" operation is transparent to the terminal operator.

Communications Interfaces

The Digital Network Architecture supports a broad range of different communications interfaces. Digital hardware products support all aspects of DNA synchronous, asynchronous, and local area communications. These include:

- Single-line devices
- Multipoint or point-to-point devices
- Character interrupt devices
- Multiline devices
- Parallel devices
- Modems

Digital also provides all the hardware you need to install an Ethernet local area network, including physical cables, transceivers, and communications controllers for attaching VAX/VMS systems or RSX-based UNIBUS PDP-11 systems. In the future, we'll be expanding local area network capabilities with many more products. These will include physical-channel hardware, sophisticated communications servers for connecting local area Ethernets to other DECnet networks and

to foreign networks, and controllers for our other system offerings, including personal computers and DECsystem-20 large computers.

The Computer Special Systems (CSS) group within Digital can design custom hardware and software in answer to your specific communications requirements. Some CSS products of interest include statistical multiplexers, specialized high-speed communications controllers, including a microprocessor that offloads communications protocols from VAX systems, and high-speed parallel communications links.

Networking Services

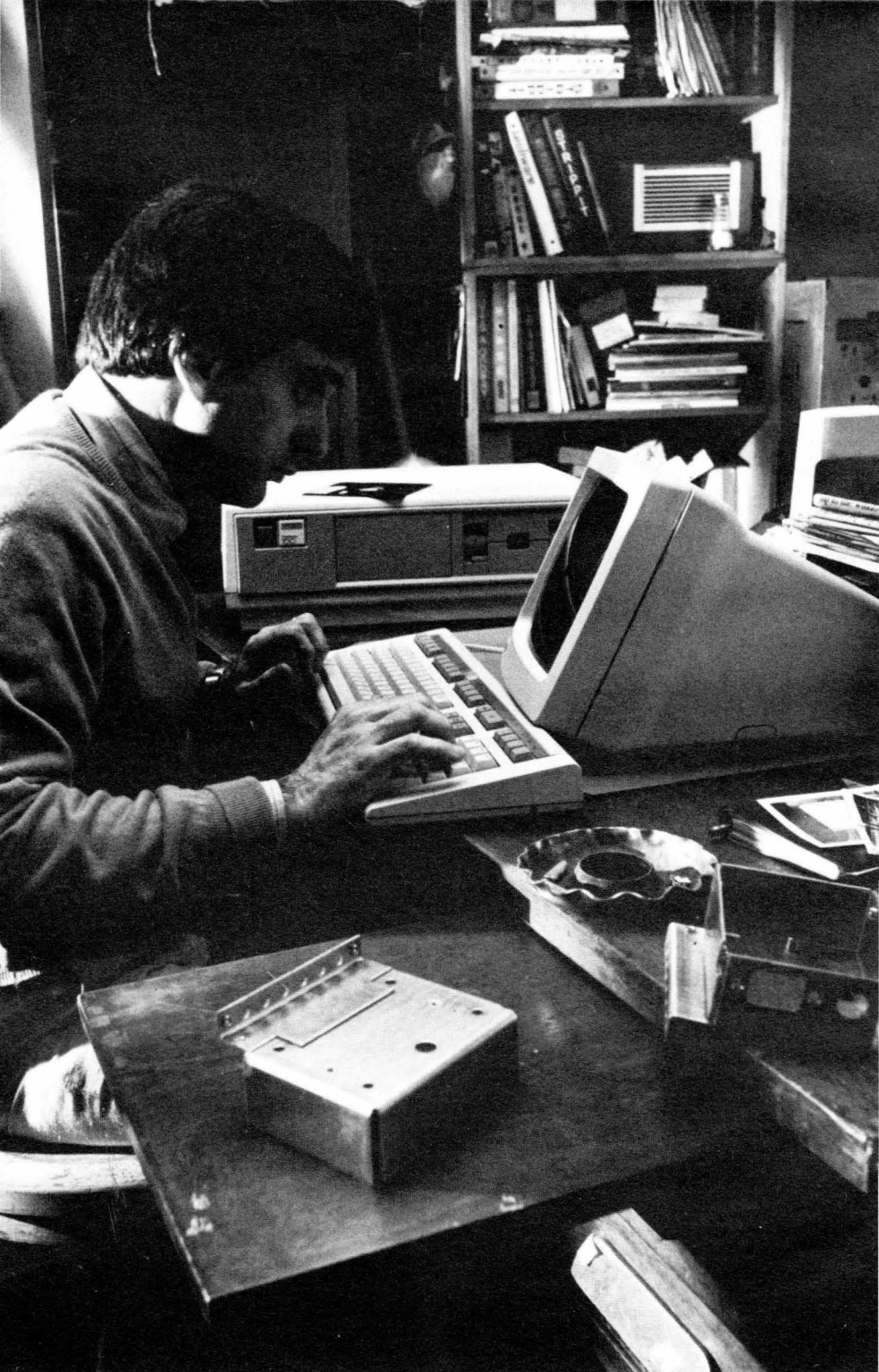
Digital networking software supports over 13,000 networked computer system nodes in a variety of applications around the world. Our own engineering network encompasses more than 200 nodes and approximately 4,000 terminals in the United States, Europe, and Australia. Our order processing network is fast reaching the same size. This breadth of experience in network planning, implementation, and maintenance reaches you through our sales offices and through over 16,000 people in our customer service organizations.

Network planning and support

Digital's sales offices worldwide have Network Specialists. These are people who can help you with every stage of network development. To begin with, we can put together a network profile detailing your networking needs down to descriptions of each node, communications link, and application. The profile considers such questions as topological design, traffic prediction, applications analysis, and projected network growth, and establishes a network implementation schedule.

Another available service is our Customer Support Plan. It covers installation, start up, application development, training, network management, and troubleshooting as well as recommending supporting software and educational services. Digital Field Service and Software Support personnel will install the hardware and software needed at each node and demonstrate a working connection to all adjacent nodes.

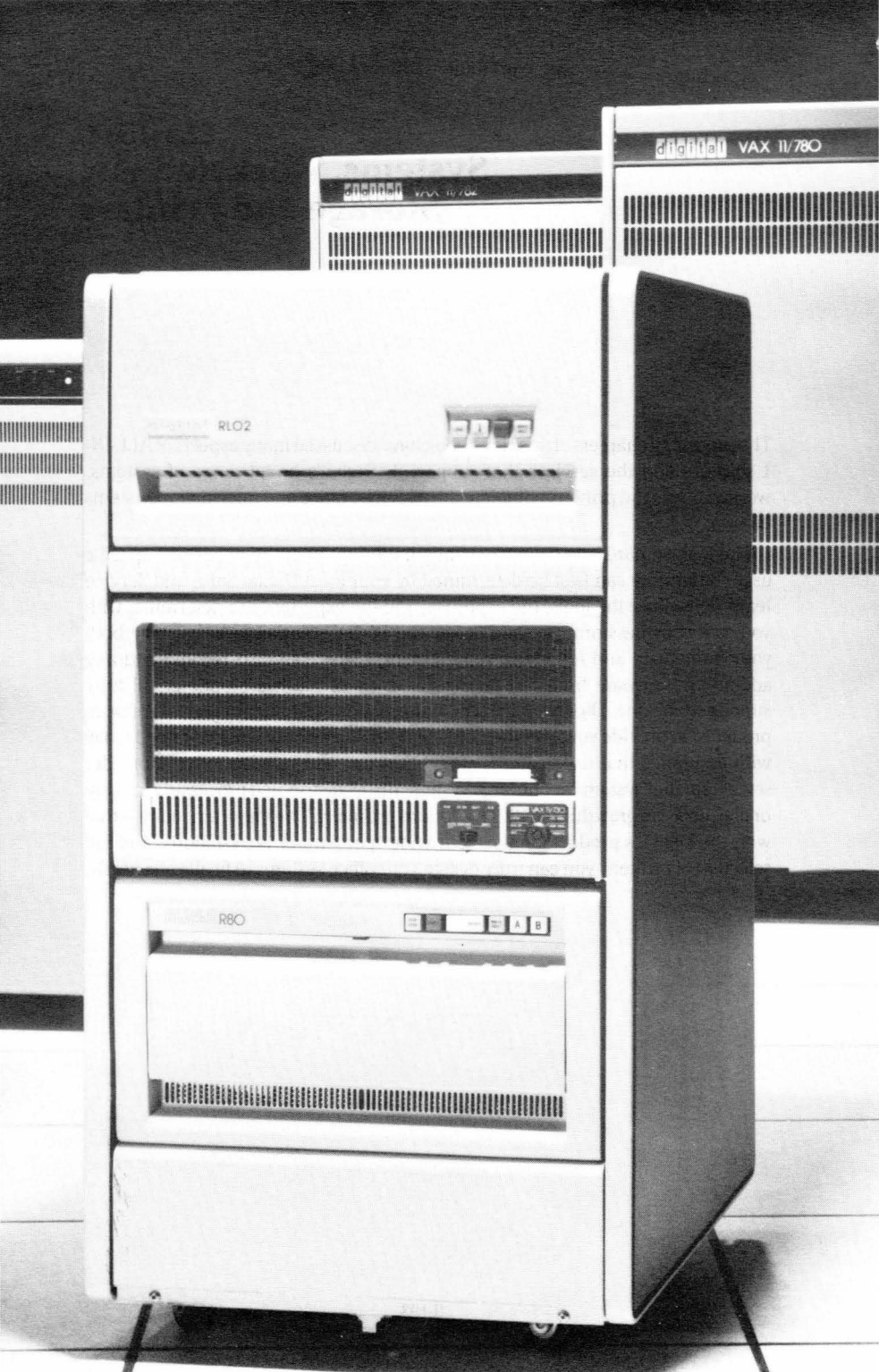
While we can help you plan and implement your network, there's no substitute for knowledgeable people in your own organization. To that end, Digital's Educational Services offers a complete Network Training Curriculum. It includes courses for all skill levels required to run a successful and efficient network system. There are basic concept courses such as Data Communications Fundamentals and Packet Switching Concepts; courses for network managers and for programmers; courses that teach a specific implementation of the Digital Network Architecture, such as DECnet RSX or DECnet VAX/VMS; and advanced courses for network designers that include the latest developments and trends in networks.



Chapter 4.
Systems, Workstations, Storage and Printers

The preceding chapters of this Handbook have discussed many aspects of ALL-IN-1 software and the services that support it. Digital's broad range of systems, workstations, and printers complete the ALL-IN-1 office and information systems picture.

The precise hardware/software configuration to meet the needs of a specific user community can best be determined by your local Digital Sales and Service team. They have the tools, the expertise, and the experience to determine, with you, your business problem and define the Digital solution to best satisfy both your immediate and long-term requirements. They can also recommend any additional hardware from the impressive array of hardware options, all fully supported by the Digital office and information system integrated software products, to provide you with the right solution. Install only what you need today with assurance that expansion is straightforward and nondisruptive. Consider several smaller systems or one large system. Install distributed processing initially or plan on it as a growth strategy. The options are many. The important point is that with the Digital's product families, our wide spectrum of workstations, and full selection of printers, you can truly design your office systems to fit all your needs.


VAX 11/780
RL02
RB0

Section 1.

VAX and PDP-11 System Families

Digital has a long history of producing *families* of computer systems that provide our customers with a wide range of compatible, reliable, cost-effective hardware and software. As technology or market needs dictate, additional members are added to the family.

The VAX Family of Computer Systems

The VAX family of computer systems is an excellent example of Digital's computer family concept. Current VAX systems are the VAX-11/780 (the largest member), the VAX-11/782 (dual processor), the VAX-11/750, the VAX-11/730, the VAX-11/725 (the smallest member), and MicroVAX I. In addition, the two larger systems, the VAX-11/780 and VAX-11/750 systems can be expanded using VAXclusters. This family concept has significant advantages:

- The best system to do your job can be installed, without buying excess capacity that is not needed.
- To meet changing organizational or capacity requirements, your office solution can be expanded by adding more systems, or larger systems, without disruption. This protects your applications development and software investment.
- Applications written on one family member can run on any other family member with no change, providing flexibility of development and deployment.
- All family members take full advantage of the powerful and flexible VMS virtual memory operating system, the VAX Information Architecture, and Digital Network Architecture. You don't sacrifice any of these capabilities by installing a "small" system.
- You are always assured of the most cost-effective solution without limiting growth, providing optimal price/performance at any stage of growth.
- Digital's full line of workstations, printers, and storage devices are supported on all family members, allowing each system to be configured to meet the specific needs of the user community it serves.
- Modular, cost-effective growth can be attained using the VAXcluster capability. This provides a growth path for large departmental systems as well as organization-wide systems.

VAX-11/780

The largest member of the VAX family, the VAX 11/780 addresses a wide range of applications types and user communities.

These include:

- Corporate or departmental mail systems (large number of ad hoc users)
- Department application systems that support a large number of concurrent users (actual number determined by user and usage profiles)
- Target growth system in VAXcluster environment for large departmental or organizational applications
- Corporate or departmental database systems, networked to other computer systems
- Full-service departmental ALL-IN-1 office systems
- Systems that are networked to other family members for distributed processing or to increase overall system capacity and response

VAX-11/782

A dual processor variation of the VAX-11/780, the VAX-11/782 is a tightly-coupled master-slave system. The VAX-11/782 is designed for compute-intensive environments where the additional VAX-11/780 slave CPU provides a cost-effective growth path for single systems. Examples of VAX-11/782 systems are:

- Application development systems, in which programmers are engaged in compilations and interactive debug sessions (actual number determined by user and usage profiles)
- Application systems in which users require heavy computation modeling and simulation.

VAX-11/750

The VAX-11/750 exhibits, in an office environment, between 60 and 65 percent of the power of an 11/780. It is packaged for the office, requiring minimal environmental control. Examples of typical installations include:

- Departmental mail systems (networked to VAX or other systems)
- Distributed system nodes to provide general office functions and access to other systems
- Departmental or group ALL-IN-1 office systems
- Single application systems to support a specific business unit
- Node on a VAX cluster to support distributed computing

VAX-11/730

Providing, in an office environment, about 25 to 30 percent of the power of a VAX-11/780, the VAX-11/730 is attractively packaged for the office, requiring

minimal environmental control and floorspace. Examples of typical installations include:

- Nodes on corporate or departmental mail systems
- Team computing system
- ALL-IN-1 office capability for a small field office
- Host for a personal computer cluster to provide communications and information management functions

VAXclusters

VAXclusters provide managable, modular growth for existing customers as well as providing large "computer center" style systems for big applications. VAXclusters, with high speed CI780 and CI750 ports as well as HSC50 intelligent mass storage controllers, provide cost effective growth.

- Add-on computer power with minimal additional disk investment
- Provides growth path when a department grows beyond a single system
- Corporate level computing

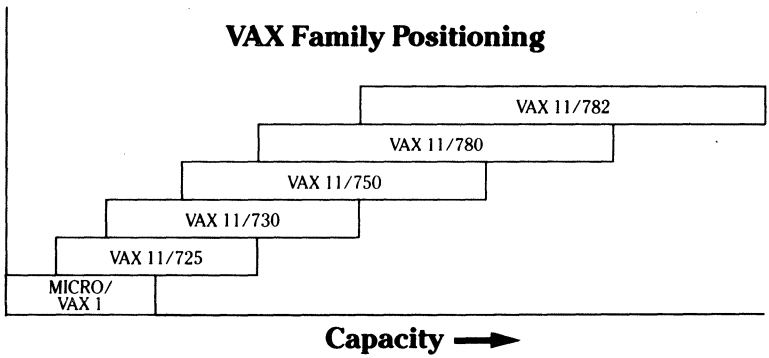
VAX-11/725

The VAX-11/725 provides the CPU power of the 11/730 in an under-the-desk package. The VAX-11/725 is bounded supporting up to 8 users and up to 104Mb of disk storage. Although the 11/725 currently does not support ALL-IN-1 Office Menu it is being considered for future ALL-IN-1 enhancements.



MicroVAX 1

The first member of the MicroVAX family, the MicroVAX 1, is approximately 30% of 11/780 CPU performance in a Micro-11 package. Initially, MicroVAX is targeted at real-time applications for the OEM market. The MicroVAX will be the foundation for future VAX-based team computing as software becomes available.

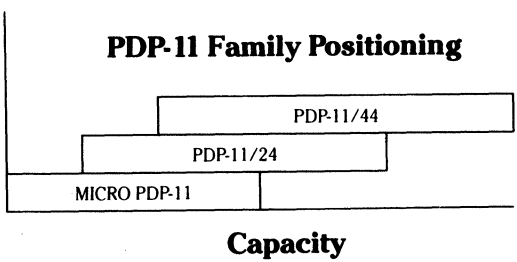


Newest PDP-11 Member

MICRO PDP-11

The newest member of the popular PDP-11 family of computer systems is the MICRO PDP-11. For over a decade, the PDP-11 architecture, hardware, and software have established the standard against which all other minicomputers are measured.

The MICRO PDP-11, with its powerful instruction set, compact packaging, and extensive collection of operating system software, is ideal for many unique office applications. Examples are scientific workstations with realtime requirements, four-user workstation clusters tied to larger machines, or even as a DECmate file server.







Section 2.
Workstations

The terminal or workstation that provides office functions or access to an ALL-IN-1 Office system or communications capability is an extremely important element of an office and information system. User's perceive the workstation as their "computer," for it is through the terminal/workstation that office functions are accomplished.

Digital's leadership as a terminal and workstation supplier is shown in six important areas:

- Digital's leadership in the design and manufacture of terminals. More Digital terminals are connected to computers than those of any other manufacturer (over 2,000,000).
- Digital's leadership in personal computing, with the Professional, the DECmate, and the Rainbow personal computers.
- Packaged workstations that address the specific needs of office professionals (word processing for secretaries, computer-aided design for engineers, spreadsheets and modeling for financial analysts, etc.)
- Compatibility across a wide range of terminal and workstation types (word processing on a DECmate II uses the same user interface menu and Gold Key editing implementation as a VT100 terminal connected to an VAX-based ALL-IN-1 system)
- The Professional personal computer can use Digital's Network Architecture for communications
- Ease of use is a key design criteria for all workstations (easy-to-learn, easy-to-remember, easy-to-use menu-driven user interfaces)

The broad selection of compatible workstations allows our customers to select the best workstation for each user, in terms of price per workstation, functions required, and local storage and computing capability required on the desk.

Workstation Summary

Telephone	Access to Digital's Voice Messaging System and DECtalk
VT100 Family	Digital's family of desk top text terminals, for casual Office System usage.
VT220	Lowest-cost text terminal for the casual user of an ALL-IN-1 Office System
VT240	Lowest-cost graphics terminal for the casual user of an ALL-IN-1 Office System
DECmate II Series	Digital's Office Workstation Integrated with ALL-IN-1 Document Processing Full-capability word processing CP/M-based personal computing Small Business computing system Can serve as a terminal to ALL-IN-1
Professional Series	Digital's high-end personal computer for those who require powerful local data processing For high-analysis professions, e.g., financial analysts, planning, economics Network data exchange with ALL-IN-1
Rainbow Series	Digital's price/performance leader for industry-standard applications For professionals who work independently ALL-IN-1 communications capability
VAXstation	High function/powerful data processing system Strong graphics and visual capabilities Used by engineering and design professionals

Digital's VT200 Family of Terminals

The VT200 Family Concept

If you liked our VT100 family—and with nearly 1-1/2 million installed already, many people did—you'll love our VT200 family of terminals. Digital has improved on the world-proven and accepted standard of interactive video terminals—the standard we established with the VT100 family of video terminals.

When we challenged ourselves to engineer an even better video terminal family, we wanted no compromises on the features and benefits that made the VT100 the most successful video terminal ever made. Its ease of use, its price/performance qualities, its flexibility offered by powerful communications capabilities, and its maintainability had all melded successfully to establish the VT100's tremendous acceptance and reputation in the marketplace. These characteristics and others could not be compromised. In fact, we set out to improve on them.

The Changes

Our starting point for redesigning the VT100 family was fairly easy. We already had optimized a form-factor for terminals and workstations for our new family of Personal Computers: the Professional 325 and 350, the Rainbow 100 and 100-Plus, and the DECmate II. Having achieved a favorable new design standard that incorporated extensive and important ergonomic design principles, modularity features, and sensible compactness in this personal computer family, we determined that this form-factor would be applied to the new VT family of terminals. Leveraging success into a new family of video terminals would allow us to offer unparalleled standards of compatibility for our workstations.

We're proud of our finished product and the features, functions, and benefits that the VT200 family can bring to your office. Let's examine some of the innovative features of the VT200 family of terminals or workstations and relate the benefits they can bring to your business organization.

For starters, compared to the VT100 family, the VT200 family terminals have been substantially reduced in size . A VT200 will occupy less space on your desk. And because the VT200 family of terminals employs the form-factor of our entire family of personal computers, its overall appearance, keyboard layout, keyboard design, and monitor size, shape, and design overcome potential problems associated with adaptation when a user works on different types of workstations.



Users feel more comfortable with a familiar workstation design and, resultingly, can be more productive when moving from one member to another in the Digital family of personal computers, workstations, and terminals.

Like all personal computers from Digital, the VT200 terminals employ a low-profile keyboard that strictly adheres to ergonomic design standards. What this means is that the keyboard—and, in fact, the whole workstation—maximizes user comfort and efficiency. The arrangement of the keys, the shape of the keys, the size and contour of the keyboard, the weight of the keyboard, and many other considerations have all been incorporated in the VT200 to optimize operator performance.

The VT200's monitor also adheres to ergonomic standards. The monitor, or screen, is a 12-inch, nonglare screen conforming to U.S. and European standards.

Other important features of the VT200 family include a 20 mA interface to support communications beyond 50 feet, a printer port, local echo, and such enhanced video capabilities as bold, blink, underline, reverse video, and 132-character condensed readout. These important features enhance the communications capabilities and the overall capabilities of the VT200.

Let's examine the models included in the VT200 family.

VT220

The family of VT200s includes the highly reliable, user-friendly VT220 text-only conversational terminal. The VT220 monochromatic text-only terminal introduces an attractive new design that incorporates ergonomic features while maintaining full VT100 functionality—including VT52 emulation, advanced video features, built-in printer port, and U.S./European modem controls.

International features of the VT220 include a multinational characterset, universal power supply, and both 20 mA and EIA interfaces. These important features expand the flexibility and functionality of the VT220.

The keyboard has been designed to minimize keystrokes and streamline overall operations through such operator-oriented features as split-screen capability, bidirectional smooth scrolling capability, double height/width characters, and reverse video. These attributes allow the VT220 to meet nearly any application need. The VT220 is a totally self-contained terminal with no real functional upgrade capability.



VT240 and VT241

If you need graphics display capabilities in your video terminals, you can choose from two Digital graphics terminals. We offer the VT240 for black and white or monochromatic graphics and the VT241 when color graphics are necessary.

The VT240 is a monochromatic graphics/text terminal. The VT241 is a VT240 with a 13-inch color display monitor. Both the VT240 and the VT241 incorporate all the capabilities and features found in the VT200 family. These capabilities include a built-in printer port to allow for the integration of a series of printers, advanced video features for increased display capabilities, down-line loadable character sets to maximize flexibility and provide invaluable timesavings, programmable function keys to eliminate repetitive keystrokes in performing routine tasks, and full VT100 compatibility. VT100 compatibility includes VT52 emulation and U.S./European modem controls, as well as such operator-oriented features as reverse video, double height/width characters, split screen, and bidirectional smooth scroll.

For exciting and powerful graphics applications, the VT240 and VT241 generate full bit-map graphics in both ReGIS format and Tektronics 4010/4014 emulation, thereby conforming to accepted industry standards for graphics. ReGIS (Remote Graphics Instruction Set) is Digital's general purpose graphics descriptor; it lets you easily create and store pictorial data for later recall and usage in your



work. ReGIS is an instruction set built into the VT240 and VT241. The commands can be used to generate lines, text, circles, and curves. ReGIS instructions allow absolute or relative positioning of the text and pictures. Frequently used picture components can be labeled and stored in memory as subroutines. Distinctive characteristics called attributes can be assigned to drawings and text to give emphasis. These attributes include assigning color or intensity; shading of figures with pattern or character; overlay, replace, complement, and erase writing of graphics; variable height and width characters; variable spacing and writing direction; and italics.

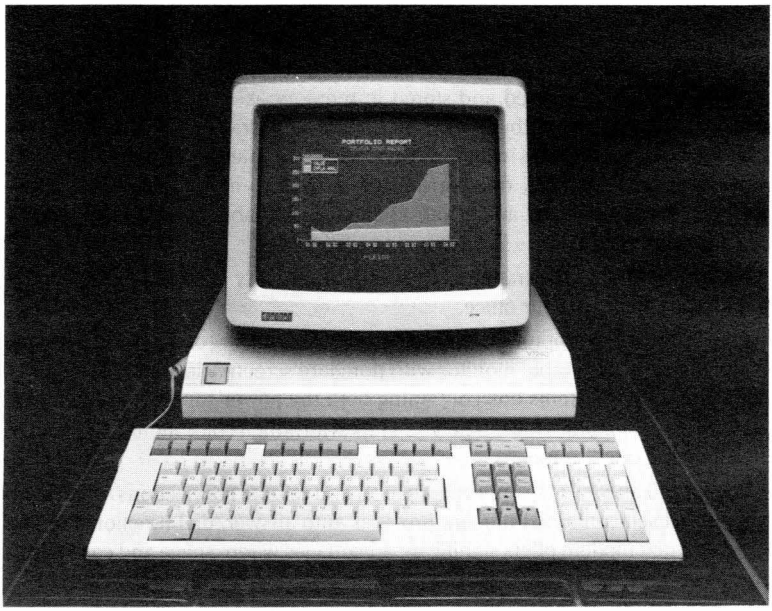
Tektronics 4010/4014 graphics emulation brings very popular and functional graphics capability to your office.

The VT240 is a microprocessor-based terminal consisting of three parts: a black and white 12-inch, tiltable monitor with nonglare screen; a low-profile, modular keyboard; and, a systems box containing both the power supply and the terminal's video and graphics logic. The VT241 uses a 13-inch color monitor instead of the 12-inch monochrome.

The VT240 and VT241 support both local and remote connections to the host; an optional self-contained modem provides auto answer/dial functionality.The self-contained modem offers significant advantages where space and ease-of-use are considerations.

Like the whole VT200 family, the VT240 and VT241 terminals are easy to use, with a plain-language set-up menu for defining selectable system characteristics. These set-up parameters are stored in nonvolatile memory and can be changed at any time. Nonvolatile memory ensures that your set-up will remain as the characteristics of your workstation, even in the event of a power failure. As your requirements may change, you can easily and quickly change the terminal's characteristics by using a plain-language, menu guidance utility. Communications protocols, tab settings, print speed, and keyboard attributes are some of the features you can customize to fit your application.

The VT240 and VT241 graphics planes are divided into picture elements, or pixels, in a 800-by-240 array. Each pixel can be programmed individually to provide medium-resolution graphics and a wide variety of text styles.This offers a very high degree of flexibility and resolution for your graphics requirements. There are two complete graphics planes that are positioned one behind the other. This allows two separate graphs to be overlayed for comparison or for blending and shading to achieve multiple levels of gray and color with the VT241. Both the



VT240 and VT241 integrate the presentation of text and graphics as a single screen image.

The VT200 Family Snapshot

Below is a summary of the features and benefits of the VT200 family:

Digital Personal Computer family form-factor

The VT200 family of interactive video terminals use the same form-factor as our personal computers.

The design standards employed in the personal computer family and the VT200 family adhere to stringent ergonomic standards to optimize user comfort and competence in using the workstation and when working at different workstations. The form-factor offers reduced size over its predecessor - the VT100 family. Less space is required on your desk with a VT200.

Low-Profile Keyboard

The keyboard design has been optimized for operator comfort and effectiveness. The keyboard is thin and modular—keyboard layout and "touch" incorporate important ergonomic design considerations.

Compact, Glare-free monitor

The 12-inch standard video monitor for the VT200 terminals is tiltable so that it can be adjusted to keep you comfortable. The screen has been designed to reduce glare under normal office lighting.

As a user, your relationship to the workstation is through the keyboard and the monitor. Both have been designed to make you comfortable and effective and to keep you from getting tired.

15 Different Keyboards

There are 15 different keyboards available with the VT200 family.

This wide choice of keyboards offers unmatched flexibility in meeting the needs of any application. Whether the consideration is another language, country, or the nature of the application itself, one of the VT200's keyboard layout and designs will fullfill your requirements.

15 Programmable Function Keys

The VT200 family incorporates function keys to improve the "user friendliness" of the terminal. Fifteen of these function keys are programmable and can be downline loaded from the host system to contain user-defined character sequences. A total of 256 characters can be assigned to these functions, and they can be changed at any time.

Programmable function keys can streamline applications by offering substantial time-savings in executing common tasks. Programmable function keys also help make the VT200 an easy-to-learn and easy-to-use terminal.

Selective Erase

The selective erase feature supports applications in which data is entered by filling in the blanks of a form. After the blanks are filled in and the data is accepted by the host system, the data in the blanks is the only information erased. The form remains on the screen for user reference.

This powerful feature can save invaluable time in tasks that require an operator to provide information following a predefined form. The form remains constant on the screen, so the system or the terminal doesn't have to "repaint" the screen.

Plain-Language, Menu-driven Setups

In set-up mode, the VT200 terminals display a screen that represents a group of choices from which to select operating characteristics. Many of these characteristics have factory-installed defaults that can be readily displayed in set-up mode.

The operator uses set-up to define or change the characterisitcs, which are then stored as the operating status. The operator pages from screen to screen (seven in all) defining parameters such as keyboard language, baud rate, key click, auto-wrap, cursor style, margin bell, parity, printer speed, and answerback message, and as many more. The set-up menu can be displayed in English, French, or German.

With plain-language and menu-driven features of the set-up mode, you can easily and quickly define or change the characteristics of your terminal. No technical or programming skills are required.

CRT Saver

During normal operation, if the VT200 hasn't received information from the user or host after 30 minutes, the monitor screen goes blank. No data is lost, however. Pressing any key or receiving data from the host system restores the screen. A green indicator light lets the user know that the terminal is still powered up.

This powerful feature increases the life of the monitor.

Composite Video Output

Composite video output allows the VT200 terminal to drive an auxiliary underscan monitor.

This feature means you can use a VT200 for applications that CAN be displayed to a group of people on an auxiliary monitor.

Flexible Communications Capabilities

The VT200 family supports full-duplex, asynchronous communications with 10 possible transmit/receive speeds. The built-in 20 mA current loop supports communications exceeding 50 feet. The VT200 terminal family operate in accordance with the following standards: EIA standards RS232-C and RS423, and CCCITT Recommendations V.24, V.26 (V.10), and X.20 (V.21). The serial character communication format used for communication with the host computer is user-selectable to seven or eight bits. A 254-byte character input buffer and XON/XOFF support helps ensure that transmitted data is not lost.

The VT200 family offers maximum flexibility in communications to meet the needs of the office.

Printer Port

The serial printer port enables hardcopy printing off the video terminal, thus sharing one communication line between two peripherals. RS232 compatible, the printer port also allows local print functions without host intervention. When in local keyboard-to-printer mode, the characters entered on the VT200 keyboard will be printed on the printer.

The built-in printer port allows you to connect to a local or remote printer to produce hardcopy out-put from the VT200. This attaching the VT200 to a printer much easier.

Full VT100 Functionality

VT100 compatibility includes VT52 emulation and U.S./European modem controls, as well as such operator-oriented features as reverse video, double height/width characters, split screen, and bidirectional smooth-screen scroll.

All the capabilities of the acclaimed VT100 family of terminals is contained in the VT200 family. For users of VT100s, full compatibility is assured.

Bit-map Graphics for the VT240 and VT241

Both the VT240 and the VT241 employ bit-map graphics display design. Through bit-mapping, each picture element or pixel is inividually addressable for output.

Bit-map graphics offer extremely good resolution for quality graphics output.

Two Graphics Protocols Supported

The VT240 and the VT241 support both ReGIS and Techtronix 4010/4014 graphics protocols.

You can use a wide range of Digital's and outside graphics software. The proven and accepted standards offer maximum flexibility and protection of investment.

Optional integral 300/1200 bit per second modem with Auto Dial

The VT240 and VT241 terminals are available with an optional 300/1200 baud integral modem, supporting autoanswer and autodialing.

Through this feature, a telephone and VT240/241 terminal can share the same communications line. An operator can use the VT240/241 terminal keyboard to dial calls to a host computer instead of using the telephone. Using the keyboard, telephone numbers can be stored in nonvolatile memory to be dialed automatically with a single keystroke.

DECmate II

Information management and information processing are two key business challenges that a steadily growing collection of small computer systems try to meet. Word processors, personal computers, business computers, and executive workstations are but a few of the systems and approaches being suggested to help you address your office's needs for information management and processing.

Whether you're an office manager responsible for your organization's word processing functions, a professional who analyzes data and produces reports, or the owner of a small business, you need a computer that offers a powerful combination of capabilities at a competitive price. For you, DECmate II is the answer.

The DECmate II was designed to be a full-featured, standalone word processor. Unlike other powerful word processors, the DECmate II doesn't stop there. Recognizing that businesses need more than word processing, we have designed the DECmate II to offer you complete business and data processing capabilities. But no computer system for the office is complete without powerful and flexible communications capabilities so we engineered these into the DECmate II as well.

The DECmate II delivers three important dimensions of capabilities for your office: powerful word processing, flexible business and data processing, and extensive communications capabilities.

Powerful Word Processing

The DECmate has been acclaimed as the standalone word processor price/performance leader by users and independent industry consultants.

Analyzed purely as a word processor, the DECmate is the leading performer among all the available standalone systems. This is even more impressive when one considers that it costs about one-half the price of comparable systems.

Perhaps the most common need in the office environment is for fast, accurate text generation and revision. Letters, memos, reports, and other typed information often go through multiple drafts and redrafts, demanding hours of time from both professional and clerical staff.

DECmate can improve the efficiency of that process immensely. First drafts are entered into the system and all subsequent revisions can be quickly and easily made, directly on the stored first draft. Only after the material is "letter perfect" is it printed in presentation form, thus saving hours of typing and retyping.

DECmate's word processing is both powerful and easy to use. Major command functions, such as replace, search, file and delete, are labelled on single keys on the keyboard, and require only one or two keystrokes to activate. Compared to other word processors, DECmate is amazingly easy to operate.

Flexible Business and Data Processing

For business or data processing tasks, like financial analysis or basic accounting

functions, DECmate offers literally hundreds of different possibilities. With integrated accounting packages available for the DECmate, a small-to-medium business can run its entire bookkeeping operation on a DECmate in a fraction of the time that manual systems demand.

With DECmate's powerful CP/M option, you gain access to an enormous number of widely available packaged software programs. With a DECmate, your information management needs can be addressed through powerful computer tools like spreadsheet analysis, financial planning, database management and others.

Extensive Communications Capabilities

Communications is a critical part of an effective office information system. DECmate offers an unmatched set of communications capabilities. Douments can be easily transmitted to and received from other DECmates, other computer systems manufactured by Digital, and even other manufacturers' computer systems. With our ALL-IN-1 Office Information System running on our family of VAX computers, your DECmate can give you access to electronic mail and huge corporate or departmental data files. With DECmate's ability to communicate over telephone lines, you can access and retrieve information from the Dow Jones News/Retrieval Service, the Source, and dozens of other information utilities.

Full-feature Word Processing Hardware and Software

The DECmate is a standalone word processor that is both easy to learn and easy to use. DECmate II/WPS is a single-user word processing software package designed for office and business use on DECmate II systems. With this basic text-editing software, users can create and update documents sorted on diskettes. Its basic features include:

- Menu-driven operation
- Easy-to-learn instructions
- Special editing keypad
- Two 5¼ inch diskettes
- Full editing features
- Full control of tabs, margins, and justification
- Full pagination capability
- Shared serial printer switch support
- Time and date stamp key
- Document statistics

DECmate II and WPS combine to offer you full-function word processing.

Computer-Based Instruction

Digital's exclusive Computer-Based Instruction (CBI) program takes you step by step through the basics of operating the DECmate II system, using carefully drawn

and animated graphics and proven instructional techniques.

The Computer-Based Instruction program helps you become familiar with the operation of the system and, as a result, helps you become immediately productive. Through hands-on learning, you experience the advantages that the DECmate II can bring to your office.

Help Feature

The DECmate II incorporates a Help key that when you need assistance gives you additional prompts, options, or explanations. The Help feature is always easily available when you need assistance in performing one of the many functions provided by the DECmate II. Help is accessed by simply depressing a single key at any time during your use of the DECmate II. Requesting and receiving Help does not interrupt the function that you were performing. This Help feature makes a DECmate system easier to learn and to use.

Modular design

Every DECmate II system consists of three basic parts: a system unit, a video display, and a keyboard. You can move the keyboard to the position most comfortable to you because it is attached to the video display by a six-foot coiled, telephone-type cord. The lightweight video display can also be moved and tilted to the position that is most comfortable for you. The small system unit can be put under or beside your desk—depending upon your preference or the space available in your office.

The DECmate II's modular design gives you,the user, a great deal of flexibility. It provides mobility and saves repair/replacement costs and time.

Powerful Formatting Features

DECmate II includes many useful text formatting features, including:

- Underlining
- Boldfacing or shadow bolding
- Centering a word, phrase, or line of text
- Changing case (upper and lower)
- Fully automatic pagination
- Subscripting
- Superscripting
- Overprinting characters
- Printing the date and time of creation on a document
- Automatic line justification
- Semiautomatic hyphenation

DECmate II's easy-to-use text formatting features help you give your documents an effective, professional appearance.

Full Editing Capabilities

DECmate II's specially-labelled word processing keys let you delete, add, move, duplicate, underline, capitalize, or boldface text—a character, word, line, sentence, paragraph, or page at a time.

Modification of sentences and paragraphs occur rapidly—with only a few keystrokes needed to make major changes. Whenever you add or delete text anywhere in a document, the DECmate II Word Processing Software automatically expands or closes up all the text around your change. DECmate II's powerful editing capabilities save operator time and simplify production of top-quality documents.

Menus and Cue Cards

A menu appears on the screen whenever there is a choice for you to make. Cue cards are prompting commands that appear automatically whenever the system needs more information from you, or when you make a mistake.

Menus and cue cards help a novice operator learn system operation quickly. For new operators, each menu provides easy-to-follow instructions on how to proceed. With only a little experience, operators can make menu selections and bypass cues without pausing to read them. These exciting features simplify system learning and use for beginners or infrequent users and eliminate the need for remembering or learning command lines.

Cut and Paste

Blocks of text—up to three full pages at a time—can be moved from one location to another within a document, transferred from one document to another, or copied repeatedly throughout a document at the touch of a key.

The powerful cut and paste feature of the DECmate II saves typing time and eliminates the possibility of introducing new errors as often happens when retyping text. Cut and paste permits fast production of professional-quality documents.

Search and Replace

Search and replace capability lets you rapidly search a document backward or forward for a given word or phrase that you can then modify or replace with new text as you choose.

Global Search and Replace

Global Search and Replace allows you to search forward through an entire document for a word or phrase you wish to change or delete. DECmate II will automatically replace every occurrence of the phrase with whatever information you specify.

The global search and replace feature saves you time and ensures that your document is accurately and automatically corrected to your instructions.

Automatic Pagination

The DECmate II will determine and highlight on your screen the location of each page break in your text.

Automatic pagination lets you see on your screen exactly where the printed pages will start and end. You can change any or all of them before your printing begins. In this way you can prevent a page break from occurring in the middle of a table or chart. This can save you invaluable time because you don't have to use trial and error to get documents printed correctly.

Go-to-Page

Go-to-Page allows you to immediately access a specific page in a document.

While editing, you can tell the DECmate II what page you want to find, and it will search for that page and display it. This saves you time when you want to go to a specific page in a lengthy document and edit text on just that page.

User-Defined Keys

With user-defined keys you can record a series of keystrokes once for later use. Then at any time it is needed you just press one key to perform the stored series of steps. Up to 100 user-defined keys can be designated.

User-defined keys save you time and keystrokes in word processing. Once defined, a user-defined key will eliminate the need for you to press all the necessary keys to perform a function—all you have to do is press the user-defined key. All the original steps are performed automatically. This powerful feature saves you time and keystrokes and greatly simplifies system use.

Special Printing Features

DECmate IIs support the following special printing features:

- You can store a list of documents to be printed
- You can retrieve and review this list as needed
- You can send up to eight documents to the printer at any time and DECmate II will keep track of them in a queue or list, printing each in its turn
- The DECmate II can print up to 10 columns across the page
- The pitch, or characters per inch, for printing can be predefined; up to 25 characters per inch can be used
- DECmate II gives the printers such capabilities as subscripting and superscripting, a limited form of proportional spacing, underlining, bolding, and overstriking
- DECmate II will automatically print chapter headings at the top or bottom of every page
- DECmate II will determine page numbers and section numbers automatically and position them on the top or bottom of every page, at your request.

DECmate II's special printing features help you produce professional-quality documents for maximum effectiveness.

Sort Option

Digital offers a sort option that can be added to your DECmate II to alphabetize and arrange information in lists automatically. Sort is similar to list processing in that it will take information from a list, sort that list according to your specifications, and put that sorted information into a new document.

The sort capability saves invaluable time in processes that involve lists of information, such as names and numbers. Sort can also save you money if your business performs bulk mailings. Sort can arrange mailings by zip code to save you money on bulk mailing charges.

Powerful Communications Capabilities

DECmate II's communication software gives you three powerful ways to transmit information with your DECmate.

Communications is an important consideration in evaluating the effectiveness of the DECmate II for your office. If, for example, you must send a new product description, created on your DECmate, to a sales representative in the field, you can transmit the entire document from your DECmate II instantly directly to the sales representative's DECmate II. You can even transmit it automatically or unattended,so no one is needed at the other end to receive the information. DECmates allow you to communicate with many other devices other than just DECmates. These include other word processors, phototypesetters, optical character readers, and computers and external databases like the Dow Jones News/Retrieval Service, The Source, or Compuserve. With the DECmate II, you have access to the wealth of financial, business, reference, and general information that is available from these external databases.

List Processing

You can create unique and customized documents from a form document. Because List Processing performs a select and merge function, you can pair the form document with all entries in your list or with selected entries. It's easy for you to prepare mass mailings, standard monthly reports, or standard forms. The flexibility this feature provides lets you mix, match, and customize your text in the form that you need it.

Editor and List Processing Math

With DECmate II/WPS, you can perform calculations (addition, subtraction, multiplication, and division) while you edit a document or during list processing. And you can add the results of these calculations to the document you're editing or processing. It's easy for you to create, update, and maintain numerical tables in documents. This feature improves the speed and accuracy of your numerical calculations.

The DECmate Office Workstation

To meet the demanding needs of today's office, Digital has designed and packaged a powerful combination of a DECmate II system with high performance word processing software, CP/M application software capabilites, and flexible communications capabilities for easy access to other workstations, ALL-IN-1 systems, corporate host systems and external data bases. We call this combination the DECmate Office Workstation.

We've designed the DECmate Office Workstation to provide the capabilities to help you do your job more efficiently—more effectively. We understand that you need more than a word processor in your office to help you do your job. You, of course, need word processing to write and revise letters, memos and reports. But you also need to merge financial data files with word processing documents, and then electronically mail the final report to others in your department or company. On most systems available today, this merging and mailing process either doesn't exist or involves dozens of keystrokes and complicated procedures.

That's why Digital designed the DECmate Office Workstation to combine all the features you were looking for in a single, attractively priced desktop unit.

Word Processing Now Integrated with Your CP/M Application

Of course the DECmate Office Workstation offers features-rich, high-quality word processing developed by Digital and optimized for the DECmate II system. DECmate also has all the tools that managers and professionals need to help them with their jobs—spreadsheets, data management, graphics, project management, financial tools, and many others.

You can select from among the industry's most popular CP/M software application programs to build a workstation that does exactly what you need it to do.

But Digital now offers you an important advantage. Recent enhancements to DECmate's CP/M software lets you merge word processing documents with your CP/M files—on the same workstation. Using only a few keystrokes, the WPS-CONVERT utility links the two files together in seconds.

And, now that DECmate systems support a 10 Mbyte Winchester disk for CP/M and COS 310 applications, you'll have plenty of space to store and access numerous applications and data, quickly and easily.

Communications Made Even Simpler

DECmate's true value as an Office Workstation becomes more obvious once you realize how easy it is to transfer documents to and from other systems. A new WPS software feature called Easycom makes it easy to dial, log onto a host, and issue start-up commands.

A single keyboard command puts you and your documents in touch with other office information systems such as our All-IN-1 system, other DECmate users, or even other vendor's systems and public information data bases like Dow Jones News/Retrieval, Compuserve, WESTLAW, and The Source.

You Can Customize a DECmate Office Workstation to Work the Way You Do

Designing your own DECmate Office Workstation is as easy as ordering dinner from a menu. We'll help you get started with a DECmate II desktop system, and include a special package that consists of our newest WPS Word Processing Software, Easycom, and Digital's custom CP/M Version 2.0 with WPSCONVERT —all for less than $5,000.

The Professional 300 Family of Personal Computers

Digital's Professional 300 family is a powerful series of personal computers that will greatly expand the notion of what a personal computer can do for you. The Professional is much more than a personal computer. In fact, it has earned the name of a professional computer.

Into the Professional 300 series Digital has built a number of exciting new capabilities, including a Telephone Management System, bit-map graphics, and file compatibility with our powerful family of VAX computers.

Telephone Management System

—Expanding the Capabilities of Your Telephone

With Digital's Telephone Management System, you can program your Professional 350 to "answer" your telephone. Telephone Management System (TMS), an option, lets you merely enter a name of an individual, a publicly accessible database, or another computer at your keyboard, and the system will look that name up in its telephone directory and automatically place the call for you. TMS includes an option board and a "hands-free" telephone unit equipped with a speaker and a microphone.

TMS can digitize voice messages so that they can be stored on a disk and later converted back to speech. Your Professional 350 can be used as a telephone answering machine, as a dictating machine, or as a "voicemail" terminal or workstation. "Verbal" notes may even be added to—as well as transmitted with—written documents!

Powerful Graphics Features

—Expanding the Capabilities of your Graphics Communications

While most personal computers use a video monitor with resolution similar to that of a home television, the Professional series incorporates superior graphics features to provide outstanding resolution. Greater resolution means greater impact in meeting your graphics needs.

All of Digital's Personal Computers display a full 132 columns of data or text. The Professional 300 Series also features bit-map graphics. With bit-mapping, each pixel or picture element is individually controlled by the Professional's powerful processor. A Professional with bit-mapping offers three to four times the resolution of a home television set. This distinctive quality means the Professional can be used as a graphics workstation.

Networking

—Expanding the "Reach" of your Communications

Digital is an acknowledged leader in distributed processing and local-area networking. We are committed to providing complete networking support for our

Professional 300 Series of personal computers. Local-area networks will play a vital role in addressing your office's information communication needs; our Professional Series' operating system was written to support the networking and communications protocols of both our proven DECnet product and Ethernet, a powerful local-area networking product.

The Professional 350

The Professional 350 is a powerful desktop professional computer that incorporates a system box, a modular keyboard, and a modular video screen. The system box contains a powerful and proven PDP-11 processor with up to 512 Kbytes of memory, a modular power supply, three option slots for expanding the capabilities of your system, a printer port for attaching a printer, and a dual floppy disk drive with a capacity of 800 Kbytes of data—the equivalent of about 535 typewritten pages.

Options for the Professional 350 include a 5- or 10-million-byte Winchester disk and an extended bit-map option board that provides you with two additional display planes for monochromatic shading and color. The video display for your Professional can also be upgraded to a color video screen. Printed output can be accommodated through a choice of three printers: a letter-quality printer, a desktop printer, or a three-speed printer that provides high-quality, intermediate-quality and high-speed dot-matrix printing.

The Professional 325

The Professional 325 is, essentially, a smaller version of the Pro 350. Designed to work in clusters where a file server might provide data storage for a number of personal computers, the Professional 325 offers less expansion capability. Extended bit-map graphics or other advanced options may be added; the same choice of printers is available for both 350 and 325 users.

The Professional Series from Digital

—Extending the Capabilities of the Personal Computer

Below are some of the exciting features, the functions and the benefits of our Professional Series of Personal Computers:

Multitasking Operating System

The Professional Series' operating system, P/OS, runs on our acclaimed PDP-11 family processor to provide power and flexibility not found in other personal computers. The Professional Series offers multitasking, or simultaneously performing two or more tasks.

This unmatched computer power allows the Professional to work the way you work—performing even dissimilar tasks simultaneously. By performing more than one task at a time, the system multiplies its own and the user's productivity!

Bit-mapped Graphics

The Professional Series incorporates bit-mapped graphics technology. This powerful concept for personal computers provides computer control for the most minute components of the display image—the pixels or "dots" that comprise the image.

Bit-mapping provides resolution three to four times that of, for example, a standard television. Most personal computers have home-television resolution. With the Professional's bit-mapped graphics, however, the image is sharper, clearer, more visually powerful and flexible. Bit-map graphics allows the system to actually "draw" graphs rather than "constructing" them from typewriter symbols. This enhanced graphics capability greatly expands the horizons for business graphics.

Telephone Management System (optional)

Telephone Management System, TMS, is a distinctive offering for the Professional 350 that integrates your telephone into your Professional system. A vast range of computer applications using and extending the power and functions of the telephone are enabled through TMS.

With TMS on the Professional 350, your telephone will become an extension of the system—imagination and creativity are the limits on what this innovative alliance can mean for your office. Using your Professional as a telephone calling, answering, or processing device, digitizing voice from the system for subsequent processing, for embedding in text, for dictation, for transmission, and so on, can bring some truly effective capabilities into your office. TMS can open new avenues of communication, can streamline rote tasks, and add new dimensions to personal computing.

Menu-driven User Interface

Menus prompt and guide you through the use of the Professional.

Through a "friendly," meaningful menu approach, the functions of the system and the program you are running are easily performed. Even a novice can fully use the power of the Professional. This rapid deployment of the Professional's computing power promotes enhanced productivity as well as ease of learning.

Ergonomic Keyboard and Monitor Design

Both the keyboard and the monitor for the Professional incorporate ergonomic design principles.

The streamlined keyboard meets and exceeds ergonomic design standards for operator comfort and efficiency. These important design considerations maximize operator "acceptance" and comfort-level with the system and minimize operator fatigue. The nonglare screen on the monitor overcomes problems typically associated with office lighting environments.

Computer-Based Instruction

Instruction on the use of the Professional is available, directly on the system itself. Computer-based instruction is a very effective method of training operators in the use of a system. Employing a tutorial approach, computer-based instruction, or CBI, offers a proven "hands-on" approach to learning how to use the Professional. Novice operators can learn at their own pace and play an active role in understanding and using the system. This ease-of-learning feature is invaluable in helping to make the Professional of immediate value in your office.

Full 80- or 132-Column Display

The Professional offers you the flexibility to display either 80 columns or characters or 132 columns or characters.

As a user, you can view more than the standard 80-column-only display of many personal computers. The Professional's ability to display up to 132 columns or characters per line is especially useful in spreadsheet and in word-processing applications.

Communications Capabilities

P/OS, the Professional's operating system, was written so that DECnet and Ethernet networking and communications protocols can be supported. A built-in communications port links your Professional with other workstations or host systems.

The communications and networking capabilities of the Professional can be used to transmit and receive electronic mail, share date files, or to access external databases. These capabilities are critical needs of the office that can be effectively addressed through the Professional. Digital is an acknowledged leader in distributed processing and local-area networking. We are commited to providing complete networking support for our Professional 300 series of personal computers. Local-area networks will play a vital role in addressing your office's information communication needs; our Professional Series' operating system was written to support the networking and communications protocols of both our proven DECnet product and Ethernet, a powerful local-area networking product.

Help Feature

Help is always available to the user whenever needed through the typing of one key.

When using the Professional, you can obtain detailed prompts, reminders, or directions by using the resident "Help" feature. "Help" will prompt you through the next step of a process so you don't need to refer to a manual. This important feature can save you valuable time when using the system—it makes the Professional a personal computer that is both easy to learn and easy to use!

Printer Capability with a Choice of Printers

The Professionals from Digital include a printer port that allows you to attach a printer to your personal computer.

Since you will often have a need for a hardcopy print of your files, documents, messages, memos, and other things on the system, you will need to attach a printer to your personal computer. With the Professional Series of personal computers, you have a choice of three printers: a letter-quality printer, a desktop printer, or a three-speed printer that provides either high-quality, intermediate quality and high-speed dot matrix printing.

User-defined Function Keys

The Professional gives you the ability to reduce the number of keystrokes needed to perform commonly used functions. As a user, you can define a task or function and assign function keys to perform them.

The Professional has a collection of user-defined function keys that can be programmed to perform a task or function instantaneously. This capability saves you time when performing the more routine types of work on your Professional. Much like a set tab function on a typewriter or workstation, you can easily and quickly "customize" your workstation to do much of the work you do. Pressing a user-defined function key will trigger a predefined function. It eliminates the need for going through all the steps required to perform commonly used tasks or functions. The Professional's user-defined keys will save you time and increase your efficiency.

Built-in Diagnostics

The Professional Series of personal computers have built-in diagnostics to monitor the condition of their parts. If a part of the Professional is faulty, the diagnostics will promptly identify it for you in clear, meaningful terminology.

The Professional's built-in diagnostics verify the proper operation of the system and identify the location of any faulty components. Maintenance costs and troubleshooting activites can be greatly reduced through this feature.

User-installable Options

Upgrading your Professional to incorporate some of the add-on options is so simple that you can do it yourself.

This simplicity saves you time and money when you upgrade your Professional.

Optional Hard Disk Mass Storage for the Professional 350

A 10-Mbyte Winchester Drive with an integral controller is available as an option for the Professional 350.

For some users or applications, the Professional's dual mini-diskette storage system of up to 800 Kbytes of data may not be enough. Unlike many other personal computers, the Professional allows you to add an additional dual mini-diskette drive for an additional 800 Kbytes. Or you can add a Winchester-

technology hard disk that will provide you with additional storage equivalent to about 5,000 typewritten pages.

Floating-Point Processor

The Professional system incorporates a powerful floating point processor. It provides significantly enhanced performance for those applications requiring large amounts of mathematical calculation. These tasks include financial analysis, trend analysis and financial modeling.

Optional Extended Bit-map Graphics

This feature adds two planes to the standard video graphics display. Each plane supports a display of 960 by 240 pixels. It also adds a color output map that can display 8 colors from a palette of 256 on the color monitor or 8 of a possible 16 shades of gray on the monochrome monitor.

Extended bit-map graphics displays greatly enhanced graphics images, thus communicating more information per screen and enhancing user productivity.

Optional CP/M-80 Coprocessor

This option permits CP/M 80 applications programs to be run on the Professional.

The CP/M coprocessor lets you use the hundreds of applications currently available for CP/M operating system. You can continue to use an existing library of CP/M programs while gradually moving up to the more powerful P/OS environment, thus protecting your investment in software.

Optional IBM 2780/3780 Communications

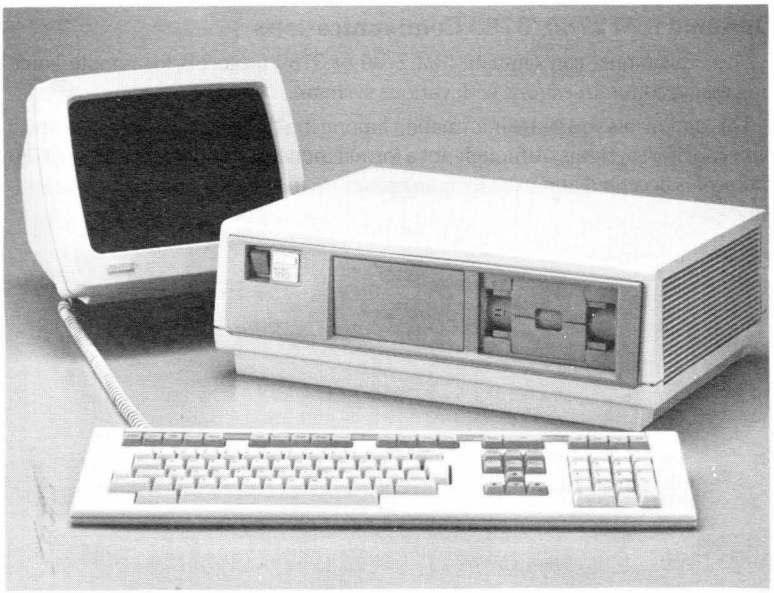
The Professional can emulate IBM 2780 or 3780 protocols for remote batch processing communications with various systems.

This option lets you share information among the Professional 300 series and a variety of host systems. Although not a formal industry standard, the 2780/3780 protocol is accepted and used by many products in the data processing community.

RAINBOW 100 SERIES of Personal Computers

The Rainbow 100 personal computer is a complete business system. Rainbow gives you a tremendously broad base of software applications from which to choose, and runs them fast. Applications run better because of Rainbow's range two processors that boost system throughput. Rainbow's dual-processor design—one 8-bit and one 16-bit CPU—lets you run both mature 8-bit software and today's advanced 16-bit applications on the same personal computer, automatically. No swapping disks or even telling your personal computer which kind of program you've loaded—Rainbow's "softsense" automatically knows which it is. And since Rainbow runs both the popular CP/M 86/80 and MS-DOS operating systems without any additional hardware, you have an enormous variety of applications to choose from.

A Rainbow 100 system is ready to use. There are no "hidden-cost" options that you need before you can start working. You get enough memory to do real work from the start—64 Kbytes, optionally expandable up to 256 Kbytes. The innovative floppy disk drive, which holds two 400 Kbyte diskettes on one spindle, gives you a minimum storage capacity of 800 Kbytes, or more than 400 pages of text, to store your documents and programs. You can add a second dual-diskette drive for a total of 1.6 Mbytes of diskette space. Rainbow's advanced engineering—including its memory-mapped video which repaints the screen quickly as you work—gives you really high performance.



Rainbow also communicates quickly and effectively with other computers. Rainbow's built-in terminal emulation allows it to act as a terminal to other Digital computers at no extra cost, without loading any software, giving you access to the processing power and resources of mainframes and minicomputers.

Alternately, you can use optional software that lets you communicate with mainframes and personal computers manufactured by IBM Corporation, Apple Computer, Inc., and Texas Instruments.

You don't have to buy a communications port or a printer port as extra options because they're standard. The communications port lets you take full advantage of Rainbow's communications capabilities: Rainbow can talk to another personal computer, can communicate interactively with a mainframe host or an information network (such as a public information system like the New York Times Information Service), or, can act as a terminal to a host. Rainbow gives you dial-in access to outside information services including the Dow Jones News/Retrieval, which carries financial news, market information, and company profiles, and the Source for travel information, reservations, and business information programs. The Source can also link you to a private distribution network through an executive mail service. Personal computer local area networks, such as OMNINET from Corvus Systems, lets your Rainbow exchange data and files with other personal computers as well as share such resources as disks and printers.

Digital offers a full selection of options, peripherals, furniture, and accessories for the Rainbow. Because they're from Digital, you know you can count on high quality and reliability. Three printers—the dot-matrix LA50 Personal Printer, the versatile Letterprinter 100 and the daisywheel LQP02 Letter Quality Printer—are designed to work with Rainbow and are engineered for dependability.

Here's the Plus

Rainbow comes in two models—the Rainbow 100 and the Rainbow 100+—to meet different business requirements. The Rainbow 100+ is a direct extension of the entry-level Rainbow 100, with all the outstanding features of the Rainbow 100, plus: an internal 10 Mbyte Winchester disk, more main memory, more memory expansion capability, and enhanced graphics capability, all as standard features. Rainbow 100+'s increased storage space and main memory give you faster information transfer and access to your files.

If your business demands more mass storage for programs and data, you'll want the Rainbow 100+ with its internal 10 Mbyte hard disk. The Rainbow 100+ comes with 128 Kbytes of main memory and is expandable to 896 Kbytes. You expand the memory on the Rainbow 100+ simply by adding chips to a memory foundation module, so you can increase memory whenever you want to.

Countless Applications

Rainbow runs all of today's popular personal computer operating systems,

including CP/M-86/80 (a combination of CP/M-86 and CP/M- 80 with additional utilities, including powerful screen-oriented text editor); MS-DOS; Concurrent CP/M (available from Digital Research, Inc.); and UCSD p-System (available from TICOM Systems, Inc.). This means you can access thousands of industry-standard software applications, from spreadsheets to accounting packages to word processing to database management. You can choose the software that's right for the job that you need to get done.

Whatever your profession, Rainbow can help solve your problems. Marketing or sales managers can use the Rainbow to analyze advertising returns or price sensitivity. Rainbow can forecast sales or end-of-the year estimates for a business owner. Financial managers can perform breakeven analyses, cash flow, and net present value analysis. With Rainbow, professionals can produce their memos, reports, proposals, and letters quickly and simply. And the graphics they run under industry-standard GSX-86 graphics software can add clarity to their reports and give them a more professional look.

Let's examine, below, some of the important features of the Rainbow personal computers:

Total CP/M Capability

The Rainbow personal computers have the distinctive ability to run either CP/M-80 (8-bit CP/M) or CP/M-86 (16-bit CP/M). The Rainbow's two processors offer this powerful benefit.

The Rainbow personal computers provide unmatched flexibility to allow you to run the widest range of personal computing software.

Softsense Feature

The Rainbows incorporate a totally automatic sensing and switching capability called Softsense. This Digital-unique feature lets you load into the Rainbow either 8-bit or 16-bit CP/M-based programs without changing or even notifying the system. Softsense will automatically "sense" the type of operating system required and will activate the appropriate processor.

The two processors in the Rainbow broaden the range of available software that you can use in meeting your personal computing needs. Softsense eliminates the need for you to be concerned about which "flavor" of CP/M operating system is being used. Softsense provides a degree of "ease of use" that no other personal computer offers.

Built-in Terminal Emulation Capability

The Rainbow personal computers can connect to a computer network or to a computer host system without your having to purchase additional software.

With Rainbow's terminal emulation capability you can use your personal computer as a terminal or workstation tied into a computer network or into a Digital computer. This feature gives you extreme flexibility by giving you access, through your Rainbow, to shared databases, to electronic mail networks, to

departmental systems, and to other computing resources both inside and outside your business organization.

Ergonomic Keyboard and Monitor Design

Rainbow's streamlined keyboard meets and exceeds worldwide ergonomic design standards for operator comfort and efficiency. These important design considerations maximize operator acceptance and comfort level and minimize operator fatigue. The non-glare screen will overcome common glare problems and further increase operator efficiency.

Computer-based Instruction

Instructions for the use of the Rainbow series are available on the system itself.

Employing a tutorial approach, computer-based instruction (CBI) offers hands-on experience in learning how to operate the Rainbow. Novice operators can learn at their own pace, and play an active role in understanding and using the Rainbow. Because there is no lengthy learning process involved, the Rainbow can be of immediate value in your work.

Full 80- or 132-Column Display

As a user, you have the option of viewing more information than can be displayed on the standard 80-column-only display of many personal computers. The Rainbow can display up to 132-columns of data, which is particularly useful in an application like a financial spreadsheet, where many columns of data are being evaluated or reported on.

"Help" Feature

The Rainbow series incorporates an online "help" facility that's invoked by depressing one key.

You can obtain detailed prompts, reminders, or directions by taking advantage of the help feature. Help will prompt you through the next step of a process so you don't have to refer to a manual. This help makes the Rainbow a personal computer that is both easy-to-learn as well as easy-to-use.

User-Defined Function Keys

The Rainbow series lets you define and use a set of user-defined function keys to initiate and perform repetitive tasks.

The Rainbow's set of user-defined keys can be easily "programmed" to perform a task or function. All you need do once the keys are "programmed" is press the appropriate key and the predefined function or task will be executed. This can be a powerful timesaver in performing routine work.

Built-in Diagnostics

Rainbow personal computers have built-in diagnostics to monitor the condition of their parts. If a part of the Rainbow is faulty, it will be promptly and clearly identified.

The Rainbow's built-in diagnostics verify the proper operation of the system

and identify the location of any faulty components. Maintenance costs and troubleshooting activities are greatly reduced.

Customer-Installable Options

Upgrading your Rainbow to incorporate some of the add-on options is so simple you can do it yourself.

This of course saves both time and money when you decide to upgrade your Rainbow with add-on options.

Winchester Disk

For some users or sophisticated applications the online diskette storage of a personal computer simply is not enough. So Digital now offers a 10-Mbyte Winchester disk with integral controller for the Rainbow series. This hard disk is standard on the Rainbow 100+ and is optional on the basic Rainbow 100.

Graphics

With the graphics option, the Rainbow can display graphics on the screen in either medium- or high-resolution modes. In high-resolution mode (240-by-800 pixels), four colors from a palette of 4096 may be displayed on the color monitor. Four gray scale values can be displayed on the monochrome monitor. In medium resolution mode (240-by-384 pixels) 16 colors or grey scales can be displayed. The industry-standard GSX graphics interface for CP/M is used.

Graphic representations of data make numerical relationships easier to understand and visual presentations more effective. The industry-standard device interface (GSX) means you can use many of the graphics applications currently available.

Extended Communications

Extended communications can handle a wide variety of protocols including asynchronous/byte-synchronous protocols such as DDCMP and bisynch, and bit-synchronous such as SDLC, HDLC, and ADCCP. The Rainbow also incorporates RS-422 and RS-423 DMA ports to broaden its communication flexibility. Extended communications option lets a Rainbow communicate with IBM mainframes via either Bisynch or SNA protocols. The user can also develop software that communicates with public packetswitching networks using the X.25 protocol.

VAXstation 100

If you're an engineer, you're probably involved in many aspects of the engineering process and perform functions ranging from office tasks to complicated technical analysis. Digital's VAXstation 100 lets you view and perform all the necessary functions at one location, on one terminal, simultaneously.

The VAXstation 100, coupled with one of our powerful VAX computers, provides you with everything from state-of-the-art graphics for detailed design work to powerful screen management software that lets you work on several jobs simultaneously. Instead of using a different terminal for each type of work—work that may span activities from doing CAD/CAM to writing project status reports—you can use a VAXstation system to do all your work at a single terminal.

The powerful characteristic of the VAXstation 100 that allows simultaneous performance and display of tasks is called multiapplication functionality. The VAXstation 100 lets you access, view, and manipulate multiple applications at the same time from the VAXstation terminal. The VAXstation 100 supports this by providing multiple "windows" that are active (whether or not they are visible on-screen) at the same time. A window is a rectangular region dedicated to a specific function. The VAXstation provides powerful region-manipulation capability. Region manipulation lets you move rectangular blocks of pixels, or picture elements, from one location to another. With this feature, you can create and manipulate regions on the screen and view different processes within these windows or regions. You can look at different portions of a specific function by scrolling within that particular window. In addition, you can move a window anywhere on the display screen. For example, by moving a window, you can view different segments of a mechanical design, or drawing, or an electronic schematic. The entire design need not be displayed on-screen, only the portion you wish to view within the window. At the same time a similar function can be performed at any of the other windows you have called up.

With a VAXstation 100, you can create windows and stack them. They can also be moved off-screen. For example, you can use a window to run an analysis program, move that window off-screen while the analysis is still running, and bring up another window enclosing a mechanical design.

A pointing device, known as a mouse, is used to move windows, move the cursor within windows, indicate action to be taken within windows, and to specify the windows to which data should be sent and from which data should be extracted.

The true multiapplication capabilities offered by the VAXstation 100 can be applied to a wide range of engineering office tasks including drafting design, analysis, electronic mail, text processing, and business graphics. VAXstations are compatible workstations designed for professionals who require high-performance computing power and state-of-the-art graphics. They are also well suited to businesses that want the most efficient work environment possible for

their professional staffs. VAXstation software is layered on VAX/VMS, so all the features of VMS—program development, networking, database management, and user-to-user communications—are available as well.

The VAXstation 100 provides all the tools for efficient workstation applications, including:

- high-resolution raster graphics display
- screen management software that's easy to use and flexible enough for a wide variety of text- and graphics-processing
- an advanced user interface for simplified operation
- a large variety of proven applications software available from several sources

A VAXstation system comprises a VAX family processor configuration, one or more VAXstation graphics subsystems, and VAXstation software. The powerful VAX processor can be shared among many workstations, or be dedicated to a single, demanding task.

The VAXstation 100 graphics subsystem includes a monochrome display that offers one display plane and a resolution of 864 vertical- by-1088 horizontal pixels.

Below are some of the major features that make the VAXstation 100 the workstation of choice for professional environments:

Human Interface

The human interface employs both powerful software and user devices to give you easy access to VAXstation applications—including word processing, program development and state-of-the-art graphics.

The VAXstation's advanced human interface provides transparent access to applications; you work directly with the application and no complex command language is necessary. The manner in which the VAXstation software interfaces with the application software is completely transparent. This makes the VAXstation easy to learn and easy to use.

Powerful Graphics

The VAXstation 100 incorporates high-resolution, high-performance monochromatic raster graphics technology. It uses a powerful graphics processor to handle all the graphics functions, offloading these functions from the host CPU.

The VAXstation provides powerful graphics capabilities including: high-speed raster copy operations; line or curve drawing; multiple fonts; proportional spacing; and, flood operations. Because the on-board graphics processor handles these functions, valuable CPU resources can be conserved and can be used for more computation-intensive CPU tasks like analysis.

Variety of Input/Output Devices

The VAXstation 100 supports a variety of input/output devices including a keyboard, mouse, and optional graphics tablet.

Depending on the user's needs, the input/output devices can include the VAXstation keyboard, a mouse, or a graphics tablet. This variety of options provides flexibility in working with a VAXstation.

Ergonomically Designed Keyboard

The VAXstation 100's keyboard is the same advanced, ergonomically designed keyboard as used with Digital's family of personal computers and the VT200 family of video terminals. The keyboard incorporates standard typewriter style keys, a separate 18-key numeric pad, user-definable keys, and special control keys. Both English and other layouts are available. The keyboard includes nondefined keys for future graphic and text function expansion.

The keyboard has been engineered for optimum efficiency and acceptance by the user. The size of the keyboard, the shape of the keys, the arrangement of the keys, and many other factors minimize operator fatigue and maximize operator throughput. The standard form factor amongst the personal computer family and the VT200 family minimizes adjustment if a user moves from one terminal to another.

Ergonomic Design Features

The VAXstation 100 hardware provides workstation power that can fit into an engineer's office. The monitor is compact enough to fit easily on a desk. The monitor screen features an antiglare reflection surface and is designed to swivel according to user requirements.

This compact size saves space on your desk. The VAXstation's anti-glare, tiltable monitor helps eliminate user discomfort, eyestrain, and fatigue.

Fiber Optics Link

The VAXstation 100 includes a fiber optics cable that connects the VAXstation to the VAX system up to 300 meters away.

Employing a fiber optics connection between the VAXstation and its supporting host VAX system provides a very highspeed, secure connection. You do not have to locate the VAXstation near the CPU. This means that the noise and power requirements associated with a CPU environment do not impinge on an engineer's workspace.

Ability to Access Multiple Applications

Through its windowing and emulation capabilities, the VAXstation allows the engineering professional to access as many applications as required to get the job done.

The VAXstation provides powerful flexibility and performance features to make the professional more efficient and effective. With this ability to access multiple applications according to need, the VAXstation 100 moves well beyond the application limitations imposed by turnkey workstation products.

Full VAX Family Compatibility

The VAXstation 100 can be configured with any member of the VAX family of 32-bit computers.

Unlike other available workstation products, the VAXstation 100 is not limited to a "one processor" configuration. Depending upon engineering needs, a VAXstation 100 can be configured with a VAX-11/730, a VAX-11/750, or a VAX-11/780. Total VAX family compatibility ensures that applications and development work already done on a departmental engineering VAX can be used on VAXstations. This compatibility also means the VAX system can be expanded to meet growing and changing engineering needs.



Section 3.
Storage Devices

Information is the backbone of contemporary office systems. The VAX Information Architecture software system provides an unmatched information management structure for office systems. Digital provides a complete family of disks and tapes, which set industry standards for high-performance mass storage, to complete the information management picture.

Digital Storage Architecture (DSA)

Operating within the framework of VAX Office Information Systems, DSA is an exciting new concept for implements a carefully planned framework for powerful storage products: disks, tapes, and unique intelligent controllers. The result is optimum performance, industry-leading data integrity, and outstanding uptime for mass storage systems.

Historically various facets of mass storage technology have advanced at different rates. With many systems, upgrading one segment of mass storage obsoletes other segments of the system. The system manager is faced with the expensive and disruptive proposition of replacing everything at once, to take advantage of available new technology. DSA, however, separates these diverse technologies so that new or additional mass storage hardware can be incorporated into a system quickly, easily, and without disruption or reprogramming. Because compatibility is a primary design requirement of all DSA products, system investment is protected, growth is made easy, and costs are lowered.

Mass Storage Summary

RA80 Disk Drive	Winchester technology 121 million bytes (formatted) per drive Sealed Head Disk Assembly protects the unit from environmental contamination and eliminates the need for head alignment and adjustment procedures
RA60 Disk Drive	High-capacity removable-media disk drive 205 million bytes (formatted) per drive Digital's unique embedded servo system enhances reliability, maintenance, and disk pack interchange between drives
RA81 Disk Drive	High performance, high capacity Winchester technology 456 million bytes capacity Integrated on-board microdiagnostics

TU78 Tape Drive	High-performance tape subsystem 1,600 or 6,250 bits per second (125 in/sec) 781 Kbyte-per-second transfer rate Automatic tape threading, inline micro- diagnostics, two-track error correction, dual access connect to more than one processor
UDA50 Controller	Microprocessor based (intelligent) disk controller for VAX or PDP-11 Supports any combination of four Digital disks
HSC50 I/O Server	High-performance mass storage I/O server for attaching large number of disks and tapes to multiple CPUs (up to 15)



Section 4.
Printers

Digital manufactures printers and hardcopy terminals that span a wide range of speeds, print qualities, and features, to meet the needs of individual office workers.

Letterprinter 100

- Three printers in one: draft, letter-quality, and dot matrix:
  - Draft, 240 char/s
  - Letter, 30 char/s
  - Memo (optional), 80 char/s
- Can manually or electronically change fonts.

LA12 DECwriter Correspondent

- Portable terminal with integral communications features.
  - Dot-Matrix
  - Draft, 150 char/s
  - Graphics
- Models available with modems, accoustic coupler, dial through keypad.

LA120 DECprinter III

- Dependable, rugged, high-duty cycle printer.
  - Dot-Matrix
  - Draft, 180 char/s
- Handles 1-6 part forms (LA120-RA) or 4-9 part forms (LA120-RB).

LA50 Personal Printer

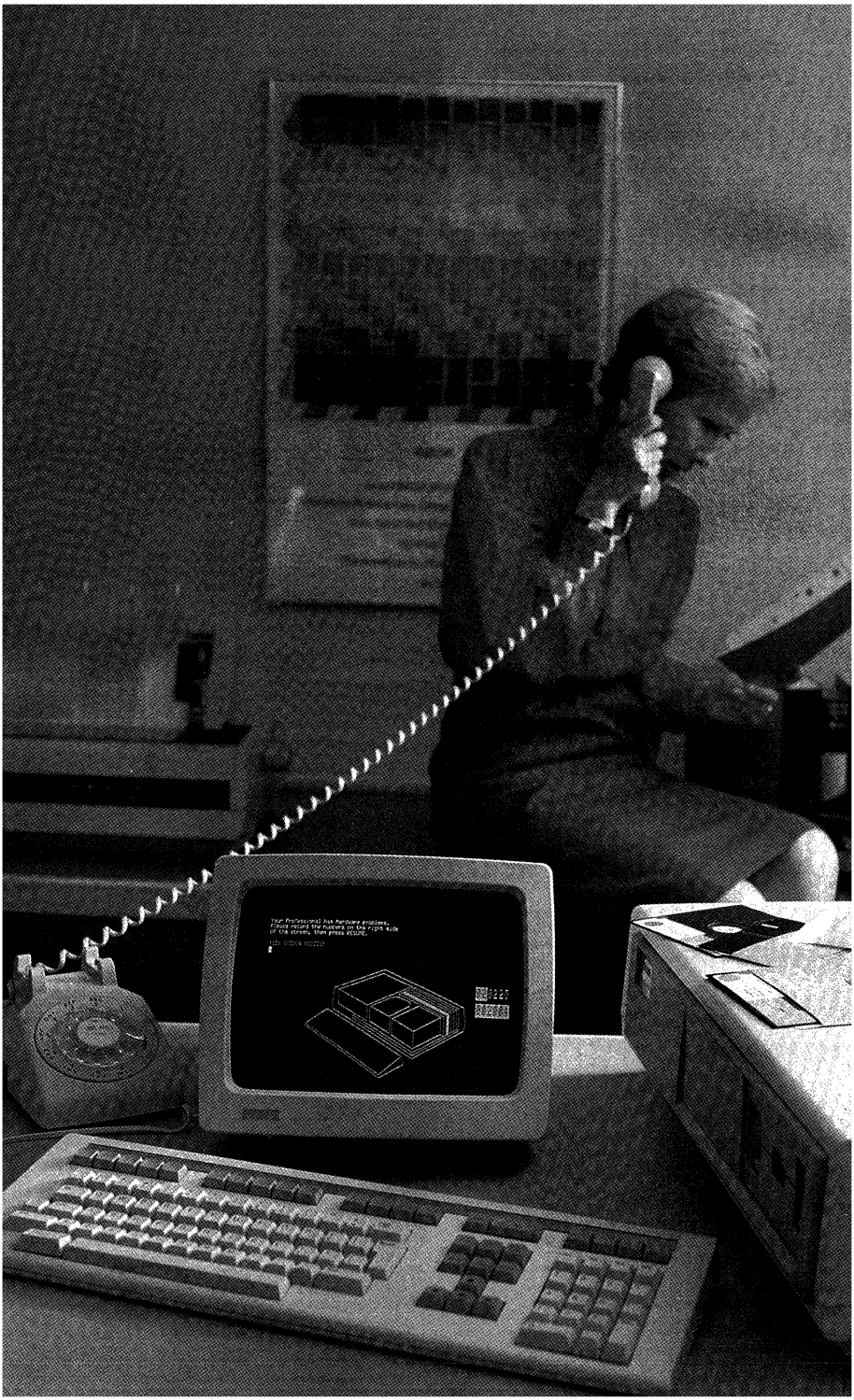
- Low cost, compact printer ideal for personal or small business systems.
  - Dot Matrix
  - Draft, 100 char/s
  - Memo, 50 char/s
  - Graphics

LQP02 Letter-Quality Printer

- Letter-quality documents.
- Prints using Daisy wheels.
  - Letter, 32 char/s
- Professional quality correspondence.

LN01 System printer

- High-quality output on regular stationary.
- 12 pages minute.
- Labor saving—no bursting, decollating, etc.


Your Professional has hardware problems.
Please record the numbers on the right side
of the screen, then press RETURN.

Chapter 5.
Service Capabilities

The quality and completeness of service offerings are often as important to the overall success of an office system as the hardware and software capabilities. Digital provides an unparalleled range of quality services to make each ALL-IN-1 installation a success. These services are packaged and priced to allow you to select exactly what level and type of services are required to complement your own staff.

After an order is placed for a VAX/ALL-IN-1 system, the sales and service managers responsible for the customer along with customer installation management prepare a "Customer Support Plan." This Plan outlines, in detail, the support plan for your installation.

Before the System Arrives

Digital support, through the sales and service organizations, begins well in advance of the targeted installation date. A software specialist will often work with a Digital Sales Representative to evaluate your needs prior to purchase, recommending hardware/software solutions to meet those needs, and providing advice on the feasibility and costs of the proposed solutions.

Field Service specialists can work with you, even before you buy an office system, to help determine your specific maintenance needs. Once these needs are determined, they will work with your representatives and the Digital Sales Representative to develop a comprehensive maintenance program. If appropriate, Field Service will arrange to have a site planning specialist visit your site to assist in planning for the new system.

Digital Educational Services specialists provide in-depth planning assistance for the education of your support personnel, systems managers, systems or applications programmers, or users of the system. It often makes good sense to begin the education process well ahead of the system installation date.

The responsible Digital Sales Representative can even arrange a computer access contract, which gives you access to an ALL-IN-1 system at one of our Regional Centers, before the scheduled installation date. This will help you get a head start on key applications development or training.

If you have unique requirements, Digital's Computer Special Systems group can provide custom hardware or software and even manufacture custom low-volume products.

When the System Arrives

Through proper planning, the Digital Customer Support Plan will be in place prior to scheduled installation. This document defines exactly what you may expect and allows Digital's sales and service organizations to schedule resources to ensure a smooth installation.

When your system arrives, Digital's Field Service will successfully install the system and ensure that the hardware is working properly. The responsible customer field service representative works with the manufacturing Final Test Group to make sure that all check lists and installation procedures are met. This ensures a smooth installation and that all required tasks are performed during field installation. Digital has established, well-defined quality goals to avoid such installation problems as missing parts, revision level incompatability, or manufacturing defects. After the system has successfully passed system hardware tests, the system software will be installed and fully tested.

For those ALL-IN-1 products that require Digital installation, a Software Specialist will install the software and verify that the system is complete. For Digital-supported products, software warranty services include telephone assistance and onsite remedial support, Product and Documentation Updates, and the distribution of a periodic newsletter. Software Performance Reports service is included under warranty services, as well.

Getting Started

Because of the completeness of the ALL-IN-1 software systems, many customers begin to use the generic office functions it provides immediately upon the completion of successful installation.

To help you get a running start a Digital Software Specialist can offer a unique service, DECstart. A proven combination of direct assistance, document review, discussion, and hands-on experience, DECstart helps you learn directly on your own system and put the knowledge to use immediately. DECstart services are conducted over a period of time to ensure mastery of the system. Programmers and system managers are taken step-by-step through techniques required to effectively operate your system. DECstart helps managers keep an ALL-IN-1 system running smoothly, allows your personnel to gain experience, under supervision, in the troubleshooting of problems, and provides assistance in setting up the system.

Digital's Software Services group offers a wide range of service options to supplement the standard DECstart package. Optional services are priced according to the time they require; therefore, an estimate can be provided for any services you may be considering.

Software professionals are specifically trained in Digital products and experienced in design, programming, and customizing software as well as tailoring ALL-IN-1 Office software to meet your specific requirements. Software Specialists are available to provide system analysis, application design review and optimization,

and system/application integration. Resources are available to perform specific project tasks, supplement or complement your programming staff, or manage projects from start to successful completion.

Varying levels and types of expertise are available, ranging from programmer to project manager. Professional services are available on a per-call, resident, and a fix-price for a given project basis.

Digital's Educational Services offers comprehensive and diversified educational programs to ensure that you and your users have the necessary level of expertise to use the system with top efficiency. The job-related curriculum offered provides a broad spectrum of high-quality, proven courses in six areas:

- General computer education for the novice user
- Education on specific products for the novice user
- Software training
- Hardware training
- Management training
- Technical seminars

Educational Services provides several formats for instruction, so that you can tailor courses to satisfy specific requirements. These formats include:

- *Lecture/lab:* offered at Digital's 26 training centers, as well as at other locations. These courses provide intensive classroom as well as hands-on experience.
- *Self-paced Instruction (SPI):* designed to allow students to select their own learning pace. SPIs are available in print (texts, audio cassettes, and tests), audiovisual (video and filmstrip), and computer-based instruction (CBI) that lets you learn about the computer from the computer itself.
- *Seminars:* designed for both your technical and nontechnical staff covering a wide range of subject material.
- *Onsite Instruction:* Provided onsite training at your place of business. These courses can be Digital's standard training courses, or designed specifically to address your unique needs.
- *Digital Press:* publications that cover a broad scope of computing issues. Titles include books on computing technology, management, business applications, general computer concepts, and the history of data processing.

Services for the Future

Digital Field Service offers the widest range of hardware services in the industry. Over 400 Digital Field Service locations in 38 countries provide quality and reliable service around the world. Today, there are over 12,000 trained field service engineers, maintaining Digital products.

All of the Office and Information Systems hardware products are fully supported by Digital Field Service. With the wide selection of service offerings, you can select the service package that meets your needs.

DECservice is Digital's recommended service offering for VAX office solutions. Features include a response commitment defined by your physical distance from a Digital Service location, continued ongoing repair assurance (regardless of coverage hours), an assigned service account representative, all parts and labor, engineering changes, a site planning guide, and budget planning through a fixed monthly charge.

BASIC Service Agreement provides for onsite maintenance and offers economy if defined response time, continuous effort outside normal coverage hours, and extended coverage hours are not required.

Guaranteed Uptime is the first total system Uptime Guarantee in the industry. It is a formal program in which a customer works with Digital to select and maintain a standard of reliability—reliability that Digital will guarantee.

Automated Remote Diagnosis is the primary service tool for the VAX-11/780 and VAX-11/750. It is a standard part of both the DECservice and the BASIC Service agreements and is the best method of supplying you with the highest possible level of service. Remote diagnosis provides customers with:

- 15 minute response time to telephone calls to the Digital Diagnosis Center (DDC), regardless of when the call is placed.
- A centralized, experienced staff available 24 hours a day, seven days per week
- Preventative maintenance diagnostics run during off hours prior to a site visit
- Fast, accurate diagnosis
- Engineers trained especially in the repair of specific devices
- Backup support (internal technical consultation) provided through a terminal network for serious/intermittent problems.

On-site and Carry-in Services for Workstations is available on a contracted or per-call basis. 160 Carry-in service centers areavailable for those who prefer the convenience of dropping off their systems or components for service. Depending on the extent of the repair or service to be rendered, the turnaround time for carry-in service is from one to two days.

DECmailer Service provides a mail-in service designed for those personal computer owners who are capable of doing their own system maintenance. Within five days of the time Digital receives a logic board, we will return one that has been repaired and updated with the latest technological improvements.

Software Services are available to support ALL-IN-1 customers during any aspect of system analysis, software development, or implementation effort. These services start with the personal attention of a Digital software consultant and continue through the distribution of up-to-date software and software information.

Software Product Services (SPS) provide informational, preventive, and remedial service after the period of software warranty. These services provide updates to the latest software products, responses to reported software problems, and technical

publications that contain programming notes and documentation corrections.

The family of software products include four levels of services.

- *Software Product Updates.* Single major releases of software, including documentation. No software services are included in this package, but may be purchased at per-call rates.
- *Self-Maintenance Service for Software.* Tools are provided to enable self-sufficient Office System users to maintain their own system software. These include software and documentation updates, newsletters, and Software Performance Reports, a formal software problem reporting mechanism.
- *Basic Service for Software.* This service is appropriate if you require some, but not total, support. Included are all the elements of Self-Maintenance service, plus telephone support for usage and remedial software questions.
- *DECSUPPORT Service for Software.* The most comprehensive software product service available. DECsupport includes all the elements of Basic service, plus preventive maintenance, delivery and installation of updates and program change orders, and onsite remedial support for critical situations.

Ongoing software support is ensured through a variety of postwarranty software product services, which offer customers the opportunity to keep their software up to date and running smoothly. A full range of professional software services is available to assist customers through all phases of their office system implementation.

As well as the services provided through the Digital Service organizations, an extensive collection of ongoing information can be supplied through your Sales Representative.

- DECUS—The most active user's group in the industry,—includes an Office Automation Special Interest Group (O/A SIG) ensures that each DECUS Symposium includes information of interest to Office Systems users.
- *Insight* is Digital's quarterly customer newsletter, with information of interest to all Digital customers.
- Product Catalogs and Handbooks provide up-to-date information about Digital's hardware and software offerings, to allow you to take full advantage of new products to expand or enhance your systems.
- New Product Seminars are conducted to inform customers of new products.
- Sales literature is always available to provide information about applications, product features, and so on, to allow you to be kept abreast of Digital's most up-to-date information.

Satisfaction Guaranteed

Digital is committed to your complete satisfaction with your ALL-IN-1 system. We're confident that we can provide the right products and services for your office to help you solve critical business problems. We'll stand behind you and your investment in office and information systems.

To demonstrate our commitment to you, and the confidence we have in the quality of our products and services, we offer you a money-back guarantee, one that's unmatched by any other computer company—bar none. To ensure that your office system is as successful as you expect it to be, the ALL-IN-1 money-back guarantee provides you with a system that is designed, implemented, and supported by Digital. It also provides you with the option to return the ALL-IN-1 system and get your money back if, within 120 days, you are not completely satisfied.

To qualify for the money-back guarantee, you and Digital must mutually agree to the following:

- You must order ALL-IN-1 per Digital's Standard Terms and Conditions.
- You agree to sign a contract addendum, The ALL-IN-1 Money-Back Guarantee, to be submitted with the order.
- You agree to purchase the recommended services, support, and education, per the Customer Support Plan.
- You participate in periodic reviewing with Digital to assess progress toward a successful installation.
- You agree to use only Digital products during the term of the guarantee (no third party software).
- You notify Digital, in writing, if you choose to exercise the money-back option. Upon receipt of this notification, we will accept return of the hardware and software, and refund to you monies paid. This refund applies only to hardware and software licenses, and specifically excludes bundled or unbundled services.
- The return period covers 120 calendar days from the date the system is shipped from our factory.

THE USER INTERFACE

ALL-IN-1 OFFICE MENU 3-3

OFFICE CAPABILITIES

WORD PROCESSING
DECmate II/WPS 3-9
EASYCOM — See DECmate II/WPS
MASS-11 3-15
DECtype 3-16
Select-86 3-21
VAX DECspell 3-23
DECpage 3-31
VAX Smart Mailer 3-32
PROSE-PLUS 3-35
GRAPHICS
VAX DECgraph 3-37
Fingraph 3-41
VAX DECslide 3-43
POLYGRAFIX 3-46
VOICE AND ELECTRONIC MAIL
VAX DECmail 3-50
Digital Voice Messaging System 3-56
DECtalk 3-57
E-Com — See Digital's Electronic Mail Room
VAX Dow Jones Access 3-61
DECmail/RSTS 3-62
DECmail/MS-20 3-65
DECmail/MS-10 3-67
CALCULATION AND MODELING
VAX DECalc 3-69
MULTIPLAN for DECmate II 3-73
MULTIPLAN for PC100 (Rainbow) 3-76
Supercomp-Twenty 3-78
LOTUS 1-2-3 3-81
MAPS/Pro 3-84
EMPIRE 3-86
TIME AND RESOURCE MANAGEMENT
Calendar Management 3-88
FILING AND RETRIEVAL
BASIS-OA 3-91
MOVEMENT OF INFORMATION
See Office Networks

PART III

Product Specifications and Ordering Information

DATA PROCESSING CAPABILITIES

APPLICATIONS DEVELOPMENT
VAX/VMS Operating System....3-92
VAX ADE....3-122
VAX APL....3-125
VAX BASIC....3-128
VAX BLISS-32....3-133
VAX BLISS-16....3-137
VAX C....3-142
VAX COBOL....3-146
VAX CORAL 66....3-150
VAX DEC/CMS....3-153
VAX DIBOL....3-157
VAX DSM....3-161
VAX FORTRAN....3-164
VAX PASCAL....3-168
VAX PL/I....3-172
INFORMATION MANAGEMENT
VAX Common Data Dictionary (CDD)....3-178
VAX DATATRIEVE....3-181
VAX TDMS....3-186
VAX FMS....3-192
VAX ACMS....3-201
VAX DBMS....3-205
OFFICE NETWORKS
DECnet-VAX....3-212
OBSERVER....3-223
Message Router for VMS....3-226
DECdx....3-229
DECnet Router....3-230
DELNI....3-233
DEUNA....3-235
DEQNA....3-237
Digital Ethernet Repeater....3-238
H4000....3-240
Terminal Servers....3-242
VAX BTS....3-245
VAX PSI....3-249
X.25 Communications Protocol....3-254
SNA Gateway....3-257
VAX 2780/3780 Protocol Emulator....3-261
VAX 3271 Protocol Emulator....3-264
External Document Exchange....3-269

DMF32 Multifunction Communications Controller 3-271
DMR11 3-274
DMP11 3-277
DF03 Family 3-280

SYSTEMS, WORKSTATIONS, STORAGE, AND PRINTERS

VAX and PDP-11 SYSTEMS
VAX-11/780 3-285
VAX-11/782 3-290
VAX-11/750 3-294
VAXcluster Systems 3-299
VAX-11/730 3-306
VAX-11/725 3-310
MicroVAX1 3-312
Micro/PDP-11 3-316
WORKSTATIONS
VT200 Family 3-318
DECmate II 3-323
DECmate II CP/M Operating System 3-327
DECmate II Office Workstation 3-329
Professional 325/350 3-330
Rainbow 100/100 + ... 3-335
VAXstation 100 3-342
STORAGE DEVICES
RA81 3-346
RA60 3-348
RCD50-AA 3-350
RD51 3-351
RL02 3-352
RX50 3-354
RX02 3-356
TU80 3-358
TU77 3-360
TU78 3-362
PRINTERS
LA50 3-364
LA12 3-366
LA100 3-368
LA120 3-370
LQP02 3-372
LN01 3-374
Printer Cables 3-376

ALL-IN-1 Office Menu

Description

ALL-IN-1 Office Menu provides the office system applications of electronic mail, document processing, desk management including calendar and calculation, and forms development on the VAX/VMS Operating System. ALL-IN-1 Office Menu consists of a flow control facility, application interfaces, and Form Driver (FDV).

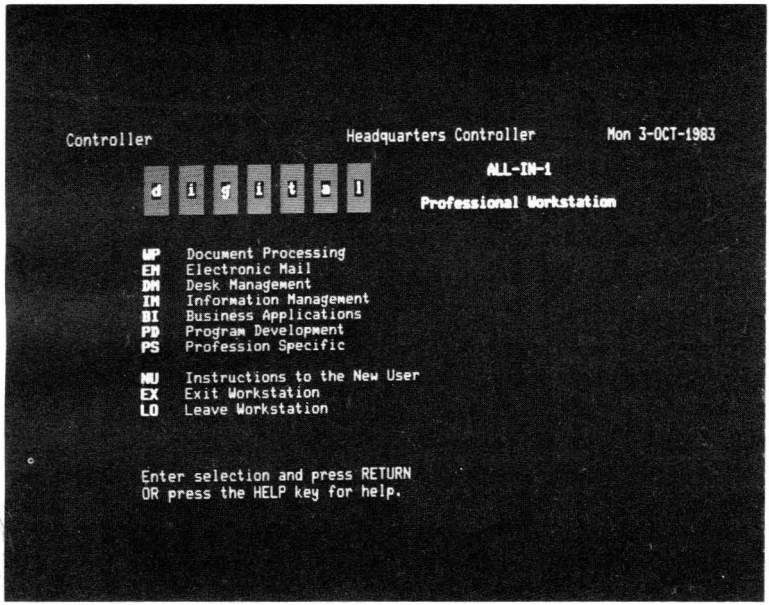
Flow Control Facility

The flow control facility allows a user at a VT terminal to select from a menu of options and move from one application to another. Selections can accommodate the following three classes of users:

- New users—Functions are accessed through a hierarchy of menus
- Experienced users—Functions can be accessed directly without intervening menus
- Analyst/programmers—Allows direct access to VAX/VMS commands and programmer productivity facilities

Application Interfaces

The application interfaces provide menu-driven access to applications. These menus can be modified to meet the needs of the user. The applications available are:



Electronic Mail

- The electronic mail application provides two user interfaces for access to either VAX DECmail Version 2.0 (not included in ALL-IN-1 Office Menu) or Customizable Mail (which is part of ALL-IN-1 Office Menu and described below). The interface to VAX DECmail Version 2.0 allows easy access to VAX DECmail from the menu. Once into VAX DECmail, the user can utilize all the capabilities of the VAX DECmail product.

  The Customizable Electronic Mail application provides a means of sending and receiving messages among users. Messages are transmitted immediately after they are prepared, and the receiver can read the message immediately or at a later time. Messages are filed on the system and available for retrieval based on user selectable criteria for recall. The major features of Customizable Electronic Mail are
  - Mail Preparation—Create, Edit, Send
  - Mail Reception—Read, Answer, Forward, Print, Delete
  - Mail Filing—File, Search File, Read List, Print List
  - Mail Distribution—Send To, Carbon Copies, Mailing Lists
  - Mail Utilities—Index of Messages

Document Processing

- The document processing application allows the user to create, edit and format documents. Most editing operations are implemented as one or two keystrokes on the function keypad. The user has a choice of the keypad being defined as a standard EDT-compatible keypad or, for WPS compatibility, a VT100W keypad. The major features of the Document Processing application are:
  - Create or Edit a Document
  - Document Filing
  - Document Searching
  - Printing
  - Update and Deletion of Filing Information
  - Create and Store Boilerplates

Desk Management

The desk management capability contains applications to organize daily tasks, such as date and time display, action item management, phone directory, and calendar management.

- *Calendar Management*

  The Calendar Management application automates personal or group scheduling of appointments, meetings and tickler files. The software allows the user to maintain a personal calendar of workday activities, arrange group meetings, confirm, check confirmations or cancel a meeting, view the calendar (by day, week or month), or print the calendar (by day or week).

- *Desk Calculator*

  The calculation application allows the user to perform interactive calculations and then include the results in documents or mail messages. The alternate keypad is used like a standard calculator and performs calculations in formula mode.

- *File Cabinet Maintenance*

  File Cabinet Maintenance converts documents and Customizable Mail messages created with ALL-IN-1 into VAX/VMS files, and vice versa.

Forms Development (requires VAX-FMS V1.1)

The Forms Development application provides the ability to add customized applications to the standard office system applications provided with ALL-IN-1 Office Menu. FMS forms are used to provide the following functions: menus, data entry, record search, text file search, VMS DCL command file parameter entry, and arithmetic calculations.

The Form Editor is used to create and modify video forms by displaying them on the screen as they are to appear to the application user. All form attributes and field attributes are assigned in this form editing process. All information necessary for the processing of a form is imbedded within the form definition.

System Management

System Management application allows the system manager to modify parameters common to all users of an ALL-IN-1 Office Menu system. The major features are:

- Create a new User Profile (adds a new user to the system)
- User Profile Update
- Mailing List Maintenance
- Common Parameter Maintenance
- Help Library Maintenance
- User Environmental Test Package

Common Facilities

Common to all the applications within ALL-IN-1 Office Menu are the file cabinet, user profile, and the Help facility. These capabilities help integrate and tailor the applications for individual users of the system.

- *Filing Cabinet*

  Text and header information for all documents and messages for a user are stored in the file cabinet. The document filing information consists of: document name for unique identification, title, file folder, format, author, setup, and creation date.

- *User Profile*

  Each user within ALL-IN-1 Office Menu has a profile for keeping demographic data, user customization data, privileges, default values, and installation specific data.

- *Help*

  Help provides on-line additional information about the function currently being performed and aids in introducing and training users of the ALL-IN-1 Office Menu system. The Help facility operates at two levels: short reminder and detailed description.

Form Driver (FDV)

The Form Driver (FDV) is included to make it possible to use these standard, nonmodified menus and applications when ALL-IN-1 Office Menu is installed on a VAX/VMS system which is not running VAX-FMS. To modify or customize the menus or applications, VAX-FMS is a prerequisite. See the section on Forms Development for more information.

The Form Driver (FDV) is a shareable, native-mode subroutine called from application programs to control screen processing. The Form Driver manages all screen input and output, displays forms, manipulates the screen, performs basic input validation, and responds to the operator's requests for help.

Source Code Information

The following source code modules are provided on all available distribution media for this product in order to facilitate local language translations, customizing of messages, and sample programs:

BMAC.REQ
OAMAC.REQ
OAGBL.BLI
OAMESS.MSG
OA.BLI
NETMAIL.BLI

This source code is provided on an "AS IS" basis without any warranty of any kind, either express or implied.

Minimum Hardware Required

Any valid VAX/VMS system configuration with at least 2 megabytes of dedicated main memory.

VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

Supports any mass storage, unit record, or terminal device supported by the prerequisite software.

Prerequisite Software

VAX/VMS Operating System

Optional Software

- VAX-FMS V1.1 (to utilize Forms Development)
- VAX-DATATRIEVE
- VAX-DECmail
- DECnet-VAX

Training Credits

None

Software Installation

Digital Installed

ALL-IN-1 Office Menu Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services	QC902-AH	QD902-AM QD902-AV	QE902-AM QE902-AV
Single-use license-only option, no documentation, no support services	QC902-DZ	QD902-DZ	QE902-DZ
Update/Unsupported Options Users of ALL-IN-1 whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC902-HH	QD902-HM QD902-HV	QE902-HM QE902-HV
Right to copy for single use, no binaries, no documentation, no support services	QC902-HZ	QD902-HZ	QE902-HZ

Miscellaneous Options Documentation-only kits	QC902-GZ	QD902-GZ	QE902-GZ
ALL-IN-1 Basic Software Package This package is available as an add-on option for existing VAX/VMS customers. This option includes single-use license, binaries, documentation, and support services for ALL-IN-1 Office Menu, VAX-DECmail, and DX/VMS.	N/A	QD903-AM	QE903-AM
Single-use license-only option, no binaries, no documentation, no support services.	N/A	QD903-DZ	QE903-DZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (H, M, V, Z) represents the distribution media for the product and must be specified at the end of the ordering number, e.g., QC902-AH = binaries on RL02 Disk Cartridge.

H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

DECmate II/WPS

Description

DECmate II/WPS is a single-user word processing software package for DECmate II combining text editing with other advanced features for office automation. This menu-driven software lets users create and update documents stored on diskettes. The user can store up to 200 documents of various lengths, or up to a total of 150 pages (approximately 2000 characters per page) on a single 5¼" double density document diskette.

Editing capabilities make it easy to correct text without completely retyping a new draft. Documents can be queued to a letter quality or draft printer. The user can print and edit different documents simultaneously.

Basic Features

- Responsive menu-driven operation
- Easy-to-learn instructions
- Special editing keypad
- Two 5¼" diskette system configuration standard
- Full editing features, including:
  - Cut and paste text
  - Operations by grammatical entity (character, word, tab position, sentence, paragraph, page, line)
  - Boilerplate insert from library files
  - User-defined shorthand expressions for most operations
  - Delete by word or character, rubout by character
  - Headers and footers automatically placed on the top and bottom of every page in a document
  - Transposition key
  - Underlining, bolding, and uppercasing as automatic functions, with the ability to reverse the functions
  - Global Search-and-Replace, allowing the user to locate and replace a given phrase with another throughout a document
  - Help Messages to remind the user of what a function does
- Full control of tabs, margins, and justification, with:
  - Automatic centering of text on a line
  - Decimal, and left- and right-adjusted tabs
  - Semiautomatic hyphenation
  - Wide ruler support displaying 132 characters on a 158 character line
  - Ten rulers stored by the user for immediate recall
  - Unlimited rulers allowed in a document

- Full pagination capability
  - Discretionary pagination control
  - Page numbers automatically inserted at the top or bottom of pages when printed at the user's discretion
  - Automatic division of documents into specified page sizes
  - Go-to-page for quick movement directly to a specific page on a previously paginated document
- An average output rate of 32 characters per second for the letter quality printer (LQP02)
- Shared serial printer switch support that lets one DECmate II use two printers, or two DECmate IIs share one printer
- Selectable pitch with a wide variety of typeface printwheels for letter quality printers
- Underline, bold, and shadow bold printout for letter quality printers (LQP02)
- Multicolumn printing for letter quality printers with bidirectional form-feed tractors
- Superscript and subscript on letter quality printers
- Time and date stamp key
- Document statistics
- Single sheet or continuous-form printing

Other Features

List Processing—The user can generate customized letters or reports using a "form document" such as a letter or report. Variable text, such as names and addresses, is automatically selected and inserted from a list of items.

Sort—A list processing user can arrange records of data, such as names or zip codes, in ascending or descending alphabetic or numeric order on as many as twelve fields.

Math for Editing and List Processing—The user can perform simple mathematical operations while editing or List Processing. The List Processing option is needed to perform List Processing Math. Valid mathematical functions include:

Addition	(+)
Subtraction	(−)
Multiplication	(*)
Division	(/)
Replacement	(=)

Communications—Users can transmit documents between a DECmate II system running DECmate II/WPS and local or remote computer systems, or to another word processing system running other WPS-8 software. Communications uses XON/XOFF to protect against loss of data. None of the word processing software supports packet-switching networks.

Communication Features

- Support for VT52 and VT100 (with advanced video option) series compatible, or DECmate II emulation to enable the DECmate II terminal to act like a VT52, VT100 or DECmate II terminal in CX, as required by the host
- Asynchronous, serial RS232-C compatible, full duplex
- DX Document Transmission Mode

  The DX feature sends all special format control information (underlining, bolding, ruler settings) with the document. The remote system receives all information found in the original document (except pagination information). DX uses a special error-detecting protocol to ensure accurate transmission. DX can communicate at 16 menu selectable transmission rates between 50 and 19,200 baud.

  Using DX, documents created under Decmate II/WPS can be sent to:

  - Another DIGITAL word processing system running WPS-8 DX software.
  - An unattended DIGITAL word processing system (using the corresponding WPS-8 communications option AX).
  - Any DIGITAL operating systems that have the corresponding DX layered application software. Files can be prepared off-line on the word processor and then sent to the host for processing.
- AX Automation Transmission Mode

  Used in conjunction with DX, the AX feature provides the same document transmission capabilities as the DX feature and, in addition, allows one of the WPS-8 systems in the communication link to be placed in the automatic mode. With this feature, only one person operates the communication link between two systems.
- CX Character Transmission Mode

  Using the CX character transmission feature, a user can communicate in a serial, ASCII, asynchronous mode. Special word processing control characters are not sent with the document. Users can transmit documents to another computer system interactively and to various other devices that can transmit and receive ASCII characters.

  CX package features include:
- Break key to terminate the communications process
- Fifteen menu selectable transmission rates between 50 and 9600 baud, parity number of stop and data bits
- Flexible control of communications characteristics for
  - Embedded control characters
  - Optional use of XON/XOFF protocol (to protect against data loss)
  - Answerback support
  - TWX emulation

- Flexible control of keyboard, printer, and storage with
  - Input from keyboard, document, or remote host
  - Output to screen, printer, document, or remote host
  - Multiple combinations possible

Easycom

Easycom automates much of CX and AX/DX communications on DECmate II. The host system manager or other programmer uses the Easycom logon processor commands to write logon files. These logon files send commands to the host establishing communications. It is the customer's responsibility to develop and write these logon files. Digital supports Easycom communications with Digital hosts only.

Optional Hardware

PC27X-AA	Z80 Auxiliary Processing Unit with 64 KB for CP/M© application software
RX50-XA	Dual RX50 add-on floppy drives
PC27X-BA	RX01/RX02 controller option board
PCXXF-BA	Floor Stand
LA50-RA/RB	LA50 Receive-only draft printer
LA100-PC	LA100 Receive-only dot matrix printer featuring variable printing resolutions
LA34-WA	LA34 Receive-only draft printer
LA120-RA	LA120 Receive-only draft printer
LQP02-AA	Desktop Serial Letter Quality Printer, 60Hz, 120V
LQP02-AD	Desktop Serial Letter Quality Printer, 50Hz, 240V
LQPSE-FA	Serial Letter Quality Printer, 60Hz, 120V (hardware supported but no longer available)
LQPSE-FD	Serial Letter Quality Printer, 50Hz, 240V (Hardware supported but no longer available)
LQPX2-SF	Automatic two-tray sheet and envelope feeder (DECmate II/WPS does not support envelope feeder)
LQPXX-AC	Automatic two-tray sheet feeder, 8½″ x 11″ paper
LQPXX-AD	Automatic two-tray sheet feeder, A-4 paper
LQPX2-AA	Bidirectional forms tractor for LQP02
LQPXX-AA	Bidirectional forms tractor for LQPSE

Prerequisite Software

None

Optional Software

None

Software Installation

Customer Installed

Support Category

Digital Supported

DECmate II/WPS
Ordering Information

DECmate II/WPS is available only on RX50 Double Density 5¼" Diskette distribution media.

QWA01-A3	DECmate II/WPS complete package. Includes basic word processing, list processing, sort, math, and communications.
QWA02-C3	DECmate II/WPS All options, no services, upgrade. Includes list processing, sort, math, and communications. Single-use license, binaries, documentation, no support services.

DECmate II/WPS base software (QF740-A3 is a prerequisite for the following options:

QF741-A3	DECmate II/WPS List Processing software, single-use license, binaries, documentation, support services
QF742-A3	DECmate II/WPS Sort software, single-use license, binaries, documentation, support services
QF743-A3	DECmate II/WPS Communications software, single-use license, binaries, documentation, support services
QF744-A3	DECmate II/WPS Math software, single-use license, binaries, documentation, support services

Miscellaneous Options

QF745-GZ	Documentation-only kit, for all DECmate II/WPS software, including User's Guides, Quick Lookup Guide, Getting Started Card, List Processing, Sort, Communications, and Math manuals
QF740-GZ	DECmate II Documentation-only kit, including User's Guides, Quick Lookup Guide, and Getting Started Card
QF741-GZ	Documentation-only kit, for DECmate II List Processing software, including List Processing manual
QF742-GZ	Documentation-only kit, for DECmate II Sort Software, including Sort manual
QF743-GZ	Documentation-only kit, for DECmate II Communications software, including Communications manual
QF744-GZ	Documentation-only kit, for DECmate II Math software, including Math manual
AV-P423A-TA	DECmate II Introduction to Word Processing training card
BL-P115A-BA	DECmate II Introduction to Word Processing computer-based instruction system diskette
BL-P116A-BA	DECmate II Introduction to Word Processing computer-based instruction course diskette
EY-1099E-RC-0001	DECmate II Introduction to Word Processing training card
EY-1099E-CW-0101	DECmate II Introduction to Word Processing computer-based instruction system diskette
EY-1099E-CW-0201	DECmate II Introduction to Word Processing computer-based instruction course diskette
EY-1489E-RC-0001	DECmate II Advanced Word Processing user card

EY-1489E-CW-0101	DECmate II Advanced Word Processing computer-based instruction system diskette
EY-1489E-CW-0201	DECmate II Advanced Word Processing computer-based instruction course diskette
EY-1490E-RC-0001	DECmate II Word Processing Introduction to List Processing user card
EY-1490E-CW-0101	DECmate II Word Processing Introduction to List Processing computer-based instruction system diskette
EY-1490E-CW-0201	DECmate II Word Processing Introduction to List Processing computer-based instruction course diskette
EY-1491E-RC-0001	DECmate II Word Processing Introduction to Communications user card
EY-1491E-CW-0101	DECmate II Word Processing Introduction to Communications computer-based instruction system diskette
EY-1491E-CW-0201	DECmate II Word Processing Introduction to Communications computer-based instruction course diskette
EY-1492E-RC-0001	DECmate II Word Processing Introduction to Sort user card
EY-1492E-CW-0101	DECmate II Word Processing Introduction to Sort computer-based instruction system diskette
EY-1492E-CW-0201	DECmate II Word Processing Introduction to Sort computer-based instruction course diskette
EY-1493E-RC-0001	DECmate II Word Processing Introduction to Math user card
EY-1493E-CW-0101	DECmate II Word Processing Introduction to Math computer-based instruction system diskette
EY-1493E-CW-0201	DECmate II Word Processing Introduction to Math computer-based instruction course diskette
AA-J356B-TK	DECmate Word Processing Technical Notebook

MASS-11

Ordering Information

See your Digital Sales Representative for ordering information.

DECtype Word Processing Application

DECtype is a word processing application designed to run on CTS-300 and VAX/VMS Operating Systems, permitting concurrent word and data processing in a multiuser environment. This feature extends the data processing system with word processing capabilities.

The DECtype editor creates and maintains documents stored on the full range of disk devices supported by CTS-300 and VAX/VMS. Storage available for documents will vary depending upon other data storage requirements on the same disk media.

Features

- Concurrent word processing and data processing
- Password security
- Center screen editing allowing view of preceding and following text
- Document index includes

  Document name
  Description of document
  Date document was created
  Date document was modified
  Number of revisions
  Total time spent editing a document
  Number of lines in a document

Document Preparation

- Menu-driven operation
- Easy-to-learn commands
- Ten user-defined keys (UDK) for predetermined repetitive operations that can be recalled with a two keystroke sequence. UDKs allow sequences of frequently used steps to be stored, including repetitive looping and storage of up to 250 keystrokes per UDK.
- Full control of tabs, margins, justification and pagination with

  Ragged or justified margins
  Automatic line centering
  Discretionary pagination control
  Standard, decimal and right aligned tabs
  Automatic page numbering
- Selectable pitch and type fonts
- Underlined and overstruck (bold) printout
- Superscripts, subscripts, and composite characters
- Running page headers and footers
- Automatic insertion of current date in printed document

Editing Capabilities

- Special editing keypad
- Cut and paste for manipulating portions of text and for transferring text from one document to another
- Automatic word wrapping
- Operations by grammatical entity (character, word, tab position, sentence, paragraph, line, page)
- Stored documents, paragraphs, phrases and abbreviations can be inserted into the document being edited with a few keystrokes
- "Undelete" capability allows retrieval of accidentally deleted text
- Key to swap transposed characters or words
- Search and replace—Search for a phrase; search and select the phrase found; replace the selected phrase with the contents of a paste buffer; search forward, backward, case sensitive or insensitive
- Delete by character and word, rubout by line, sentence, word or character
- Edit wide documents (132 columns)
- Date and time stamp key for inserting current date and time into text
- Ten stored rulers for repeated settings
- Four function math capability
- Jump to page
- Edit while viewing special control characters
- View the index of documents while editing a document
- Quit editing without changing document

Printer Utilities

- Ten stored printer settings for repeated use
- Queued printing (spooling) allows printers to be shared by all users without tying up terminals
- Single sheet or continuous forms printing
- Printer management enables users to

  Add, remove and maintain spoolers (system manager)
  Remove documents from the queue
  Change print priority of documents in a queue
  View the list of documents in the print queue
  View printer status of all defined printers
  Defer a print request (system manager)

List Processing

List processing creates customized form letters and reports from stored information (lists).

Lists can be prepared by DECtype or other data processing programs and merged with a form to create unique and customized documents.

Documentation

DECtype user documentation is written in a clear consistent style, and is designed for users of varying backgrounds. The following books make up the documentation set.

- Using DECtype
- DECtype Reference Manual
- DECtype Reference Card
- Managing and Installing DECtype on CTS-300 systems
- Managing and Installing DECtype on VAX/VMS systems

Minimum Hardware Required

One of the following:

- Any valid CTS-300 system configuration with 128KB of memory, one printer and two RX02 diskette drives.
- Any valid VAX/VMS system configuration (R80/RL02 configuration required for VAX-11/730 systems).

Any configuration must include the following:

- One VT100-NA or VT102-NA terminal with the advanced video option, or VT100-WA or VT102-WA Word Processing Terminals.
- At least 800 free blocks of on-line storage must be available on the system disk for DECtype executable images and libraries.

Optional Hardware

- LQP02-AA Letter Quality Printer with LQPX2-AA bidirectional tractor
- Any valid line printer supported by the prerequisite software
- LA100 Letterprinter 100, supported as a draft printer
- Additional VT100-WAs or VT102-WAs
- Any valid disk storage device supported by the prerequisite software
- VT1XX-CE Keyboard upgrade kit for VT100-NA to VT100-WA

Prerequistite Software

CTS-300 Operating System, Version 7.0 or VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

Ordering Information

For CTS-300 Systems

QJ038-A— Single-use license, binaries, documentation, support services (media: H, Q, V, X)

QJ038-D— Single-use license-only option, no binaries, no documentation, no support services (media: Z)

Update/Unsupported Options

Users of DECtype whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.

QJ038-H— Binaries, documentation (media: H, Q, V, X)

QJ038-H— Right to copy for single use, no binaries, no documentation (media: Z)

Upgrade/Update Options

Users of DECtype on D315-WA, WD, WY or WZ 64KB systems whose specified Support Category warranty has expired may order under license the following combination software update and hardware upgrade at the prevailing rate. The software update is distributed in binary form on the appropriate medium and includes no installation or other services unless specifically stated. The hardware upgrade includes a 64KB memory module with no installation or other services unless specifically stated.

DS3AA-H— MSV11-DD memory module, binaries, documentation, (media: X)

DS3AA-H— MSV11-DD memory module, right to copy for single use, no binaries, no documentation (media: Z)

Miscellaneous Options

QJ038-G— Documentation-only kit (media: Z)

For VAX/VMS Systems

Refer to Table

DECtype Word Processing Application Ordering Information

Options	Systems		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services	QC038-AG	QD038-AG	QE038-AY
Single-use license-only option, no binaries, no documentation, no support services	QC038-DZ	QD038-DZ	QE038-DZ
Update/Unsupported Options Users of VAX DECgraph whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC038-HG	QD038-HG	QE038-HY
Right to copy for single-use, no binaries, no documentation	QC038-HZ	QD038-HZ	QE038-HZ
Miscellaneous Options Documentation-only kits	QC038-GZ	QD038-GZ	QE038-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, H, Q, V, X, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QJ038-AH = binaries on RL02 Disk Cartridge.

G = TU58 DECtape II Cartridge*
H = RL02 Disk Cartridge
Q = RL01 Disk Cartridge
V = RK07 Disk Cartridge
X = RX02 Double Density 8″ Diskette
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

SELECT-86

Digital distributes this Software Product under license from Select Information Systems, Inc.

Description

SELECT-86 is a word processing software package that runs under the PC100 CP/M-86/80 Operating System on the PC100 personal computer. The software is menu driven throughout and contains a computer assisted teaching system integrated with the software. This teaching facility is complemented by an extensive "help" facility that can be invoked at any time during the use of SELECT-86. Most operations can be accomplished by the user without reference to the manuals.

SELECT-86 is a PC100 CP/M-86/80 applications program that makes use of the file name and directory services of the operating system. Thus a user should have some familiarity with the basic operations of the PC100 CP/M-86/80 Operating System and the PC100 computer.

SELECT-86 assists in the enhancement of personal productivity. It is sophisticated enough for the word processing needs of the secretary. Also, the busy professional will find SELECT-86 easy to understand when producing reports, memos, lists, schedules and other materials.

SELECT-86 includes spelling verification and form letter generation facilities. SELECT-86 may be used for document or program creation and can edit PC100 CP/M-86/80 ASCII formatted files created by other software.

Features:

- Edits letters, documents and source programs up to the maximum file size space on the disk (typically 200 pages)
- Edits ASCII files generated by MULTIPLAN-86 software
- Performs on-screen formatting and justification of text and automatic pagination
- Formats pages, including the use of variable top, bottom left, and right margins
- Allows headers and footers with page numbering, variable horizontal pitch (characters per inch across the page), variable vertical pitch (characters per inch down the page)
- Selects print font (on LA100 printer only)

SELECT-86 includes a 10,000 word dictionary which is expandable, subject to the limitations of disk space, and an automatic spelling verification program.

- SELECT-86 includes the ability to insert one document into another, to print one document while editing another, and view one document without stopping to file away the one that you are editing. SELECT-86 automatically maintains a backup copy of each document each time it is edited. It also provides a facility to save the user's work should the file being created exceed the space available on the diskette being used.

Minimum Hardware Required

Any valid PC100 Personal Computer configuration with:

- PC100A CPU and dual drive floppy diskette
- VR201-A Monitor
- PC1K1-AA Country Kit with keyboard
- 138 KB of disk space required for Install/Teach
- 264 KB of disk space required for Master Spell

Optional Hardware

- RX50-YA Dual drive mini-floppy expansion unit with cables
- PC1xx-AA 64KB random access memory
- PC1xx-AB 192KB random access memory

Prerequisite Software

PC100 CP/M-86/80 Operating System, Version 1.0.4 (1.1)

Optional Software

None

Training

None

Installation

Customer Installed

Support Category

Customer Supported

DCS Classification

Digital Service-Approved

Warranty

None

This software product is provided "AS IS" without any warranty of any kind either express or implied.

SELECT-86
Ordering Information

SELECT-86 is available for use only on the PC100 personal computer and distributed on RX50 floppy diskette distribution media.

QA061-C3	Single-use license, binaries, documentation, no support services (Media: 3)
Additional Copies of Documentation:	
AA-N656A-TV	SELECT-86 User's Guide
AA-P574A-TV	SELECT-86 Getting Started

VAX DECspell Verifier/Corrector

VAX DECspell Verifier/Corrector is a spelling verification and correction utility which runs under the VAX/VMS Operating System. It has the capability of automatically scanning text documents or files and detecting spelling errors. It can also offer a list of suggestions from which the user can select the correctly spelled word for substitution.

VAX DECspell is offered with either an American English or a British English Lexicon. As an extra option, VAX DECspell Verifier/Corrector may be upgraded to allow users to verify documents against either of these lexicons.

VAX DECspell comprises:

- The Verifier/Corrector or Verifier Utility
- A personal dictionary formatter utility
- The lexicon databases

The Verifier/Corrector Utility

The Verifier/Corrector Utility allows the interactive verification and correction of the spelling of user documents.

VAX DECspell Verifier/Corrector displays spelling errors in context on the user's terminal, and offers a set of options from which the user can make a selection. It can also offer a list of probable corrections for the error found. The options include:

- Replace the error with a correction throughout the document or once only.
- Provide more correction possibilities.
- Edit the line containing the error.
- Ignore the error throughout the document or once only.
- Add the word in error to a personal dictionary.
- Select the dictionary to which words are added.
- Exit, with the option of saving any corrections made so far, or restore the document to its original state.
- Provide on-line help.

The Verifier Utility

The Verifier Utility allows the interactive verification and correction of the spelling of user documents.

VAX DECspell Verifier/Corrector displays spelling errors in context on the user's terminal, and offers a set of options from which the user can make a selection. The options include:

- Edit the line containing the error.
- Ignore the error throughout the document or once only.
- Add the word in error to a personal dictionary.
- Select the dictionary to which words are added.

- Exit, with the option of saving any corrections made so far, or restoring the document to its original state.
- Provide on-line help.

Verification uses the master lexicon provided with VAX DECspell Verifier/Corrector together with over 10,000 additional, user-specified words. These user-specified words are divided between the user's personal dictionary and up to ten other dictionaries. These additional dictionaries can be personal dictionaries or dictionaries shared with other users.

VAX DECspell Verifier/Corrector can verify sequential ASCII text files held on disk, such as those produced by the EDT editor. Furthermore, it can verify word processing documents transferred to VAX/VMS by DX from DECmate II Systems.

Note: The VAX DECspell Corrector Option may be used to upgrade VAX DECspell Verifier, to add the corrections suggestions capability, and replace options.

The Personal Dictionary Formatter

The Personal Dictionary Formatter allows users to maintain their own dictionaries. Personal and shared dictionaries are sequential ASCII files, and thus can be edited. This utility provides the additional capability of sorting words into alphanumeric order, and formatting dictionaries so that they can be printed.

The Lexicon Databases

VAX DECspell Verifier or Verifier Corrector includes either an American English or British English Lexicon. The appropriate additional lexicon may be purchased for installations that require both lexicons, i.e., American English users of VAX DECspell will purchase the British English Additional Lexicon if both lexicons are required.

The spelling verification uses a British English or an American English Lexicon based upon American Heritage Dictionaries published by Houghton Mifflin.* Each of these lexicons contains in excess of 70,000 words.

Minimum Hardware Required

Any valid VAX/VMS system configuration with:

- Mass storage with a minimum of 2000 disk blocks available on the system disk during and following installation for both languages.
- When an additional lexicon is used, an additional 1000 blocks are required.
- A VT100 series or VT52 series video terminal is required to run the Verifier or Verifier/Corrector.

VAX-11/730 Systems:

- An R80/RL02 configuration is required for VAX11/730 Systems.

*© Copyright 1983, 1981 Houghton Mifflin Company. All rights strictly reserved.

Contains confidential unpublished property of Houghton Mifflin, licensed solely for use in DIGITAL software. Reproduction, disclosure, or recreation of embodied computer programs or algorithms prohibited.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

Customer Responsibilities

Before installation of this software, the customer must

- Previously have installed all requisite hardware including terminals.
- Obtain, install, and demonstrate as operational any modems and other equipment and facilities necessary to interface to Digital's communication equipment.
- Demonstrate equivalency of operation for modems other than DF01, DF02, and DF03, or in Europe, PTT approved modems.
- Make available for a reasonable period of time, as mutually agreed by Digital and the customer, all hardware, communications facilities, and terminals that are to be used during installation.

Delays caused by any failure to meet these responsibilities will be charged at the then prevailing rate for time and materials.

VAX DECspell Verifier/Corrector Ordering Information

American English Options	Systems		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Verifier/Corrector Single-use license, binaries, documentation, support services.	QC650-AG	QD650-AG	QE650-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC650-DZ	QD650-DZ	QE650-DZ

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Update/Unsupported Options Users of VAX DECspell Verifier/Corrector whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC650-HG	QD650-HG	QE650-HY
Right to copy for single-use, no binaries, no documentation, no support services.	QC650-HZ	QD650-HZ	QE650-HZ
Verifier Single-use license, binaries, documentation, support services.	QC652-AG	QD652-AG	QE652-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC652-DZ	QD652-DZ	QE652-DZ
Update/Unsupported Options Users of VAX DECspell Verifier whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC652-HG	QD652-HG	QE652-HY
Right to copy for single use, no binaries, no documentation, no support services.	QC652-HG	QD652-HG	QE652-HY
Additional Lexicon (British English Lexicon) Single-use license, binaries, documentation, support services.	QC656-AG	QD656-AG	QE656-AY

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license-only option, no binaries, no documentation, no support services.	QC656-DZ	QD656-DZ	QE656-DZ
Update/Unsupported Options Users of VAX DECspell Additional Lexicon whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC656-HG	QD656-HG	QE656-HY
Right to copy for single use, no binaries, no documentation, no support services.	QC656-HG	QD656-HG	QE656-HY

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the ordering number, e.g., QC650-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

Refer to the preceding table for more details.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DECspell Verifier/Corrector Ordering Information

British English Options	Systems		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Verifier/Corrector Single-use license, binaries, documentation, support services.	QC651-AG	QD651-AG	QE651-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC651-DZ	QD651-DZ	QE651-DZ
Update/Unsupported Options Users of VAX DECspell Verifier/Corrector whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC651-HG	QD651-HG	QE651-HY
Right to copy for single-use, no binaries, no documentation, no support services.	QC651-HZ	QD651-HZ	QE651-HZ
Verifier Single-use license, binaries, documentation, support services.	QC653-AG	QD653-AG	QE653-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC653-DZ	QD653-DZ	QE653-DZ
Update/Unsupported Options Users of VAX DECspell Verifier whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC653-HG	QD653-HG	QE653-HY

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Right to copy for single use, no binaries, no documentation, no support services.	QC653-HG	QD653-HG	QE653-HY
Additional Lexicon (American English) Single-use license, binaries, documentation, support services.	QC655-AG	QD655-AG	QE655-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC655-DZ	QD655-DZ	QE655-DZ
Update/Unsupported Options Users of VAX DECspell Additional Lexicon whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC655-HG	QD655-HG	QE655-HY
Right to copy for single use, no binaries, no documentation, no support services.	QC655-HZ	QD655-HZ	QE655-HZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the ordering number, e.g., QC650-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

Refer to the preceding table for more details.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DECspell Verifier/Corrector Ordering Information

Options	Systems		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Correction Option for Spelling Verifier Single-use license, binaries, documentation, support services.	QC654-AG	QD654-AG	QE654-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC654-DZ	QD654-DZ	QE654-DZ
Update/Unsupported Options Users of VAX DECspell Correction Option for Spelling Verifier whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC654-HG	QD654-HG	QE654-HY
Right to copy for single-use, no binaries, no documentation, no support services.	QC654-HZ	QD654-HZ	QE654-HZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the ordering number, e.g., QC650-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

DECpage

Ordering Information

See your Digital Sales Representative for ordering information.

VAX Smart Mailer

Description

The VAX Smart Mailer software is an application used to create and maintain mailing lists of names and addresses, and generate address labels.

Mailing List Contents

- Mailing lists contain packed addresses with up to 327 characters, each composed of a name, three address lines, city-town, state/country, zip code, two separate identifiers, a counter, a comment and up to six user-defined categories.
- Category information is user-defined and can be different for each mailing list. Each category can have a separate descriptive label, and data type (Alphanumeric, Numeric, Date, Yes/No).
- Each mailing list can have associated sublists. A sublist is defined as all addresses from a mailing list that meet user-defined requirements. The sublist definitions are named and stored with the mailing list, but the sublist addresses are extracted each time they are referenced, to conserve space and ensure that the addresses are up-to-date.
- Each mailing list can be set up differently. For example, a list can have different types of address identifiers, and have different validations performed on address information.

Major Functions

- Update—Mailing lists can be created and maintained by adding, removing, and changing individual address entries.
- Display—Any or all addresses, category definitions, or sublist definitions can be displayed on a video screen.
- Listings—Full addresses, category definitions, and sublist definitions can be printed (or written to a disk file).
- Labels—Any mailing list or sublist can be printed on a variety of labels.
- List Processing Interface—A standard list document file can be generated for use with Digital word processing systems to produce personalized letters.

Features

- User Interface—All user interaction is menu or form driven. There is extensive on-line, context-sensitive help (including tailored warning and error messages). Many questions and prompts have default suggested answers.
- Label Printing—Various parameters for label printing can be defined to meet specific needs. These parameters include the number of labels across a page, dimensions of a label, placement of labels on the page, and the number of times to print each address. VAX Smart Mailer can also print an optional message on all labels, print one of the address identifiers or categories on each label, and print test labels for alignment. Another option is to increase, decrease or reset the counter of each address printed to a label.

- Category Information—Up to six categories of related information can be stored for each mailing list. Each category has a user-defined descriptive label and data type code. Each address can have up to 10 characters of information for each category. This information may be used for selecting and sorting addresses for printing.
- Sublists—Addresses can be selected from mailing lists by defining requirements on specific address fields. There may be up to 30 requirements for any sublist. Each requirement states that an address field must be within a certain range (for example, COUNTER between 1 and 10, HIRE DATE above 01-JAN-83, ZIPCODE is 01759). These requirements can be logically related by using AND and OR connectors.
- Sorting—All lists may be sorted by any address field (except comments) before being printed as listings or labels.
- Presort—VAX Smart Mailer can presort U.S. addresses to take advantage of U.S. Postal rules in effect in July 1979), which allow a reduced postage rate on First Class Mail. VAX Smart Mailer sorts selected addresses into groups of Direct, City/SCF (Sectional Center Facility), Residual, and addresses that do not conform to general addressing requirements. Once sorted, statistics will be displayed to indicate the various sorted quantities. The user can then choose to have VAX Smart Mailer print labels for those addresses. A break label will be printed between each group. This will allow the user to organize the various groups into the appropriate trays required by the Post Office. The requirements for presort are explained in the Information Guide on Presort First-Class Mail (Publication 61).

Minimum Hardware Required

Any valid VAX/VMS system configuration with:

- One or more video terminals that are VT100 or VT52 compatible.
- 1500 free blocks of storage available for installation.
- VAX/VMS supported printer with label printing capability.

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

None

Training Credits

None

Prerequisite Software

VAX/VMS Operating System

Software Installation

Customer Installed

Optional Software

None

VAX Smart Mailer
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services	QCA03-AG	QDA03-AG	QEA03-AY
Single-use license-only option, no documentation, no support services	QCA03-DZ	QDA03-DZ	QEA03-DZ
Update/Unsupported Options Users of VAX Smart Mailer whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QCA03-HG	QDA03-HG	QEA03-HY
Right to copy for single use, no binaries, no documentation	QCA03-HZ	QDA03-HZ	QEA03-HZ
Miscellaneous Options Documentation-only kits	QCA03-GZ	QDA03-GZ	QEA03-GZ

**The VAX-11/782 is a multiprocessor that will be considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QCA03-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

PROSE-PLUS

Description

PROSE-PLUS is an enhanced version of PROSE, a full screen text editor designed to enter text to be used in documents, memos, and other applications. PROSE-PLUS is not only compatible with PROSE, but in addition provides added functionality. PROSE-PLUS runs under the Professional Operating System (P/OS) and uses P/OS services for menus and help frames. PROSE-PLUS functionality includes:

Editor Mode Functions

- Text/Document Output Mode
- Insert/Overstrike selection toggle key
- Menu Mode
- Command Mode
- Help Mode

Character Curser Movement

- Cursor Right/Left
- Cursor Up/Down

Viewing Screen Movement

- Screen Forward/Backward
- Half Screen
- Top/Bottom of Document
- Next/Previous Page

Text Manipulation Functions

- Remove Selected Text
- Insert Text Here
- Recover Text
- Move Text
- Copy Text

Delete Functions

- Rub Characters

Search and Replace Functions

- Find "String"
- Continue Find
- Replace Text
- Replace Next

Fetch Functions

- Get Document

Text Attribute Functions

- Attributes
  Uppercase Lowercase
  Bold Underline
- Clear all Attributes

Embedded Control Functions

- New Page
- Conditional Page
- Center Line
- Text Formatting
- Rulers

Ruler Functions

- Ruler Editor
- Left/Right Margin
- Word Wrap Tab
- Left Aligned Tab

Miscellaneous Editor Functions

- Date and Time
- Paginate
- Rewrap Selected Text
- Select
- Resume
- Exit

Special Functions

- Set Parameters
- Search
- String Match
- Change Screen Width
- Post-Edit Processor Functions

PROSE-PLUS uses RMS sequential files for its permanent files. Text in the process of being edited is kept in a temporary work file.

Minimum Hardware Required

Any valid P/OS Hard Disk or Diskette system configuration

Optional Hardware

None

Prerequisite Software

P/OS Hard Disk, Version 1.5
P/OS Diskette, Version 1.5

Optional Software

None

Software Installation

Customer Installed

Support Category

Digital Supported

DCS Classification

Digital Developed

PROSE-PLUS
Ordering Information

PROSE-PLUS is available only on RX50 Floppy Diskette distribution media.

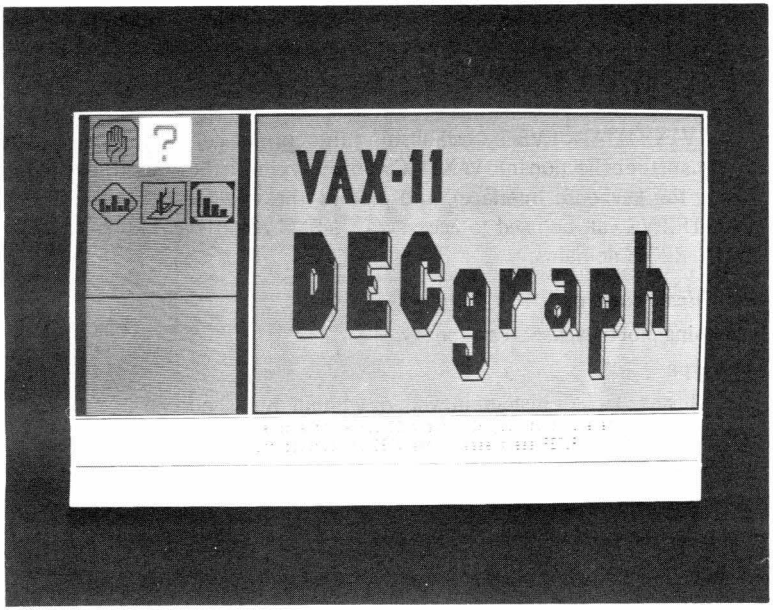
QBA11-A3	Single-use license, binaries, documentation, support services

VAX DECgraph

VAX DECgraph is a general purpose graphics plotting package that runs under the VAX/VMS Operating System. VAX DECgraph allows users to create, change, display, and print graphs. Individuals will use VAX DECgraph for decision support and making presentations.

User Interface Features

- An interactive keyboard interface to create, change, and display charts.
- Menu and submenus use symbols to display user options. Arrow keys are used to move to the different options. Once positioned on the desired option, the ACCEPT or RETURN key is used to select it. A message area at the bottom of the screen displays user information.
- A sample set of data files is supplied with the installation kit.
- Color palettes can be used to select colors for the chart.
- Online help facilities and task-oriented documentation.
- Ability to create an output file for display on VT125 terminals without VAX DECgraph.



Data Manipulation Features

- Application programmers can call VAX DECgraph from any VAX higher level language supporting the VAX/VMS calling standard. Programs can
  - Turn control over to VAX DECgraph for use with the keyboard
  - Create and display charts without using the keyboard interface
  - Include VAX DECgraph as part of a larger software system

VAX DECgraph can be used with VAX DATATRIEVE to manipulate data, then load and plot the values from the current collection.

Multiple data files can use the same plot description file to create a series of charts with similar format. A single data file can be plotted in different formats with multiple plot description files.

VAX DECgraph can create ASCII format output files that can be displayed on VT125 terminals.

Data is supplied to VAX DECgraph in one of the following ways:

- With the forms oriented keyboard interface that allows the user to input titles, labels, legends, multipliers, data types and values in the appropriate locations on the screen. Changes and updates are also made via the keyboard interface.
- With properly formatted ASCII data files (described in the documentation) that can be used to create valid data files from sources such as VAX languages or a text editor. These files can then be loaded into VAX DECgraph through the keyboard interface.
- With VAX DATATRIEVE by establishing the current collection, loading the records of the collection into VAX DECgraph by typing in the desired field names (using the keyboard interface), and plotting the selected information. VAX DATATRIEVE can be used to access VAX DBMS records as well as those in DATATRIEVE domains.

Graphics Features

In defining plot files, users can specify:

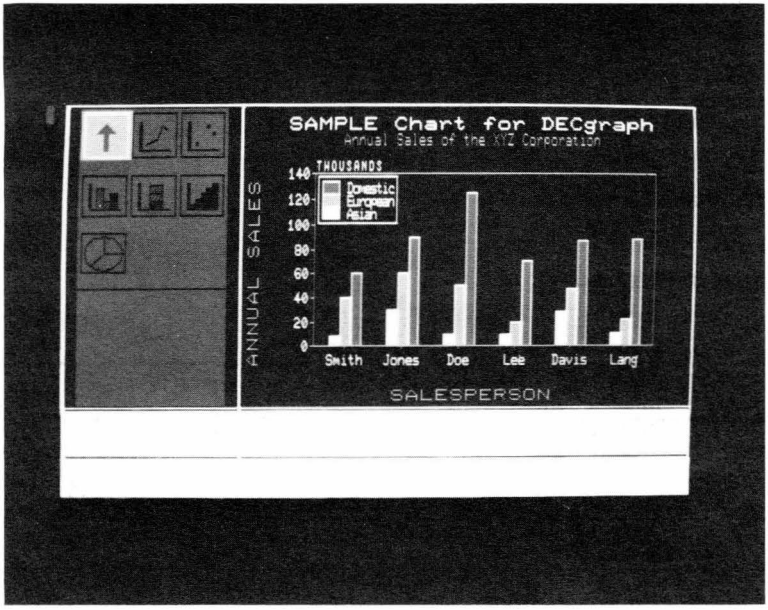
- Plot type

  Bar (cluster, stack or histogram; with or without drop shadows)

  Line (simple or filled)

  Pie (whole or with an isolated section)

  Scatter (with or without trend line)
- Grid type (vertical, horizontal, full or none)
- Scaling (linear, logarithmic)
- Range of values
- Legends (automatic or no legend)
- Color, background patterns, line types, and markers
- Charts are printed with an outside border.



Special function keys include

- Call online help
- Display the current chart
- Print the current chart in single or double size (black and white)
- Reset VAX DECgraph and return the user to the main menu
- Refresh the screen

Minimum Hardware Required

Any valid VAX/VMS system configuration (R80/RL02 configuration required for VAX-11/730 systems) with a VT125 Rev. 102 terminal. If the DMF32 is used, it must be at rev. F or later.

Note: GIGI terminals are not supported.

Optional Hardware

RGB color monitor

LA12 or LA50 printers (for black and white single size)

LA100 or LA34-VA printers (for black and white double size)

Prerequisite Software

VAX/VMS Operating System

Optional Software

VAX DATATRIEVE Version 2.0 or later

VAX Common Data Dictionary Version 2.0 or later

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

VAX DECgraph Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782*
Single-use license, binaries, documentation, support services	QC360-AG	QD360-AG	QE360-AY
Single-use license-only option, no binaries, no documentation, no support services	QC360-DZ	QD360-DZ	QE360-DZ
Update/Unsupported Options Users of VAX DECgraph whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC360-HG	QD360-HG	QE360-HY
Right to copy for single-use, no binaries, no documentation	QC360-HZ	QD360-HZ	QE360-HZ
Miscellaneous Options Documentation-only kits	QC360-GZ	QD360-GZ	QE360-GZ

*The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC360-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge**
Y = RX01 Disk Cartridge
Z = No hardware dependency

**The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

FINGRAPH

Digital distributes this software product under license from Fingraph Corporation.

FINGRAPH, developed by Fingraph Corporation, is a comprehensive and flexible graphic management information system for computer generation of graphic financial and operating reports. FINGRAPH allows systematic graphic presentation of financial statements, disaggregation schedules and operational performance data. These formats provide for a consistent and standard hierarchy of charts for all levels of management and operating functions—a Graphic Management Information System (GMIS) for the organization.

Capabilities

- Review more information quicker by "seeing" it instead of reading it
- Graphically compare actual results to budget and/or forecast
- Understand "pictures" of the business and its operations more easily providing better comprehension
- Focus on "exceptions" and understand underlying causes
- Get new charts whenever the database is updated after the initial one-time design and optional database linkage is done

Minimum Hardware Required

Any valid VAX-11/730, 11/750 or 11/780 system configuration with a minimum of 64K memory for application

- Program requires 2855 disk blocks

File storage requirements are dependent upon the number of charts, elements, data files and time periods used.

REGIS supported output device (VT125, GIGI, graphic terminal). Optional LA34RA attached to VT125 terminal for hardcopy output.

Prerequisite Software

VAX/VMS, Version 3.0

VAX/VMS DIBOL, Version 1.0

Optional Software

None

Training

None

Installation

Customer Installed

The Users Manual contains instructions for installation and use of FINGRAPH. It contains a problem set that shows how to design FINGRAPH charts. Database linkage is described if keyboard data entry is not desired.

Support Category

Customer Supported

Warranty

None

This software product is provided "AS IS" without any warranty of any kind either express or implied.

FINGRAPH
Ordering Information

FINGRAPH is available only on 9-track 1600 BPI Magtape (PE) distribution media.

For VAX-11/730	
QA143-CM	Single-use license, binaries, documentation, no support services
QA143-DZ	Single-use license-only option, no binaries, no documentation, no support services
For VAX-11/750	
QA144-CM	Single-use license, binaries, documentation, no support services
QA144-DZ	Single-use license-only option, no binaries, no documentation, no support services
For VAX-11/780	
QA145-CM	Single-use license, binaries, documentation, no support services
QA145-DZ	Single-use license-only option, no binaries, no documentation, no support services
Additional Copies of Documentation	
AA-N363A-TK	FINGRAPH User Manual

VAX DECslide

Description

VAX DECslide is a menu-driven graphic presentation utility that runs on the VAX/VMS Operating System. It is intended for individuals who create or prepare materials for in-house presentations. A combination of symbols and text are used for menu selection.

VAX DECslide uses an interactive interface so that diagrams and text are displayed as they are entered. Editing functions permit changes to slides as they are created, or after they have been saved.

A strip (text) menu and message area at the bottom of the screen displays user options, help messages, and operation status. A directory feature lists the slides, including the date and time of creation, slide name and comments.

After slides are created, they can be colored with available color palettes. They can be printed (single or double size format), saved (filed), copied, exported, changed, or deleted.

Slides are saved in the current default VMS directory. Different directories can be used to group common slides together, and all are protected via the standard VMS protection mechanisms.

Features

- VAX DECslide supports the following object types:

  Circle (can be dimensioned to an ellipse)

  Straight line (solid, dashed, dotted, dash/dot in various combinations)

  Box (can be dimensioned to a rectangle)

  Triangle

  Polygon

  Arc

  Text

- Objects can be manipulated in the following ways:

  Single objects (shapes) can be combined to form more complex, compound objects.

  Both single and compound objects can be copied, rotated, moved, redimensioned, separated or joined together.

  Height and width can be increased or decreased (zoom) to achieve desired proportions.

  Objects can be filled with a selected fill pattern.

- The text functions provide the following capabilities:
  Delete/undelete a character or line
  Cursor movement to top or bottom of text, to beginning or end of line
  Insertion and replacement of characters
  Return
- When coloring (painting) slides, users can:
  Select an appropriate palette
  Assign colors to each object
  Change the background color of the slide
- Objects, including text, can be moved about the screen in coarse mode (50 pixels per keystroke), medium (10 pixels per keystroke), or fine (1 pixel per keystroke).
- Completed slides can be "exported" (the Regis commands to display the slide can be filed) and then displayed on a VT125.
- Existing slides can be combined to form a new slide.
- Grid lines can be displayed for aligning objects on the screen.
- Various text-object character sizes are available. Each size is printable in double height/double width.
- Frequently used diagrams or text can be saved for use in a number of different slides.
- VAX DECslide is callable, permitting applications to include DECslide as part of a larger software system.

VAX DECslide, Version 1.0 cannot include foreign files (for example, graphs prepared by VAX DECgraph or text files created by EDT) in a slide set. VAX DECslide permits only slides prepared through DECslide or an application that has called DECslide.

Minimum Hardware Required

Any valid VAX/VMS System configuration (R80/RL02 configuration is required for VAX-11/730 systems) with a VT125 terminal Rev. 102.

Note: GIGI terminals are not supported.

Optional Hardware

RGB color monitor, LA12 or LA50 printers (for black and white single size), LA100 or LA34-VA printers (for black and white single or double size).

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

VAX DECslide
Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services	QC361-AG	QD361-AG	QE361-AY
Single-use license-only option, no binaries, no documentation, no support services	QC361-DZ	QD361-DZ	QE361-DZ
Update/Unsupported Options Users of VAX DECgraph whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC361-HG	QD361-HG	QE361-HY
Right to copy for single-use, no binaries, no documentation	QC361-HZ	QD361-HZ	QE361-HZ
Miscellaneous Options Documentation-only kits	QC361-GZ	QD361-GZ	QE361-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, H, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD361-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Disk Cartridge
Z = No hardware dependency

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

POLYGRAFIX

Description

The POLYGRAFIX software package is a set of five host-resident graphics packages written in FORTRAN that supports a wide range of graphics applications on a GIGI (VK100) terminal or a VT125 terminal.

Components

ReGIS Graphics Editor, Version 1.1

The ReGIS Graphics Editor is a host-resident software package written in FORTRAN that allows the user to create and edit pictures interactively on a GIGI (VK100) or VT125 terminal. The keypad-driven ReGIS Graphics Editor provides an easy means of generating Remote Graphics Instruction Set (ReGIS) code for the terminal. The user can define or change attributes, such as color, shading, writing patterns, text size, and direction. Pictures created by the Graphics Editor can be stored in files on the host system for subsequent use by:

- ReGIS Slide Projection System
- ReGIS DEC-RITE

The Graphics Editor can be used to prepare illustrations for reports and presentations.

ReGIS Slide Projection System, Version 1.1

The ReGIS Slide Projection System is host-resident software written in FORTRAN that allows the user to display existing Remote Graphics Instruction Set (ReGIS) picture files, including those created with the following ReGIS packages:

- ReGIS Graphics Editor
- ReGIS Character Set Editor
- ReGIS Data Plotting Package

The ReGIS Slide Projection System provides a method of using picture files in a manner that resembles a slide projector. A picture file contains ReGIS commands that have been inserted either directly or with any of the ReGIS software packages mentioned above. A tray file is a file that contains:

- Names of the files containing the slides
- Embedded commands processed by the ReGIS Slide Projection System

Actual editing of slide tray files is accomplished with the use of a built-in editor within the ReGIS Slide Projection System package or any standard editor. Sequences may be displayed under program or manual control.

The ReGIS Slide Projection System can be used to give presentations and prepare materials for presentations.

ReGIS Character Set Editor, Version 1.1

The ReGIS Character Set Editor is host-resident software written in FORTRAN that allows users to construct alternate character sets of up to 95 characters each. The character sets are stored in files on the host system and may be down-line loaded into any of the GIGI (VK100) or VT125's three alternate character sets.

Character sets created by the ReGIS Character Set Editor can be used by user-written applications and:

- ReGIS Graphics Editor
- ReGIS DEC-RITE
- ReGIS Slide Projection System

The package allows nontechnical users to create character sets easily and to load and use these character sets. The ReGIS Character Set Editor provides commands for creating and manipulating character set files and for controlling screen display during editing.

In addition, the user can define a character set using combinations of available characters to form multiple character mosaics.

ReGIS DEC-RITE, Version 1.1

ReGIS DEC-RITE (ReGIS Illustrated Text Editor) is an on-screen editor providing interactive, text-attribute selection, proofreading by the user, and optional final copy from a GIGI (VK100) or VT125 connected to a LA34-VA or LA100 printer. It provides easy access to the powerful text display features of ReGIS.

ReGIS DEC-RITE provides text processing features with particular emphasis upon those character attributes that the GIGI (VK100) and VT125 can provide. In addition to word and character oriented cursor controls, ReGIS, DEC-RITE allows for word-wrap, subscript, superscript, and other attributes, such as boldface, italic, color and multiple character sizes. It allows the user to incorporate character sets created by the ReGIS Character Set Editor.

Another major capability of ReGIS DEC-RITE is the ability to intersperse specially formatted picture files generated by other ReGIS software packages within the textual material.

ReGIS Data Plotting Package, Version 1.1

The ReGIS Data Plotting Package is host-resident software written in FORTRAN. The program performs interactive file and data manipulation for graphics plotting.

The ReGIS Data Plotting Package allows the user to enter and edit data in a table and to use the table to draw various types of predefined plots, such as bar graphs or line graphs, or to use the table for predefined statistical analysis. Plots can be stored and accessed for later use by other ReGIS software applications. Tables of data and plot specifications can be stored for subsequent reuse by the ReGIS Data Plotting Package.

Table Building Capabilities

- Enter raw data into a table with the number of rows and column defined by the user (limitations on size of tables: 9 columns, 99 rows)
- Names the table, names separate categories for rows and columns, and labels each row and column
- Edits a row, column, or data item
- Sorts any row or column for numeric data or alphabetically
- Performs arithmetic operations on rows, columns, or items

Plotting Capabilities

- Bar charts
- Line plots, straight lines, curves, normal curves
- Point plots

Statistical Analysis Capabilities

- Basic statistics: mean, range, variance, standard deviation, percentage
- Nonparametric comparative statistics: chi-square

The ReGIS Data Plotting Package is designed to be utilized by a wide range of users, both technical and nontechnical. The Package includes a HELP command with extensive instructions that will prompt the user for most entries.

Minimum Hardware Required

Any valid VAX/VMS system configuration with a minimum working set size of 150 pages, one or more GIGI (VK100) or VT125 terminals and the following amount of disk space:

- 1000 disk blocks per individual software package for installation
- 1600 disk blocks for program storage

For VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

LA34-VA or LA100 Printer

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

POLYGRAFIX
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC211-AG	QD211-AG	QE211-AY
Single-use, license-only, option, no binaries, no documentation.	QC211-DZ	QD211-DZ	QE211-DZ
Update/Unsupported Options Users of POLYGRAFIX whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC211-HG	QD211-HG	QE211-HY
Right to copy for single-use, no binaries, no documentation	QC211-HZ	QD211-HZ	QE211-HZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC211-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DECmail

Description

VAX DECmail is a stand-alone, mail and filing system that runs under the VAX/VMS Operating System. VAX DECmail features include the ability to create, edit, send, and process messages on a single VAX computer system. VAX DECmail also provides the ability to store, search, and retrieve messages held in system-provided or user-created folders. VAX DECmail memos and VAX/VMS (RMS) files can be moved between VAX DECmail and the RMS file system.

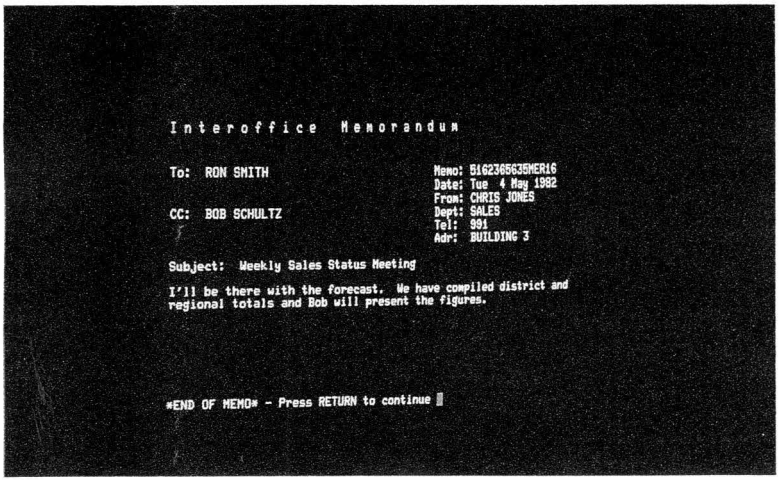
Multiple stand-alone VAX/VMS Systems running VAX DECmail, Version 2.1 can exchange mail provided each VAX/VMS System is configured with DECnet Phase III or Phase IV and Message Router. Both DECnet and Message Router are separately orderable and require a binary license for each VAX/VMS System.

Included in VAX DECmail is a self-paced computer based instruction (CBI) course to introduce new users to the DECmail application and to provide instruction on the basic functions of the product.

VAX DECmail consists of a command interface, an editor, and a filing system.

VAX DECmail can be accessed

- Directly from VT100A, VT100W, VT52, VT52W, VT125, VT125W, VT101, VT102, VT102W and VK100 (GIGI) terminals
- Directly from LA34, LA36, LA38, LA120, LA100, and LA12 hard copy terminals
- Indirectly, using CX, from DECWORD/DP, WS278, WS78, and WS200 DIGITAL word processing terminals
- Using DX from DECWORD/DP, WS278, WS78, and WS200 word processing systems to transfer documents between word processing systems and VAX-11 DECmail



The command interface offers two modes of operation

- Menu mode—for the new or infrequent user
- Command mode—for the experienced user

Command mode allows the user to issue the same instructions that are available in menu mode but in a faster, abbreviated manner.

Both modes offer extensive help facilities; explanations and directions are available for all menu items, menu item options, and command prompts.

The operations available to the user include

- READ—Examines incoming or filed memos
- CREATE—Composes a new memo
- ANSWER—Provides a response to a memo
- FORWARD—Generates a cover memo
- SEND—Routes a memo, answer, or forwarding memo to another user
- FILE—Stores memos in one or more folders
- EDIT—Modifies an unsent memo
- ATTACH—Attaches a copy of one memo to another
- DETACH—Breaks up a memo into component attachments
- DEFER—Schedules the date and time for sending of a memo
- PRINT—Produces a printed copy of a memo
- IMPORT—Transfers VAX RMS files into VAX DECmail memos
- EXPORT—Transfers VAX DECmail memos to a VAX RMS file
- DX—Transfers WPS documents between VAX DECmail memos and word processors
- TRAINING—Enables users to learn VAX DECmail basic functions by computer based, self-paced lessons

When a memo is created the user supplies the subject and the names of the addressees. The system includes the date of creation an the author's name and address. This information is inserted in the heading of the memo.

The editor is used when creating new memos or modifying existing memos that have not yet been sent. The editor provides full screen editing operations on video terminals and command driven line or character editing operations on hard-copy terminals. The screen editing operations include

- Ruler capability for formatting text of the memo
- Direction keys to move cursor around the screen (VT100 only)
- Operations on character, word, line, sentence, paragraph, page
- Automatic word wrap at right margin
- Ten cut and paste scratchpads of text
- Global search for and replacement of characters, words, or phrase

- Copy text from other memos or from/to VAX RMS files
- Automatic pagination
- Line centering between left and right margins

The editor commands are similar to those available in Digital's word processing systems. A user can move freely between a word processing system and VAX DECmail because no relearning of editing commands is required.

The filing system is based on folders. Each user has a set of permanent memo folders and can create any number of user folders.

The permanent folders can contain memos

- Received but not yet read (UNREAD)
- Created but not yet sent (UNSENT)
- Deleted (WASTEBASKET)
- Read (READ)
- Sent (SENT)
- Stored in the user's account (MASTER)

Memos can be copied from permanent folders into one or more user-created folders or to VAX RMS files. Memos deleted from any folder are transferred to the Wastebasket folder where they remain accessible until removed by the System Manager.

The Search operation allows the user to search the MASTER folder for specified memos. The search is based on any combination of author, date (or date range) of creation, and word or phrase in the subject.

VAX DECmail security features include user identification and password protection upon entry to DECmail. Users of DECmail, from their VAX/VMS accounts, can choose to enter DECmail directly without entering user account name or password. File security is equivalent to that provided by the operating system. DECmail also informs users, who are logged into VAX/VMS or DECmail, that DECmail has arrived for them.

VAX RMS text files can be mailed as VAX DECmail memos and nontext files can be mailed as an attachment to a DECmail memo. Memos can be queued to VAX system printers for printing or to VT100 class terminals that have a printer attached via the printer port option. Users have the option of including a header and paginating the memo when printed.

VAX DECmail can be used to distribute and store documents created on Digital's word processing system. Word processing users can communicate with VAX DECmail using the CX mode (Character Transmission) and then can transfer documents to and from VAX DECmail using the DX mode (Document Transmission). Documents sent to VAX DECmail in this way can be

- Forwarded to other VAX DECmail users, who can then DX transfer them to their Digital word processing systems using DX

- Read
- Printed
- Copied into another VAX DECmail memo

Additional operations allow the System Manager to authorize new users, monitor the message traffic and DECmail usage, verify the integrity of the application database, and remove deleted memos from user wastebaskets.

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration with

- 2 megabytes memory
- 20,000 free blocks on the VAX DECmail application volume set
- DF03 300/1200 baud modem or Bell 212A modem or equivalent

VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

NOTE: Depending on workload, VAX DECmail may consume significant VAX/VMS resources. VAX/VMS systems running VAX DECmail should be properly configured to ensure suitable system performance.

Optional Hardware

- Any printer supported by the operating system
- VT100W, VT52W, VT102W or equivalent video terminals and LA34 or equivalent hard copy terminals
- Since several of the VAX DECmail editing key sequences depend upon the word processing keyboard, the VT1XX-CE terminal upgrade option can optionally be added to a VT100A terminal to convert it to a VT100W.
- Keyboard surrounds identifying VAX DECmail specific functions on VT100A and VT52 keyboards

Prerequisite Software

VAX/VMS Operating System

DECnet/VAX and Message Router are required to send/receive DECmail messages from one VAX to another.

Training Credits

None

Customer Training

DECmail includes a Computer Based Instruction (CBI) package, which is accessed from the main menu. This package provides ten lessons that will teach the user most of the basic functions of VAX DECmail. The CBI function can only be used with VT100 or VT52 type terminals.

A VAX DECmail Instructor course, with user training materials to be administered by the customer instructor, is included with the VAX DECmail software. Optional on-site training for the instructor and the users, is available as well. Arrangements should be made directly with Digital's Education Services Department.

Software Installation

Customer Installed

Prerequisite Support

The completion of a Customer Support Plan is required for VAX DECmail. Additionally, a completed DECnet Network Profile is required for the VAX DECmail Multinode Option.

VAX DECmail Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services, training course	QC400-AH	QD400-AH QD400-AJ QD400-AM QD400-AV	QE400-AM QE400-AJ QE400-AV
Single-use license-only option, no binaries, no documentation, no support services, no training course.	QC400-DZ	QD-400-DZ	QE400-DZ
Update/Unsupported Options Users of VAX DECmail whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC400-HH	QD400-HH QD400-HJ QD400-HM QD400-HV	QE400-HM QE400-HJ QE400-HV
Right to copy for single-use, no binaries, no documentation, no support services	QC400-HZ	QD400-HZ	QE400-HZ

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Miscellaneous Options			
System Documentation-only kit	QC400-GZ	QD400-GZ	QE400-GZ
User Documentation-only kit	QC401-GZ	QD401-GZ	QE401-GZ
User Documentation-only kit (qty. 25)	QC402-GZ	QD402-GZ	QE402-GZ
User Documentation-only kit (qty. 50)	QC403-GZ	QD403-GZ	QE403-GZ
User Documentation-only kit (qty. 100)	QC404-GZ	QD404-GZ	QE404-GZ
Keyboard Surround Kit for the VT100 (qty. 25)	QC405-GZ	QD405-GZ	QE405-GZ
Keyboard Surround Kit for the VT100 (qty. 50)	QC406-GZ	QD406-GZ	QE406-GZ
Keyboard Surround Kit for the VT100 (qty. 100)	QC407-GZ	QD407-GZ	QE407-GZ
Keyboard Surround Kit for the VT52 (qty. 25)	QC408-GZ	QD408-GZ	QE408-GZ
Keyboard Surround Kit for the VT52 (qty. 50)	QC409-GZ	QD409-GZ	QE409-GZ
Keyboard Surround Kit for the VT52 (qty. 100)	QC410-GZ	QD410-GZ	QE410-GZ

**The VAX-11/782 is a multiprocessor that will be considered a single CPU for binary licensing purposes.

The following key (H, J, M, V, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD400-AH = binaries on RL02 Disk Cartridge.

H = RL02 Disk Cartridge
J = RA60 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

Digital's Voice Messaging System

Ordering Information
See your Digital Sales Representative for ordering information.

DECtalk

Ordering Information

See your Digital Sales Representative for ordering information.

Digital's Electronic Mailroom

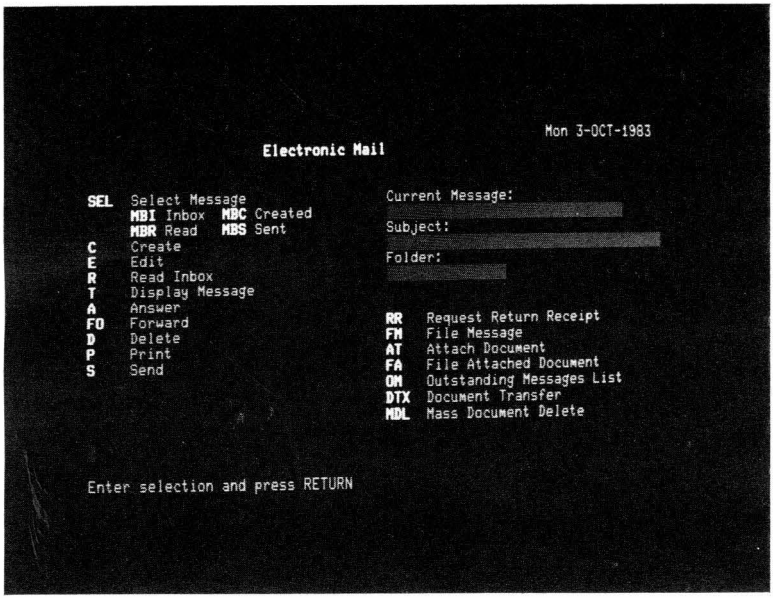
To meet the needs of businesses that frequently utilize the U.S. Postal service, Digital offers a unique and powerful product, the Electronic Mailroom. As it's name implies, this product provides your business or department with a complete set of capabilities to effectively address your mail preparation and handling requirements.

The Electronic Mailroom will electronically transmit mailings to theU.S. Postal Service's E-COM (Electronic Computer Originated Mail) service. It transmits these mailings in standard E-COM form.

With the Electronic Mailroom, you can create, format, edit, print, store and mail letters from a standard Digital Equipment Corporation terminal or workstation connected to a VAX system and quickly and easily meet E-COM standards. Once completed, the computer is connected to the E-COM system and rapid transmission of the letters is automatically initiated.

Once your mailings are electronically delivered to them, E-COM will:

- Print your letters
- Provide the paper and the distinctive envelopes
- Fold and stuff the letters
- Sort the letters by Zip Code
- Pay the first class postage
- Mail your letters



E-COM's charge for this service is approximately 26 cents per one page letter. This service, triggered by your business' Electronic Mailroom system, can dramatically reduce the costs in dollars and time to your organization for such activities as:

- Shareholder communications
- Legal and financial announcements
- Price change notifications
- Sales promotions
- Sales bulletins
- Credit collection
- Subscription renewals
- Invoicing
- Fund raising
- Surveys
- Service renewal notifications
- And many more!

Digital's Electronic Mailroom allows you the flexibility and functionality to support up to five letter types including single address letters, form letters, text-insertion letters, salutation and list-processing messages. It offers powerful word-processing functionality for truly effective online letter composition and can support both synchronous modems to help guarantee error-free transmission or high-speed modems to help decrease telephone connect costs.

Digital's Electronic Mailroom can dramatically reduce the labor, materials and other costs associated with your mailing process.

Users report that their important direct-mail campaigns are easier, more effective, less expensive and quicker than ever before.

Below are some of the major features of Digital's Electronic Mailroom:

Electronic Tie-in to E-COM

The Electronic Mailroom product will electronically transmit mailings to the U.S. Postal Service's E-COM (Electronic Computer Originated Mail) service. The Electronic Mailroom product provides computer and word processing tools to generate mailings in the E-COM format or standard and allows you to dial-up into a participating E-COM station and electronically transmit the mailings for E-COM's handling.

Word processing tools and functionality help you to develop effective mass mailing content and to send that content easily and quickly to E-COM for their processing. Important direct-mail campaigns can be accomplished effectively. The Electronic Mailroom can dramatically reduce your direct mail campaign costs in terms of both time and effort. Your critical time-to-market mailings can be accomplished with ease.

Supports Five Letter Types

The Electronic Mailroom can support up to five letter types including single address letters, form letters, salutation and list-processing messages.

All your mailing needs can be addressed by the Electronic Mailroom. It provides the maximum in flexibility of both form and content.

Word Processing Capabilities

The Electronic Mailroom incorporates powerful word processing functions for document or letter processing.

The power and functionality of word processing works to maximize your efficiency and effectiveness in letter composition. Your important mailings can be generated with all the inherent benefits of word processing.

Ordering Information
See your Digital Sales Representative for ordering information.

VAX Dow Jones Access

Ordering Information

See your Digital Sales Representative for ordering information.

DECmail/RSTS

Description

DECmail/RSTS is an electronic message system that runs on the RSTS/E Operating System. On a single-node system, DECmail/RSTS features the ability to:

- Create, edit, send, and process messages
- Store, search for, and retrieve messages held in user folders

When DECmail/RSTS is used with the optional DECnet/E product, the above features can be used in a multinode environment. In a multinode mode of operation, DECmail/RSTS provides network mail services to other DECmail/RSTS users anywhere in a DECnet network. VAX/VMS systems running the MAIL utility can also exchange messages with systems running DECmail/RSTS.

DECmail/RSTS includes an on-line help facility that provides the user with information that covers most normal situations. The user documentation provides in-depth information on these commands.

DECmail/RSTS provides flexible, easy-to-learn command options. Each user can define default settings for some command options that will allow easy use of the system.

DECmail/RSTS users may choose to call the standard EDT editor for preparation of text messages. EDT option provides the power of the standard editor for RSTS/E systems to users without the need to learn a new set of editing commands.

Features

- On-line help for commands
- Message creation, with or without editing capability (user's option)
- Message answering, with or without editing
- Message forwarding, with or without editing
- Message filing into folders
- Message listings displayed selectively by author or subject
- Distribution lists
- Message printing
- Message deleting
- Ability to send, as a message, an ASCII text file (stream, variable, fixed, or sequential) created outside of the DECmail/RSTS environment
- Ability to export message text into RSTS/E files

Minimum Hardware Required

Any valid RSTS/E system configuration

- DECmail/RSTS uses 62 bytes (31 Kwords) of memory per concurrent user
- The multinode program uses an additional 52 Kbytes (26 Kwords) per concurrent message being delivered
- At least 2000 blocks of free disk space, of which 500 must be contiguous for DECmail/RSTS code. This does not include space for user messages.

DECmail/RSTS can be used from any RSTS/E terminal. The VT05 is only supported as a hard copy terminal, i.e., without using the escape sequences. In addition, word-processing systems (WS78, WS278, and DECmate) running CX protocol are also supported.

Optional Hardware

None

Prerequisite Software

RSTS/E Operating System with 62 Kbytes (31 Kwords) of swap maximum.

Refer to the RSTS/E Optional Software Cross Reference Table (SPD 20.97.xx) for the required version.

Optional Software

DECnet/E

Training Credits

None

Software Installation

Customer Installed

Supported Category

Digital Supported

DECmail/RSTS
Ordering Information

The following key (D, H, M, V, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QR451-AD = binaries on 9-track 800 BPI Magtape (NRZI).

D = 9-track 800 BPI Magtape (NRZI)
H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

QR451-A— Single-use license, binaries, documentation, support services (media: D, H, M, V)

QR451-D— Single-use license-only option, no binaries, no documentation, no support services (media: Z)

Update/Unsupported Options

Users of DECmail/RSTS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.

QR451-H— Binaries, documentation no support services (media: D, H, M, V)

QR451-H— Right-to-copy for single-use, no binaries, no documentation no support services (media: Z)

Miscellaneous Options

QR451-G— User Documentation kit, including User's Guide (media: Z)

QR452-G— System Manager Documentation kit, including System Management and Installation Guide (media: Z)

DECmail/MS-20

Description

DECmail/MS-20 is a mail and filing system that runs on a TOPS-20 Operating System. DECmail/MS-20 features the ability to

- Create, edit, send and process messages on a single or multiple node DECsystem-20
- Store, search for, and retrieve messages held in the user's message file
- Customize the presentation of messages on the terminal

Commands

- READ—Examines incoming or filed messages
- SEND
  - Creates a new message
  - Edits an existing message draft
  - Displays a message draft on the screen
  - Erases all or selected parts of a message draft
  - Inserts a specified file at the end of a message draft
  - Removes the specified user or users from the distribution or the copy list
  - Sends the message to the specified user or users
- REPLY—Provides a response to a memo
- FORWARD—Forwards a received message to another user with added text if desired
- COPY—Copies the specified message(s) from the message file into the file specified
- EDIT—Modifies a memo using the editor selected by the user

When the memo is created, the user supplies the subject and the names of the addressees. The system includes the date of creation and the author's name, which is automatically inserted in the message.

DECmail/MS-20 permits the user to take advantage of editors supported by the operating system, allowing creation and modification of memos. Some TOPS-20 editors provide full screen editing operations on video terminals and others provide command driven line or character editing operations on hard copy terminals.

Initially, DECmail/MS-20 provides status information including the date and time the message file was last read, the number of messages and their subject, the number of pages the message file occupies on the disk, the number of flagged messages, and the current message number. The user can suppress this function.

DECmail/MS-20 security features include user identification and password protection upon entry into the system. File security is provided by the operating system.

DECmail/MS-20 has single-node, as well as multinode capability. Under multinode mode of operation, DECmail/MS-20 provides a network mail service that will deliver messages to other DECmail/MS-20 users anywhere in a DECnet network. In addition to the DECnet interface, the multinode mode provides ARPAnet message pass-through capability to deliver and receive messages from ARPAnet users. Message transfer is spooled so that the destination node need not be available at the time a message is sent.

Minimum Hardware Required

Any valid DECsystem-20 configuration

Prerequisite Software

TOPS-20 Operating System, Version 4.0 or Version 5.0

Training Credits

None

Support Category

Digital Supported

Software Installation

Customer Installed

DECmail/MS-20
Ordering Information

DECmail/MS-20 is available only on 9-track 1600 BPI Magtape (PE) distribution media.

QT215-AM	Single-use license, binaries, documentation, support services
QT215-DZ	Single-use license-only option, no binaries, no documentation, no support services

The base program of DECmail/MS-20 operates only in single-node environment. For network operation to interface with DECnet and ARPAnet users, the multinode option has to be purchased in addition to the base program.

QT214-AM	Single-use license, binaries, documentation, Network option, support services (QT215-AM is a prerequisite)
QT214-DZ	Single-use license-only option, no binaries, no documentation, Network option, no support services (QT215-DZ is a prerequisite)

Update/Unsupported Options

Users of DECmail/MS-20 whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.

QT215-HM	Binaries, documentation
QT215-HZ	Right-to-copy for single-use, no binaries, no documentation
QT214-HM	Binaries, documentation, Network option (QT215-HM is a prerequisite)
QT214-HZ	Right-to-copy for single-use, no binaries, no documentation, Network option, (QT215-HZ is a prerequisite)

DECmail/MS-10

Description

DECmail/MS-10 is a mail and filing system software product that runs on the TOPS-10 Operating System. DECmail/MS-10 features include:

- Ability to create, edit, send, and process messages on a single node DECsystem-10
- Ability to store, search, and retrieve messages held in the user's message file
- Extensive help facilities with explanation and direction for all command prompts
- Ability to customize presentation of messages on terminal

Commands

- READ—Examines incoming or filed messages
- SEND—Helps to
  - Create a new message
  - Display and modify a message draft on the screen
  - Erase all or selected parts of a message draft
  - Insert a specified file at the end of a message
  - Remove the specified user or users from the distribution or the copy list
  - Send the message to the specified user or users
- REPLY—Provides a response to a memo
- FORWARD—Forwards a received message to another user with added text if desired
- COPY—Copies the specified message(s) from the message file into the file specified

When the memo is created the user supplies the subject and the names of the addressees. The system includes the date of creation and the author's name, which is automatically inserted in the message.

Initially, DECmail/MS-10 provides status information including the date and time the message file was last read, the number of messages and their subject, the number of disk blocks the message file occupies on the disk, the number of flagged messages and the current message number. The user can suppress this function.

DECmail/MS-10 security is provided by the operating system. File security is equivalent to that provided for other user files.

Minimum Hardware Required

Any valid DECsystem-10 (KL and KS CPUs) with at least 512 Kwords of memory.

Optional Hardware

None

Prerequisite Software

TOPS-20 Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

DECmail MS-10
Ordering Information

DECmail/MS-10 is available only on 9-track 1600 BPI Magtape (PE) distribution media.

QH215-AM	Single-use license, binaries, documentation, support services
QH215-DZ	Single-use license-only option, no binaries, no documentation, no support services

Update/Unsupported Options

Users of DECmail/MS-10 whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.

QH215-HM	Binaries, documentation
QH215-HZ	Right-to-copy for single-use, no binaries, no documentation

VAX DECalc

Description

VAX DECalc is an interactive applications package for creating, editing, and manipulating the electronic equivalent of an accountant's spreadsheet. VAX DECalc executes in native mode under the VAX/VMS Operating System and drives a VT100-series terminal. VAX DECalc is self-teaching and requires little previous computer experience.

The VAX DECalc spreadsheet consists of a rectangular grid. In each box the user can enter one of the following:

- An alphanumeric "label" (up to 64 characters long)
- A numerical value (up to 12 decimal digits, or up to 12 significant decimal digits within a range of $.29 \times 10^{-39}$ to 1.7×10^{38})
- A "relationship"

  A "relationship" is a mathematical expression that defines the value of the box as a function of the value of other boxes. Among the features and limitations of relationships are:
  - Addition, subtraction, multiplication, division, and exponentiation are supported; as well as various mathematical, statistical, and trigonometric functions.
  - The user can specify, on a global basis, whether expressions are evaluated according to standard algebraic order of precedence, or strictly left to right. The order can also be modified by parentheses.
  - Comments can be included after an expression.
  - Maximum length is 64 characters (including comments).
  - Recursive relationships are not permitted, they are detected and reported as errors.

The maximum theoretical size of the grid is 63 columns by 254 rows and is set as an installation parameter. The practical limit however, is dependent on available memory and/or storage space. VAX DECalc allows multiple grids to be stored and retrieved but users can access only one grid at a time.

Upon entering DECalc, the terminal display screen is divided into:

- A "window" onto the grid
- A set of reserved areas for messages, prompts, and other user interaction.

The window displays a portion of the total grid. The current value of each box within the window is displayed. For boxes containing relationships, the resulting values are displayed.

The number of boxes displayed at any time is a function of various parameters (default start-up = 7 columns x 20 rows). Various portions of large grids can be viewed by "scrolling" the window over the grid.

The user can specify the displayed width for each column, and the display/position formats for each box. Labels, values, and relationships are entered interactively, via the terminal keyboard, as follows:

- The "marker" (highlighted grid box pointer) is positioned to the desired box using the cursor keys. The window will scroll as necessary.
- As new data is entered, it is displayed outside the window. It may be altered or canceled at any time prior to "termination," leaving the grid unchanged.
- When the data entry is "terminated," with the RETURN key or one of the cursor keys, the new data replaces the previous contents of the box. The new value is displayed within the window.
- In the normal AUTOMATIC RECALCULATION mode, if the box just changed is referenced, directly or indirectly, by other boxes, all of the affected boxes will be recalculated. The new values will be displayed if they appear within the window.

VAX DECalc also provides commands for grid manipulation. During command input the user is prompted for any options or suboptions. The user can stop at any point prior to completing entry of the command, leaving the grid unchanged. Some of the major commands include:

- BLANK or CLEAR contents of one or more boxes.
- INSERT, DELETE, or MOVE a single row or column. Grid references within relationships are adjusted to maintain the original "logical" relationship.
- REPRODUCE—Copies the contents of a box or section of boxes into one or more new locations. The user can optionally specify that any grid references be adjusted to maintain the original logical relationship.
- TITLES—Locks headings and descriptions on the screen.
- WINDOW—Splits the screen either horizontally or vertically into two windows. The windows can be scrolled independently or together. A grid box can be given a different display format within each window.

Additional Features

- Privacy Key (PF1)—toggles the screen image on or off, without affecting the contents of the grid.
- HELP Key (PF2)—Provides assistance in the use of DECalc. If the user does not specify a topic, DECalc provides help on the user's current activity.
- Edit Key (PF3)—permits simple modification of the contents of a box.
- Retrieve Key (PF4)—retrieves the contents of the last box that was altered.
- Tabular Data Entry and Automatic Summation—allow strings of numbers to be entered into successive boxes via the keypad, and summed, with a minimum number of keystrokes.

Storage

- Complete grids (including all relationships and formats) can be saved, restored, or deleted from special DECalc "directories." The grids are identified by user-

specified 40-character names. The list of grids stored within a directory can be readily searched via the cursor keys. Grids are stored in a format unique to VAX DECalc. They are not normally accessible to other programs.

In addition to normal operating system security, grids can be stored in encrypted form, keyed to a password. This encryption cannot be overridden by priviledged users.

- Display-format Print files are standard ASCII files that contain the image of a grid. Only the displayed values of boxes are included, thus the grid cannot be reconstructed from a Display-format file. These files are suitable for printing and editing into documents.

  Any contiguous portion of the grid (up to 132 characters wide) can be output. A special default permits selection of the current window image. Multiple selections can be appended to a Print file.

- Dump-format Print files are standard ASCII files containing commands that reconstruct the grid. The grid can be recreated from a Dump file by reading it in as a Command File. A Dump/Command file can also be edited or modified by another program before being reloaded.

Minimum Hardware Required

Any valid VAX/VMS system configuration with one of the following terminals:

- VT100 (with or without Advanced Video Option)
- VT125
- VT101/102/105/131

A minimum line speed of 1200 baud is recommended for performance.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Support Category

Digital Supported

Software Installation

Customer Installed

VAX DECalc
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services	QC310-AG	QD310-AG	QE310-AY
Single-use license-only option, no binaries, no documentation, no support services	QC310-DZ	QD-310-DZ	QE310-DZ
Update/Unsupported Options Users of VAX DECalc whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC310-HG	QD310-HG	QE310-HY
Right to copy for single-use, no binaries, no documentation	QC310-HZ	QD310-HZ	QE310-HZ
Miscellaneous Options Documentation-only kits	QC310-GZ	QD310-GZ	QE310-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QE310-AY = binaries on RX01 Floppy Diskette.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

MULTIPLAN
For DECmate II

Digital distributes this Software Product under license from Microsoft Corporation.

Description

MULTIPLAN for DECmate II, developed by Microsoft Corporation, is an electronic worksheet designed for a wide range of interactive planning, budgeting, forecasting, and analysis problems. MULTIPLAN for DECmate II runs under the control of the DECmate II CP/M® 2.2 Operating System.

MULTIPLAN for DECmate II edits worksheets defined on a grid of 255 rows by 63 columns. Because of memory limitations, it is not possible to use all of the grid cells for calculation at one time, but MULTIPLAN for DECmate II allows the linkage between the worksheet in use and data contained on worksheets that have been filed on the disk so that large planning problems can be broken down into manageable segments with automatic data interchange.

MULTIPLAN for DECmate II is menu operated. The following commands are provided:

Alpha:	Insert text
Blank:	Clear cells
Copy:	Replicate contents of cells
Delete:	Remove rows or columns from the worksheet
Edit:	Modify the value or formula assigned to a cell
Format:	Define the screen presentation of the data in a cell or of the entire screen
Goto:	Move the cell printer to a named area or worksheet coordinate
Help:	Get an explanation of a command or options
Insert:	Put in a new row or column between existing rows or columns
Lock:	Protect a cell from inadvertant modification
Move:	Move a row or column to a new place in the worksheet
Name:	Assign an alphabetic name to a section of the sheet
Options:	Set certain global parameters
Print:	Define printing format and initiate output to a printer or disk file
Quit:	Return to CP/M from MULTIPLAN
Sort:	Rearrange a set of cells according to their contents in ascending or descending order
Transfer:	Read or Write worksheets to disk files in internal or SYLK interchange format
Value:	Attach a formula or numeric value to a cell
Window:	Divide the visible screen into up to 8 independently scrollable windows in the worksheet

Xternal: Copies or links the worksheet with data in other saved worksheets

The following Calculation functions are provided:

ABS	AND	ATAN	AVERAGE
COLUMN	COS	COUNT	DOLLAR
EXP	FALSE	FIXED	IF
INDEX	INT	ISERROR	ISNA
LEN	LN	LOGIO	LOOKUP
MAX	MID	MIN	MOD
NA	NOT	NPV	OR
PI	REPT	ROUND	ROW
SIGN	SIN	SQRT	STDEV
SUM	TAN	TRUE	VALUE

Minimum Hardware required

DECmate II Personal Computer including

- PC2K1-A country kit
- VR201-A black and white monitor
- PC278-A system unit with 6120 Single Board Computer and dual RX50 drive
- PC27X-AA Z80 Auxiliary Processing Unit including CP/M Operating System

MULTIPLAN requires 106 Kbytes of disk storage and 64 Kbytes of minimum memory.

Optional Hardware

The software supports the use of the RX50-XA dual floppy drive and the following printers:

- LA50 100cps Dot Matrix
- LA100 240cps Dot Matrix
- LQP02 32cps Letter Quality Printer

Prerequisite Software

DECmate II CP/M® 2.2, Version 1.0 Operating System supplied with the PC27X-AA Z80 option card

Training

None

Installation

This Software Product is engineered to be installed by the customer.

MULTIPLAN for DECmate II Ordering Information	
MULTIPLAN for DECmate II is available only on RX50 diskette distribution.	
QA064-C3	Single-use license, binaries, documentation, no support services.
Additional Copies of Documentation	
AV-P233A-TV	MULTIPLAN Reference Card for DECmate II
AV-P234A-TV	MULTIPLAN Registration Card for DECmate II
AA-P232A-TV	MULTIPLAN Reference Manual for DECmate II
AV-P596A-TV	MULTIPLAN Getting Started for DECmate II
AA-R247A-TV	MULTIPLAN Tutorial for DECmate II

MULTIPLAN-86
For the PC100 (Rainbow)

Digital distributes this Software Product under license from Microsoft Corporation.

Description

MULTIPLAN-86 is an electronic worksheet designed for a wide range of interactive planning, budgeting, forecasting, and analysis problems, developed by Microsoft Corporation. MULTIPLAN-86 runs under the control of the CP/M®-86/80 Operating System.

MULTIPLAN-86 edits worksheets defined on a grid of 255 rows by 63 columns. Because of memory limitations, it is not possible to use all of the grid cells for calculation at one time, but MULTIPLAN-86 allows the linkage between the worksheet in use and data contained on worksheets that have been filed on the disk so that large planning problems can be broken down into manageable segments with automatic data interchange.

MULTIPLAN-86 is menu operated. The following commands are provided:

Alpha:	Insert text
Blank:	Clear cells
Copy:	Replicate contents of cells
Delete:	Remove rows or columns from the worksheet
Edit:	Modify the value or formula assigned to a cell
Format:	Define the screen presentation of the data in a cell or of the entire screen
Goto:	Move the cell printer to a named area or worksheet coordinate
Help:	Get an explanation of a command or options
Insert:	Put in a new row or column between existing data
Lock:	Protect a cell from inadvertant modification
Move:	Move a row or column to a new place in the worksheet
Name:	Assign an alphabetic name to a section of the sheet
Options:	Set certain global parameters
Print:	Define printing format and initiate outout to a printer or disk file
Quit:	Return to CP/M 86/80 from MULTIPLAN 86
Sort:	Rearrange a set of cells according to their contents in ascending or descending order
Transfer:	Read or Write worksheets to disk files in internal or SYLK interchange format
Value:	Attach a formula or numeric value to a cell
Window:	Divide the visible screen into up to 8 independently scrollable windows into the worksheet
Xternal:	Copies or links the worksheet with data in other saved worksheets

The following Calculation functions are provided:

ABS	AND	ATAN	AVERAGE
COLUMN	COS	COUNT	DOLLAR
EXP	FALSE	FIXED	IF
INDEX	INT	ISERROR	ISNA
LEN	LN	LOGIO	LOOKUP
MAX	MID	MIN	MOD
NA	NOT	NPV	OR
PI	REPT	ROUND	ROW
SIGN	SIN	SQRT	STDEV
SUM	TAN	TRUE	VALUE

Minimum Hardware Required

PC-100 Personal Computer consisting of:

- PC100A CPU and dual drive floppy diskette
- VR201-A Monitor
- PC1K1-AA Country Kit with Keyboard

MULTIPLAN requires 102 Kbytes of disk storage and 64 Kbytes of memory.

Optional Hardware

DEC LA34, LA50, LA100, LA120, LQP02, LA12, PC/XX-AA 64K random access memory, PC/XX-AB 192K random access memory

Prerequisite Software

CP/M-86/80, Version 1.0.4 (1.1) Operating System

Training

None

Installation

Customer Installed

MULTIPLAN-86
Ordering Information

MULTIPLAN-86 is available only on RX50 floppy diskette distribution media.

QA063-C3	Single-use license, binaries, documentation, no support services.
Additional Copies of Documentation	
AA-N587A-TV	MULTIPLAN-86 Users Guide
AA-P645A-TV	MULTIPLAN-86 Reference Manual

Supercomp-Twenty

Digital distributes this software product under license from Access Technology, Inc.

Description

Supercomp-Twenty is a high-end electronic spreadsheet which allows the user to work through a worksheet of numeric and alphabetic information, part of which is seen on the user's screen. By entering text (labels), numbers and expressions in the cells of the worksheets, the user creates a model of the work. Labels can be constrained to show only in the cell they are in, or can be shown in as many cells as it takes to show the text, until a non-empty cell is encountered.

The recalculation feature allows the user to change the contents on one or more cells, and see the effects of that change throughout the worksheet. The key feature of answering "what if" questions is important to many fields and applications.

On-line help is available at all times and the help message appears on the screen, either in the middle of a command or a function.

Supercomp-Twenty works on a spreadsheet of up to 1,000 rows by 1,000 columns, each numbered from 0 to 999. The user can move through the spreadsheet with the cursor keys, the "go to" command, or the "page" command.

The contents of the "current cell" (the one where the cursor is located) are shown at the top of the screen in the entry line, along with any pertinent formatting and cell information. Each cell may be empty (blank), contain text information, contain a number, or contain a function or expression. The user may edit or change the contents of any cell. Cells may be "Locked" to protect accidental changes.

Supercomp-Twenty allows the user to vary the width of any single column, establish global format specifications, and individually format any cell. Format choices include dollar and cents, percent, integer or a fixed number of decimal points, or scientific notation. Additionally, cells may be locked or unlocked.

When replicating is being done, the user has the choice of replicating only the cell format, only the cell value, or both format and contents. Unlike most other electronic spreadsheets, the user specifies whether cell references are absolute or relative when the expression is written, rather than at the time the replication is done.

Unlike other electronic spreadsheet offerings, Supercomp-Twenty allows the user to specify non-contiguous ranges when replicating, printing, or doing other commands that allow a range for processing. The user may save and load worksheets to the disk, save printable copies on disk, or send them directly to the printer. Through the data import and export mode, data can be shared with a wide variety of other programs, including databases.

Whenever the user inserts, moves, or deletes a row or column, Supercomp-Twenty makes a backup copy of the worksheet which can be recovered should an error occur.

Supercomp-Twenty supports the use of command files to facilitate repetitive operations including spreadsheet consolidation. The user can create the command files directly on the spreadsheet by creating the command file as a sequence of labels, and saving it with the PRINT command.

Minimum Hardware Required

Professional 325 or 350 with 256K of memory

Supercomp-Twenty requires 409 blocks of disk space and an additional 70 blocks is needed for the demonstration files.

Optional Hardware

LA50 or LQP02 printers

Prerequisite Software

P/OS Hard Disk Operating System, Version 1.5 or P/OS Diskette Operating System, Version 1.5.

Optional Software

None

Training

None

Installation

Customer installed

Support Category

Customer supported

DCS Classification

Digital Service-Approved

Software Protection

This software product contains measures that bond the product to the specific CPU upon which it is first installed. The bonding inhibits the transferring of the software to any other CPU, and inhibits the installation of the software on any other CPU.

Supercomp-Twenty
Ordering Information

Supercomp-Twenty is available only on RX50 Double Density diskette distribution media.

QA476-C3	Single-use license, binaries, documentation, no support services.
Additional Copies of Documentation	
AA-W923A-TH	How to Use Supercomp-Twenty
AA-W924A-TH	Supercomp-Twenty Handbook
AA-W925A-TH	Supercomp-Twenty Installation/Release Notes
AA-W926A-TH	Supercomp-Twenty Pocket Guide
AA-X609A-TH	Modeling and Supercomp-Twenty

Lotus 1-2-3 Integrated Spreadsheet, Information Management, and Graphics

Lotus 1-2-3 combines the power of three programs—a spreadsheet program for "what if" analyses, database commands to organize and select the information you want, and a graphics program for visual representations of your data. 1-2-3 is so fast that you can call up information and graph the results in a matter of seconds. 1-2-3 is ideal for business people who need a powerful analysis tool, without spending a lot of time learning how to use it.

The HELP key provides on-screen instruction for any part of the program. The commands, which are free from computer jargon, are the same throughout the program, saving you the frustration of learning commands from three different sources.

1-2-3 is a 16-bit application program that runs on the Rainbow personal computer under the MS-DOS operating system. 1-2-3 takes advantage of many of Rainbow's special function keys. Since Rainbow's numeric keypad is separate from the arrow keys for cursor movement you can enter numbers easily. So you'll be able to do your spreadsheet work more efficiently.

The Spreadsheet

- 1-2-3 offers 2048 rows by 256 columns—an exceptionally large workspace for an electronic spreadsheet.
- 1-2-3 works extremely fast, because it is written in assembly language. You can change the data in your worksheet and see extremely fast results.
- 1-2-3 contains 44 built-in functions to speed your work in model building. It calculates internal rate of return, net present value, and other financial functions. Statistical, mathematical, and logical functions are included as well, and 1-2-3 keeps track of the date, too.
- You can name a range of cells for inclusion in a formula. This means that you can refer to a group of cells in plain English.
- For long titles, labels can extend over cell boundaries. You can format the individual cells any way you want, varying the column widths to fit your needs.
- Recurring titles can appear on each page as a header or footer, complete with the date and page number, to give your reports a more professional appearance.

Information Management

- The "/Data" commands turn the spreadsheet into a database by using the column/row structure to store information. That's why 1-2-3's database is so easy to use. Until you use the data commands to process a database, it's just a collection of cell entries.
- The first row contains the field names, of which there can be 256. Each subsequent row is a record, with the maximum number of records at 2047.

- You can reorder rows of entries by a primary and secondary key with the "/Data Sort" command. So, for example, you can sort your personnel list by department with the employees in each department listed alphabetically by name.
- The "/Data Query" operations let you select the records you want from a database, using up to 32 criteria. You can then use these records for spreadsheet analysis. 1-2-3 will even make sure that no two records are the same, extracting the duplicates.
- You can obtain sums, averages, standard deviations, variances, and more for values in a specified field for just those records that interest you.
- With the "/Data Table" command, you can perform "what if" analyses on a selected part of the spreadsheet. You can then convert the tables into graphs.

Graphics

- You can create bar, pie chart, stacked bar, line, and xy graphs of different sizes with the "/Graph" commands in less than two seconds for visual presentations of your spreadsheets.
- To use graphs for "what if" analyses, you change a variable on the spreadsheet, touch a key, and draw a graph that displays the results instantly.
- Once a graph has been created, you can display it in another form in just three keystrokes. Graph settings are named and stored in a file you retrieve from a menu.
- You can create, display, and modify the graph until you think it is right, before printing it.
- Labels, legends, and titles can be added in different ways depending on graph type.
- 1-2-3 will draw graphs quickly on Rainbow's monochrome monitor or—in multiple colors—on Rainbow's color monitor.

Easy to Use

- 1-2-3's tutorial diskette, supplied with the package, prompts you through the process of building 1-2-3 applications, checking the entries for correctness. You can work at your own speed, choosing the lessons that you want to work on.
- Help is always available on any command or function. Pressing the Help key will provide you with clearly written, on-screen instructions in less than 15 seconds. The screens are cross-indexed to related screens for further help.
- 1-2-3 prompts you in plain English, so you won't have to familiarize yourself with computer jargon.
- You can protect important cells in your model, so untrained personnel can enter information in specific cells without fear of damaging data unintentionally.

1-2-3 Specifications	
Prerequisite Software	MS-DOS, V2 Operating System
Minimum Hardware Required	Rainbow personal computer with Graphics Option (PC1XX-BA) 256K bytes of random access memory

For further information, including any version number requirement for the operating system, please refer to the *Keys to Digital's Warranty Service* and the *Software Product Description.*

1-2-3 (QA528-C3) Media and Documentation kit includes:

- 1-2-3 Software on five RX50 diskettes:
  - -System diskette
  - -Backup system diskette
  - -Tutorial diskette
  - -Print graph diskette
  - -Utility diskette
- 1-2-3 license and *Software Product Description*
- 1-2-3 *User's Manual*

MAPS/Pro Financial Modeling

Digital distributes this Software Product under license from Ross Systems, Inc.

Description

MAPS/Pro Financial Modeling provides a distributed financial planning environment for the individual manager and the entire financial department, running on a Winchester disk-based Professional 350. This software product performs planning and analytical functions. It incorporates a database management subsystem for quick access to information while maintaining a standard format for systematic company-wide modeling and reporting.

Features

- Includes an interactive command language and editor, financial three-dimensional data base subsystem, a procedural modeling language, a tubular generator and a financial function library
- Provides a facility for consolidating departmental budgets, Consolidation Control File (CCF)
- Both command and menu driven for model creation
- Self-teach module (introductory primer with self-guiding instructions)

Minimum Hardware Required

Any valid Professional 350 system configuration

Optional Hardware

One of the following printers:

LA50, LA100, LQP02

Prerequisite Software

P/OS Hard Disk Operating System, Version 1.1

Optional Software

None

Software Protection

This software product contains measures that bond the product to the specific CPU upon which it is first installed. This bonding inhibits the transferring of the software to any other CPU, and inhibits the installation of the software on any other CPU.

Training

None

Software Installation

Customer Installed

Support Category

Customer Supported

Additional Services

Training, support and maintenance is available from Ross Systems, Inc. 1860 Embarcadero, Palo Alto, CA 94303

DCS Classification

Digital Tested

This software product has been tested on the minimum hardware and prerequisite software listed above.

MAPS/Pro Financial Modeling Ordering Information

MAPS/Pro Financial Modeling is distributed on RX50 floppy diskette distribution media.

QA431-C3	Single-use license, binaries, documentation, no support services (media: 3).

EMPIRE

Digital distributes this Software Product under license from Applied Data Research Inc.

Description

EMPIRE is a Decision Support System which facilitates financial modeling, analysis, and reporting.

Features

- Procedural modeling language that allows the user to define a problem as a column and row matrix (spreadsheet)
- Function library for finding various financial, mathematical, and statistical values such as depreciation, rate of return, present value, loan payments, amortization, compounding, payback, averages, minimums, maximums, growth rates, and simple regression
- Data manager for entering and saving data, inquiries, and consolidations
- Report writer for documents customized to the user's specifications
- Graphics facility for the pictorial display of any information in the model, in black and white or color, including hardcopy
- Interactive assumption analysis, including 'what if' sensitivity, target value (goal seeking), and impact analysis
- Risk analysis in the form of Monte Carlo simulation; and data analysis and forecasting methods including simple regression, multiple regression, exponential smoothing, moving averages, seasonal analysis, and ARIMA (Box-Jenkins) analysis

Minimum Hardware Required

Any valid VAX-11/730, VAX-11/750, or VAX-11/780 system configuration with

- Minimum of 100 KB of memory for EMPIRE
- Minimum of 15,000 blocks of disk storage for EMPIRE

Optional Hardware

Digital's GIGI VK100-AA, Tektronix 4010 and 4020 series, and Hewlett-Packard 7221 plotters for true graphic output

Prerequisite Software

VAX/VMS, Version 3.2

VAX FORTRAN, Version 3.1

Optional Software

None

Training

None

Installation

Customer Installed

Support Category

Customer Supported

Warranty

None

This software is provided "AS IS" without any warranty of any kind, either express or implied.

EMPIRE
Ordering Information

Empire is available only on 9-track 1600 BPI Magtape (PE) distribution media.

QA349-CM	Single-use license, binaries, documentation, no support services.
Additional Copies of Documentation:	
AA-V343A-TE	Empire User Reference Manual
AA-V345A-TE	Empire Installation Guide
AA-V348A-TE	Empire Update Notes, V3B
AA-V346A-TE	Empire VAX/VMS Update Notes Rev. 02/03
AV-W791A-TE	Empire Release Notes, V3B-R03
AA-W790A-TE	Empire Tutorial

Calendar Management

Description

Calendar Management software provides an automated time management system that allows users to maintain a personal calendar of workday activities, to schedule their appointments, schedule meetings with other users of Calendar Management and to maintain a tickler list. Each feature can be printed for a specified day or an entire week.

Features

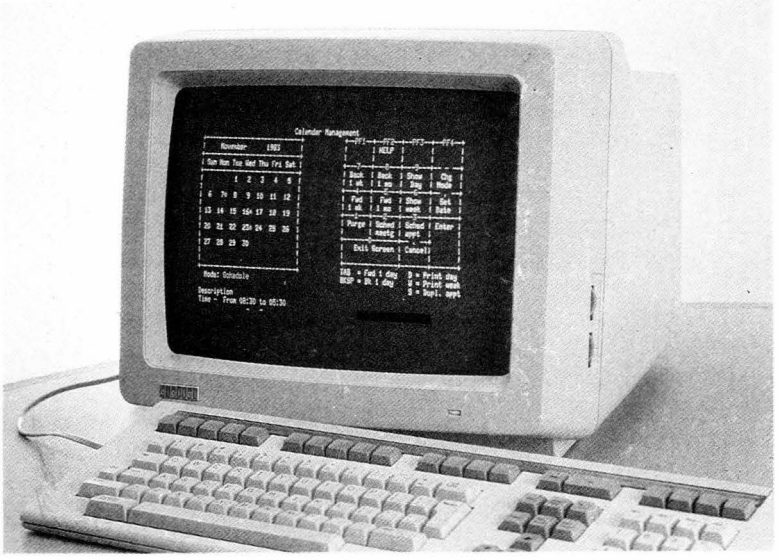
Appointment Scheduling—The user can schedule an appointment in a time slot on a chosen day.

Meeting Scheduling—Meetings can be scheduled with other users (up to 16 attendees) of Calendar Management software. The user scheduling the meeting states the desired date, time, and length of the meeting. A search is made of the attendees calendars for an available slot to schedule the meeting.

Attendance Confirmation of a Meeting—Each attendee confirms intentions of attending a meeting. If the attendee responds no, the tentative meeting entry is removed from the attendee's calendar.

Check Confirmations of Other Attendees—The meeting's originator can determine the status of the attendees confirmation responses.

Meeting Cancellations—Upon cancellation of a meeting by the originator, all attendees are notified.



Calendar View—All scheduled activities entered, such as meetings and appointments, can be reviewed in detail for a specific day or an entire week.

Tickler File—A tickler file is provided to maintain a list of important items for which the user wishes to be reminded. The tickler file can accommodate up to 20 items per day and can be reviewed for an entire day or week.

On-line Help Facility—This facility presents on-line assistance in performing current functions and provides system introduction and training. The Help facility operates at two levels; short reminder and detailed description. Access to the Help information is available by pressing the Help key.

Minimum Hardware Required

Any valid VAX/VMS system configuration with VT100 video terminals and at least 300 blocks of disk program storage

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System, Version 3.0.

Calendar Management is also available in ALL-IN-1 Office Menu application package.

Note: Calendar Management has non-sharable code but can be made sharable by using VAX FMS.

Optional Software

None

Training

None

Software Installation

Customer Installed

Support Category

Customer Supported

Warranty

None

This software product is provided "AS IS" without any warranty of any kind either express or implied.

Calendar Management Ordering Information	
QA089-C	Single-use license, binaries, documentation, no support services (media: G, Y).
QA089-D	Single-use license-only option, no binaries, no documentation, no support services (media: Z)
Additional Copies of Documentation:	
AA-N375A-TE	Calendar Management Users Manual, V1.5
AA-N376A-TE	Calendar Management Acceptance Test Plan V1.5
AV-N954A-TE	Calendar Management Release Notes V1.5

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QA089-CG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge
Y = RX01 Floppy Diskette
Z = No hardware dependency

BASIS-OA

Ordering Information

See your Digital Sales Representative for ordering information.

VAX/VMS Operating System

Description

System Overview

The VAX/VMS Operating System supports all VAX series computers, working reliably and efficiently in both time-sharing and production environments. Time-sharing users can work interactively with the system and can submit batch jobs. Jobs of all types, including processor intensive, I/O intensive, large memory, and real-time, in any mix, perform well on VAX/VMS. The system permits an absolute limit of 8192 concurrent processes. However, the actual amount of work supported at one time with good performance depends on the types of processing performed as well as on the physical memory and secondary storage available. The practical limit, with moderate per-user workloads, is in excess of 100 concurrent users for a large-scale system.

System Configuration

The user receives with VAX/VMS a standard system configuration file and a site-independent start-up procedure. The user can modify the site-independent start-up procedure or create a site-specific start-up procedure. To start the system, the user performs a bootstrap operation. Optionally, the parameter values of the selected file can be modified at bootstrap time. The system configures itself by executing the start-up procedures. After system start-up, the user can reset system parameter values on-line for the next bootstrap operation and can dynamically change a subset of the parameter values, i.e., change the configuration of the running system.

To aid the user in setting up system parameters, a procedure is provided that analyzes the system configuration and generates a file containing parameter settings. This file can be modified by the user and a system parameter file generated. In addition, the system incorporates self-tuning mechanisms. For example, the system monitors job performance and increases the amount of physical memory for jobs that need it and decreases the amount for jobs that do not. However, the user is always free to modify system parameters to suit special situations or to fine-tune. For example, the user has the ability to govern the real memory limits for each job. Services are provided for monitoring system performance and for adjusting system parameters.

The user starts the system from a console and a storage device that contains the bootstrap routine. After the system starts, the user can operate the system from any terminal. An automated procedure for shutting down the system in an orderly manner (telling interactive users to log off, spinning down disks, etc.) is provided with the system.

General Access

User access to VAX/VMS is by means of a command language. Two command languages are supplied with the system: the Digital Command Language (DCL), the standard command language for VAX/VMS; and the Monitor Console Routine (MCR), supplied for compatibility with RSX-11M, Version 3.2 systems.

DCL commands take the form of a command name followed by qualifiers. The commands can be typed on the terminal, included in command procedures, and submitted as batch jobs (either from the terminal or the card reader). The commands provide basic system services, initiate system utility programs, and initiate user programs.

Many qualifiers exist to provide detailed levels of control where needed. However, most qualifiers have default values so that the typical command consists only of the command name and a few qualifiers. In addition, command names and keywords can be abbreviated. Another facility that saves keystrokes is the ability to substitute symbolic names for commands. For example, the user might equate a lengthy command to a short symbolic name. Thereafter, only the short name need be typed to execute the command.

On erroneous input, the user receives a message. The user can obtain on-line documentation by typing HELP followed by the name of a command and (optionally) a qualifier. The help facility can be used in an interactive mode and also is available within many of the interactive utility programs.

In addition to the usual services of an operating system in support of program development and operations, VAX/VMS provides the following services that enable nonprogrammers to process data:

- Text processing—The general user requires a few days to learn how to use one of the text editors supplied with the system.
- Mail facility—A personal mail facility permits a user to send messages to any other user by typing the recipient's name, the subject of the message, and the text of the message. If the recipient is logged in, a notification that new mail has arrived appears on the recipient's terminal. Otherwise, the recipient is notified of the new mail at log-in time. Mail recipients can reply to messages and forward them to other users. Messages can be examined, printed, filed, and edited at the terminal. A directory and search capability is incorporated to permit rapid scanning of mail files. Multinode operation is available if DECnet-VAX is installed.
- Phone facility—An interactive communication utility with networking capability (optional DECnet-VAX license is required for multinode operation).
- Disk I/O—The general user can create and process sequential character files with a few simple DCL commands. Processing includes editing, expanding, copying, sorting, merging, and deleting files.

- Command-level programming—The general user can create special files, called command procedures, that contain a series of DCL commands. When a user invokes a command procedure, the system processes all the commands. Command procedures save many keystrokes by permitting the user to catalog series of often-entered commands. In addition, the user can take advantage of special DCL commands to perform programming-type functions such as assigning symbolic names, evaluating numerical and logical expressions, accepting parameters, communicating with the interactive user invoking the command procedure, performing conditional (IF) and branching (GOTO) logic, and handling conditions.

VAX/VMS provides a number of line-mode editors and a line-mode/character-mode editor called EDT. In character mode (also known as keypad mode), EDT permits the user to quickly insert and delete any amount of text within the existing text. Some of the capabilities are as follows:

- Position—The user can move a cursor up, down, right, left, to the next word, to the preceding word, or to the end of the line to be in position for an editing operation.
- Insertions—To insert text, the user simply types the characters.
- Deletions—The user can delete the current character or word, the preceding character or word, or blocks of text.
- Cut and paste—The user can move blocks of text from one position to another.
- Searches—The user can search for the next or preceding occurrence of a particular string of characters.

EDT logs changes and replays them on demand should a failure occur during an editing session.

Other system components that aid the general user include the *VAX/VMS Primer*, a manual that provides simple introductory steps for using the system, and EDTCAI, a computer-aided instruction course for learning EDT.

Finally, the general user has access to any facilities that the applications programming user makes available through application systems built on top of VAX/VMS. Programming users, for example, might construct an inventory system that permits general users to query and update indexed files that hold the inventory data.

Program Development

VAX/VMS provides a comprehensive set of tools for developing programs including editors (such as EDT for producing and editing source programs), a file differences utility, programming languages, a linker, a librarian, a symbolic debugger, and a patch utility. The assembly-level VAX MACRO language is supplied with all systems.

The file differences utility contrasts two files by automatically aligning matching text and optionally ignoring comments, empty records, trailing blanks, and multiple blanks. Output can consist of a side-by-side display of differences, a file-by-file list of differences, an interleaved list of differences, a list with change bars, or an input file for the batch editor.

The linker binds programs written in the various languages into executable and shareable images. Shareable programs permit the storage of code and data used by many executable images as a single disk file and permit this code and data to be shared in physical memory at image run time. The linker encourages the modular development of application systems by permitting images to be written as small modules and then bound into a large image, and by binding programs written in different languages. (Programs written in all native-mode languages can call one another.) The large per-process address space provided by the system removes any requirement for program overlays.

The VAX Common Run-Time Procedure Library provides general string manipulation, I/O and I/O conversion, terminal independent screen handling, date/time, mathematics, G- and H-floating point emulation, resource allocation, signaling and condition handling, syntax analysis routines and cross reference procedures that can be called from programs written in VAX MACRO or any optional, native-mode high-level languages.

The common run-time procedure library provides run-time support for the VAX native-mode, high-level languages BASIC, COBOL, FORTRAN, PL/I, and Pascal. All routines in the common run-time library follow standard call and condition handling conventions and most are contained within a shareable image.

At a lower level, programs can call the system directly for event flag, asynchronous system trap, logical name, record and file I/O, process control, timer, conversion, condition handling, lock management, and memory management services. Again, the system uses standard call and condition handling conventions.

Programmers using native mode, high-level languages need not worry about the mechanics of calling the common run-time procedures or the base system services. The necessary functions are built into the VAX languages. However, the various levels of detail are available for those with special requirements, for example, programmers constructing real-time applications. In addition, the user can add procedures to the common run-time procedure library and can write new system services.

A system utility, sort/merge, creates sorted files from unsorted binary or character input and merges several sorted files into one, in ascending or descending sequence based on one or more keys.

The sort/merge routines can be invoked as a utility through DCL commands or can be called as subroutines by user programs. In addition to the usual record sort, the sort/merge routines provide tag, address, and index sorts.

A librarian utility permits the programmer to efficiently store object modules, macros, help text, or any general record-oriented information in central, easily accessible files. Object modues are automatically incorporated in images by the linker as they are referenced by calling programs. Macros are automatically included in the source code of VAX MACRO programs as the programs are assembled. Programs can call librarian routines to access help text or general information stored in a library file.

A symbolic debugger permits programmers to trace program execution and to display and modify program contents using the same symbols that are in the source code. Working interactively with DCL-like commands, the programmer can

- Set breakpoints—Specify locations in the program where execution will temporarily halt
- Set tracepoints—Specify locations or operation codes which, if used, will cause a message to be displayed during program execution
- Set watchpoints—Specify locations, that, if modified, will cause a message to be displayed during program execution
- Step through the program—Execute the program on a line-by-line basis
- Examine locations—Display the contents of a location
- Modify locations—Change data and instructions at a location
- Call routines—Call routines in the program from the interactive command level
- Log the debugger session—Place a record of the debugger session in a log file
- Run from a command procedure—Invoke a command procedure that contains debugger commands (created from a log file and/or an editing session) to rerun a previous session, to continue a previous session, or to check a series of items in the program

Expressions and data formats are generally similar to those of the language in which the program being debugged is written.

A patch utility permits the modification of programs without recompilation and linking. Fixes are applied directly to the executable image files. Locations in programs, however, can be addressed using the same symbols that are in the source code (i.e., the programmer does not have to interpolate from listings and maps). In addition, the utility automatically relocates patches that are larger than the program content being replaced.

The definition, creation, loading, and maintenance of efficient VAX RMS Indexed Sequential (ISAM) files is facilitated by a set of utilities that are integrated by a common File Definition Language (FDL). Analysis of the current state of any RMS file provides information on the file's internal efficiency and validity. The space efficiency of an RMS ISAM file can be improved with a reclamation utility. The most appropriate set of RMS file parameters can be found with an RMS file

tuning tool. The utilities that create, efficiently load and reclaim space in RMS files can all be called by user programs as well as invoked from the DCL command language. They reside in shareable images.

Operations

The basic unit of execution in VAX/VMS is the process, which consists of context and executable images. The context identifies the process and describes its current state. The executable images consist of system and/or user programs that have been compiled and linked.

Processes receive processor time for the execution of their images on an event-driven, preemptive priority basis. Each time an event such as an I/O interrupt occurs, the system services the event, then passes control to the highest priority process ready to execute (even if the process that had control before the event could continue to execute). Processes can be assigned base priorities in the range of 0 to 31, with 4 (as a typical default) the norm for time-sharing users and applications that are not time critical. The system automatically adjusts priorities whose bases are in the range of 0 to 15 to favor I/O-bound processes. Interactive users do not have to wait long periods while computation bound processes tie up the processor. Real-time processes can be assigned higher priorities to ensure that they receive processor time whenever they are ready to execute. The system does not adjust priorities whose bases are in the range of 16 to 31, nor does it raise above 15 priorities whose bases are in the range of 0 to 15.

Processes can be started in the following ways:

- User log-in—When an interactive user logs in, the system creates a process for the user. The process provides an environment in which the user can communicate with the system to name images to be executed and to perform other activities.
- Explicit creation—A user can specify the creation of a new process. In creating a process, the user names an image that will be executed when the process starts.
- Batch job—A user can name images to be executed and other activities to be performed and can submit this information to the system as a batch job either from a terminal or a card reader.

The system queues batch jobs for execution. The user can regulate the number of queues and the number of streams per queue (that is, the number of batch jobs in the queue that can execute concurrently). Time-sharing users can enhance performance by restricting interactive use of the system to work that requires immediate responses (such as editing), by submitting as batch jobs work that requires lengthy execution times, and by limiting batch streams to a number that is reasonable for the system configuration.

Different batch job queues may have different attributes such as the maximum CPU time permitted, working set size, and priority. Facilities are provided for starting and stopping queues, as well as the jobs in a queue. Jobs in a given queue can be removed or held until a particular time.

Peripheral devices can be controlled by the system or allocated by individual processes. At least one disk must be a system disk and must contain the system images and other system files. Users can designate other disks as system or group disks for the general use of all users logging in to the system or for a subset of users known as a "group." Interactive terminals are controlled by the system, and the system normally controls one or more printers.

Print queues, both generic and specific (with forms recognition) together with queue management facilities give the user versatile print capabilities.

The user can designate system-controlled printers as spooled devices for the output of queued print jobs, so that individual processes can specify printed output without actually having to allocate a printer. Processes submit printed output as jobs to print queues. Within each queue, print jobs are processed serially by priority; jobs with the same priority are processed on a first-in/first-out basis. A print queue can be associated with one or more printers. The next job in the queue goes on the first free printer associated with the queue. Special forms and printer characteristics can be specified, and print jobs can be started, stopped, restarted, held, and aborted.

Processes can allocate devices that are not for general use. For example, an interactive user might allocate a tape drive on which to back up some disk files. An application system might allocate 12 terminals, two disk drives, and a printer to be used exclusively for certain production work.

Each process is permitted an address space as large as four gigabytes (one of which is reserved) with an upper limit of one gigabyte on program size. In practice, processes use more modest address spaces; but even so, many processes, some requiring extensive space, can be running concurrently. VAX/VMS uses the following two mechanisms to provide sufficient physical memory for the many processes using the system:

- Paging—The system allots physical memory to a process as needed up to a user-specified limit (typically in the ranges of 50 to 100 kilobytes for interactive users and 200 to 300 kilobytes for batch jobs). If memory in excess of the limit is needed, the system allows the physical memory requirements to expand to a quota and then releases some of the process code and data already in memory (taking care to preserve modifications) to make room for the new code and data. The released code and data is initially cached in memory in case it is needed again, but later it may be removed from physical memory (modifications being written to disk) depending on process directives and total system operations.
- Swapping—If too many processes exist to fit in physical memory, the system stores some of the processes on disk. The system monitors process status changes and ensures that the highest priority processes ready to execute are in physical memory. In addition, the system will attempt not to swap an executable process out of memory until the process has accomplished work for a minimum (configuration specified) period of time.

Paging and swapping should not be high overhead activities as long as concurrent processes do not exceed a reasonable number for physical memory, secondary storage, and the types of processing being performed. The in-memory cache for released code and data, the technique of paging each process against itself, and the assurance that ready-to-execute processes are in memory combine to minimize overhead.

If desired, processes can exercise control over memory management. A real-time process, for example, could inhibit the paging and/or swapping of critical code and data.

The system maintains structures in physical memory for sharing code and data among processes, for synchronizing image execution among processes, and for communicating (sending messages) among processes. User processes create and control the structures by requesting appropriate services of the system. Non-shared structures and shared structures can be protected against access by other processes.

The system minimizes operating system overhead by taking advantage of the following VAX hardware features:

- Context switching and queue instructions—To schedule processes quickly and efficiently
- Software interrupt delivery mechanism—To minimize the processor time required to return from performing a service
- Asynchronous system trap delivery mechanism and queue instructions—To minimize the processor time required for I/O processing
- Interrupt priority levels—To improve I/O response time

Reliability

The system handles errors as transparently as possible while maintaining data integrity and providing sufficient information to diagnose the errors. The system limits the effects of an error by first attempting to recover from the error, then if recovery fails, by reporting the error to the current process for action, and finally (if the error cannot be clearly bounded), shutting down and restarting the system. VAX/VMS will shut itself down rather than continue operating with a condition that could propagate undetected bad data. The types of errors possible are as follows:

- Processor errors (machine checks)—The system retries the instruction on which the processor failed, as long as no internal state has been modified. If no retry is possible or the retry fails, the system reports the error to the current process as an exception. However, if the executive is currently executing, the system shuts down and performs a cold restart by bootstrapping a fresh copy of VAX/VMS from the system disk.

- Operating system errors (system errors or undetected hardware failures)—The system checks its internal data structures for consistency to provide early detection of a system error. If the error affects only a single process, the system reports the error to the process. If the error affects more than one process, the system shuts down and performs a cold restart by bootstrapping a fresh copy of VAX/VMS from the system disk.
- User errors (user bugs)—The system uses hardware and software protection mechanisms to prevent processes from damaging one another and from damaging the system. As with a system error, the system detects a user error through internal consistency checks and reports the error to the single affected process.
- Memory errors—The system examines memory at start-up time and does not use any pages found to be bad. During system operation, the hardware transparently corrects all single-bit memory errors. An unrecoverable error causes the memory page on which the error occurred to be added to the bad page list; if the page has not been modified, system operation continues with a new copy of the page. (Unrecoverable memory errors that occur during a read by an I/O device are reported to the device so that the I/O operation can be reported as failed.)
- I/O errors—The system automatically retries failed I/O operations to recover from transient errors and marginal media conditions. Disk I/O errors are retried using the hardware recovery mechanisms. Optionally, the system validates disk I/O transfers with read-check and write-check functions. If an I/O request cannot be completed, all data that was correctly transferred is returned to the initiator.

The system logs all processor errors, all operating system errors detected through internal consistency checks, all double-bit memory errors (and a summary of corrected single-bit errors), and all I/O errors. The log can be printed or examined interactively to locate failed and troublesome components.

If the effects of an unrecoverable error cannot be limited to a process, the system shuts down and restarts without operator intervention by bootstrapping a fresh copy of VAX/VMS from the system disk (although the user can inhibit the automatic restart feature). Whenever the system fails, a dump of physical memory is taking; the dump includes the contents of the processor registers. Additionally, an entry is made in the error log indicating the hardware and software states of the machine at failure. A utility that can access system data structures symbolically is provided for analyzing dumps.

On a power failure, the system shuts down automatically. On power restoration, the system restarts automatically and resumes processing at the point of interruption if the system has a time-of-day clock and a memory battery back-up unit, and if the contents of memory are still valid. The system restarts devices and communications lines. All I/O operations in progress, including magnetic tape, are restarted. On request, programs can be notified of power restoration. An

optional battery operated hardware clock resets the date and time of day when the system restarts. If the system does not have a battery backup unit, or if the memory contents are not valid on power restoration, the system will perform a cold start (reboot).

If for any reason the system disk does not come back on line after a power failure within a specific time after the CPU regains power the system shuts down.

Diagnostics can be run on individual devices during normal system operation. The system need not be shut down and run stand-alone in order to format disks, to position disk and tape heads, and to diagnose hardware faults on device drives.

Certain critical components can operate in degraded mode. For example, the memory cache can be disabled. The system places a component in degraded mode when errors pass a threshold.

VAX/VMS includes a User Environment Test Package, which verifies that the major hardware components of the system are complete, properly installed, and ready for use. This package can be executed as part of system installation, or it can be run in stand-alone mode at any time.

One binary version of the operating system is created and distributed for each major release of VAX/VMS. Patches are applied through an automatic, machine-readable, maintenance update procedure. Each patch checks for the proper version number and revision level, and updates these figures as appropriate.

Security and Control

VAX/VMS provides privilege, protection, and quota mechanisms to limit user access to system-controlled structures in physical memory, system-structured files and volumes, and certain devices. Typically, one or a few users (system managers and/or operators) who maintain the system on a day-to-day basis have unlimited access to the system, while the access rights of the remaining users are strictly limited.

User accounts maintained in a user authorization file constitute the basis for privilege and quota assignment. The system manager can modify this file through services provided by the system. Each user account identifies a user by name and password. To log in and gain access to the system, the user must supply this name and password, passwords can never be displayed. (Even users submitting batch jobs from card readers must supply a name and password.) The password is encoded and does not appear on displays; once logged in, the users can change their passwords. In each user's account, the system manager assigns privileges and sets quotas on activities and structures that consume system resources, e.g., physical memory, CPU time, disk space, etc.

The System Manager also has the ability to limit each user to specific time of day access, such as allowing a user to only have access to the system from 9 AM to 5 PM.

Each user receives a user identification code (UIC), on which the protection mechanism is based. The UIC is associated with each structure, file, volume, and

device that the user owns. For example, when the user creates a file, the system associates the user's UIC with the file. The system also attaches a user-specified protection mask that permits and/or prohibits categories of access to the protected entity. Typically, a protection mask might permit all users to read a data file, while permitting only the owner to modify or delete it. The protection mechanism also permits users to associate in groups, such that access can be permitted to all members of the group and denied to all others.

Input/Output

I/O directives can be specified on the following levels:

- DCL commands—Commands such as EDIT, CREATE, APPEND, COPY, PRINT, TYPE, SORT, and DELETE provide the nonprogramming user with the ability to manipulate files.
- High-level programs—Programs written in COBOL, FORTRAN, BASIC, PASCAL, C, PL/I and other high-level languages can perform I/O using standard language elements. Application programmers will find this level the simplest and most efficient in most cases.
- VAX Record Management Services (RMS)—VAX RMS consists of a set of routines that MACRO and high-level language programs can call for device-independent I/O. VAX MACRO and VAX BLISS-32 programmers will find VAX RMS the most efficient level in most cases.
- Queue I/O (QIO) system services—The QIO system services are direct calls to the operating system. Programmers can use this level of I/O to perform special device dependent functions and to eliminate the system overhead involved in RMS; for example, to respond to interrupts from real-time devices as rapidly as possible.

A special program called a device driver executes I/O instructions to actually effect the data transfers. Each different type of I/O device requires its own driver. DIGITAL supplies drivers for all devices supported by VAX/VMS, and users with special needs or nonstandard devices can write their own drivers. (The VAX/VMS documentation set includes the *VAX/VMS Guide to Writing a Device Driver.)* Additionally, the system provides services for programs to bypass the driver mechanism and handle device interrupts directly for certain UNIBUS devices.

DIGITAL supplies a set of programs called ancillary control processes (ACPs), which maintain standard structures associated with disk, tape, network, and remote terminal I/O. When a new file is created on a structured disk volume, for example, the disk ACP will update the volume's directory.

The I/O routines of the native mode, high-level languages and native-mode utilities are built on top of VAX RMS, which uses the QIO services; thus, all I/O within the system is standard, unless the user elects to bypass the DIGITAL-supplied mechanisms. Supported devices include disks, tapes, unit record equipment, terminals, networks, and mailboxes (virtual devices for interprocess communication). VAX RMS provides both record access to supported file organi-

zations and an option to bypass record processing; thus, a program can address blocks within a file directly.

VAX RMS supports sequential, relative, stream, and multiple-key indexed disk files. Relative and indexed files can be shared for reading, writing, updating, and deleting records. The system automatically locks and releases records as they are processed. In addition, the programmer can lock and release records explicitly. VAX RMS will control the interlocking for shared, sequential files if the files are formatted as 512-byte, fixed-length records. For shared files, the user can optionally request that RMS allocate I/O buffers in a shared global section. Depending on the application, this could reduce the total amount of physical memory used for I/O buffers and/or reduce the amount of disk I/O necessary for processing a file. For other record formats, the user must assume responsibility for an interlocking mechanism. (Compatibility mode programs can also use RMS, but can not use record locking or file sharing.)

Disk and Tape Volumes

Disk volumes can be organized into volume sets. Files of any organization type can span any number of volumes within a volume set. They can be allocated to the set as a whole (the default) or to specific volumes within the set. Volume sets can contain a mix of disk device types and can be extended by adding volumes. Optionally, specified portions of indexed files can be allocated to specified areas of a single disk volume or to specified volumes in a volume set.

Quotas can be placed on the amount of space individual users can allocate. Quota assignment is by UIC and may be controlled individually for each volume set in the system (or volume if the volume is not part of a set).

Structure information can be cached in memory to reduce the I/O overhead required for file management services. Although not required to do so, users can preallocate space and control automatic allocation. For example, when a file is extended, it can be extended by a given number of blocks, contiguously or noncontiguously for optional file system performance in specific cases.

The system applies software validity checks and check-sums to critical disk structure information. The critical information is duplicated. If a volume is improperly dismounted because of user error system failure, its structure information is automatically rebuilt the next time it is mounted. The system detects bad blocks dynamically and prevents their reuse once the files to which the blocks were allocated are deleted.

The system provides eight levels of named directories and subdirectories, whose contents are alphabetically ordered. Device and file specifications follow standard conventions. Logical names can be used to abbreviate the specifications and to make application programs device and file-name independent. A logical name can be assigned to an entire specification, to a portion of a specification, or to another logical name.

VAX/VMS supports multivolume magnetic tape files with transparent volume switching. Access positioning is either by filename or by relative file position.

System utilities that aid in file maintenance include

- File transfer—Transfers files from one volume to another; files can be in any of several formats.
- Backup/restore—Provides comprehensive, online and standalone full volume, and incremental file backup for file structured mounted volumes and volume sets. Files can be backed up to magnetic tape or another disk. Individual files, selected directory structures, or all files on a volume set can be backed up and restored using standard file naming conventions with selection by date. Backup/restore takes place onto previously initialized and mounted volumes or on uninitialized media. The N + 1 redundant recording technique permits recovery of backed up data even if one of the N blocks has been corrupted. In the case of incremental backups, detection that a file has not been modified since the last backup eliminates the unnecessary movement of data. It is also possible to completely restore a volume or volume set from a series of (for example) daily incremental backups. Backup and restoration of disk files can be selectively performed on line or on a per-volume basis off line. Per-volume operations require exclusive access to the volume.
- Bad block locator—Locates and records bad blocks on a disk.
- Analyze disk structure—Validates structure information on a disk volume against the actual contents, prints structure information, and permits changes to structure information.

Intersystem Facilities

DECnet-VAX interfaces and the associated documentation are integral parts of VAX/VMS.

The VAX/VMS kit includes that portion of DECnet-VAX code for use on a standalone local node, not physically connected to any other system. This capability allows users to design applications using distributed techniques with considerations for expansion to a network in the future. A DECnet-VAX software license and distribution kit are required for each VAX/VMS system physically connected to a DECnet network.

Examples of network participation for VAX to VAX communication include

- Network Command Terminal Facility (requires optional DECnet-VAX on each node)—Allows an authorized user to connect and log onto a remote VAX/VMS system. Once logged onto the remote system, the user can connect and log onto yet another VAX system, or proceed to use DCL commands as if on the local VAX system.
- Mail messages to remote systems (requires optional DECnet-VAX on each node)—Can be sent to other VAX systems using the personal VAX/VMS MAIL utility.

The optional MA780 multiport memory controller provides a means for processes on different systems to communicate at the speed of accessing memory. Up to four VAX-11/780 processors can be physically connected to one multiport memory controller of 256 to 2048 kilobytes, and up to two multiport memory controllers can be physically connected to one processor. Through a utility, the VAX/VMS user can set up a multiport memory controller to contain the standard interprocess structures for sharing code and data, for synchronizing image execution, and for sending messages. In this way, a process on one system can create a message in multiport memory and a process on another system can read that message out of the same memory location. Users can also place their own data structures in multiport memory.

Attached Processor Support

VAX/VMS support of the attached processor (VAX-11/782) is transparent to the VAX/VMS user. The scheduling of the two CPUs, with VAX/VMS running in shared memory (the MA780), is handled deep in the kernel of VAX/VMS and thus is hidden from software layers above. The user of VAX/VMS in this environment enjoys all the capabilities of VAX/VMS while transparently reaping the benefits of the power of a multiprocessor system. This use of the MA780 is mutually exclusive from that described above.

Compatibility with RSX-11 Systems

VAX/VMS provides special capabilities through which PDP-11 users can develop programs for execution in either the VAX/VMS environment or an RSX-11M or RSX-11S environment. These special capabilities include the RSX-11M Application Migration Executive (AME), the optional PDP-11 compatibility mode language processor (FORTRAN, IV/VAX to RSX PDP-11 Cross Compiler), and the MCR command language interpreter. MCR is used in place of DCL to process RSX-11 commands. In addition to the standard disk file structure, VAX/VMS includes an RSX/IAS-compatible file structure for simple cross-migration of code and data. Both file structures are available to programs running in either compatibility or native mode. Specific compatibility capabilities include

- Compilation of programs written in BLISS-16, MACRO-11 and the optional PDP-11 language processor to generate compatibility mode object modules
- Taskbuilding of compatibility mode object modules into RSX-11M, Version 3.2 tasks if the user has an RSX-11M license for the target system
- Partial debugging of these RSX-11M tasks
- Generation of RSX-11S (Version 4.0) system images if the customer has an RSX-11S license for the target system
- Creation and maintenance of RSX-11 libraries
- Execution of RSX-11M, Version 3.2 indirect MCR command files
- Development of programs to run on both RSX-11 and VAX/VMS systems

- Down-line loading of the RSX-11S system (via the optional DECnet-VAX), if the customer has an RSX-11 license
- Creation, reading, and writing of disks or tapes for transport to and from RSX-11 systems

However, certain limitations exist for tasks developed under the RSX-11M AME if they are to be executed or debugged in compatibility mode. These tasks must

- Not depend on the performance provided by PDP-11 floating point instructions
- Not be privileged
- Not access the PDP-11 I/O page
- Not issue DECnet system service directives
- Not issue PLAS memory management directives
- Not depend on the console switches
- Not depend on devices not supported by the VAX/VMS system
- Not depend on the ability to share write access to files through RMS-11

The user's development environment must not be dependent on generating DECnet-11M or DECnet-11S.

Applications requiring the cooperation of a number of tasks may or may not run, depending on the system environment assumptions they make. The AME makes possible the migration of many existing applications from the RSX-11M family of systems to VAX/VMS by allowing recompilation and rebuilding of nonprivileged tasks originally developed under RSX-11 or IAS systems, for which a compatibility mode compiler is available. Such tasks, as well as any task complying with the above and built originally under RSX-11M, Version 3.2, can be executed directly under the RSX-11M AME.

Installation

VAX/VMS systems are distributed as binary kits on tape or disk. Procedures for setting up the system disk from a kit and for readying the system for day-to-day operations are simple and straightforward. The binary kit includes the following facilities:

- System installation package
- System configuration procedures
- User Environment Test Package
- Operating system kernel, including virtual memory manager, swapper, system services, and drivers for VAX/VMS supported I/O devices
- RSX-11M Version 3.2 Executive Emulator, a subset of the RSX-11M utilities, RMS-11 Version 1.8, RMS utilities, and PDP-11 SORT
- System generation utility (for tailoring system parameter files)
- User authorization control program
- Interactive and batch job controller and symbiont manager
- Card reader input symbiont

- Line printer output symbiont
- Bootstrap utility
- Start-up procedure
- Shut-down procedure
- Accounting manager
- Accounting report utility
- Operator communication process
- Message utility
- MAIL utility (requires the optional DECnet-VAX on each node for remote mail to another VAX/VMS system)
- Error logging and print utility
- Help facility
- DCL command interpreter
- DCL command definition utility
- MCR command interpreter
- Monitor utility (for displaying system activity)
- Various interactive and batch editors
- Text formatter (Digital standard runoff)
- Log-in facility
- Network command terminal facility (allows remote log-in to another VAX system if the optional DECnet-VAX software license and kit is installed on each node)
- Phone facility—An interactive communications utility with networking capability (requires the optional DECnet-VAX software license and kit on each node for remote communication)
- VAX MACRO assembler with cross-reference capability
- Linker with cross-reference capability
- Install utility
- Librarian utility with cross-reference capability
- Common run-time procedure library
- Symbolic debugger (for MACRO and most optional native-mode languages)
- VAX Record Management Services
- RMS file analysis and validation utility
- RMS file conversion and loading utility
- RMS Indexed Sequential file space reclamation utility
- RMS file design and tuning utility
- Files-11 ancillary control process
- Disk quota utility

- Back-up and restore facilities
- Disk structure analysis
- Magnetic tape ancillary control process
- Sort/merge utility
- File management facilities
- File differences utility
- File search utility (for searching the content of files)
- Dump utility
- Patch utility
- System dump analyzer
- Bad block locator utility
- Software maintenance update procedure
- EDTCAI course
- Unsupported utilities such as TECO
- Obsoleted utilities (e.g., DSC, VFY) that may not be supported at the next major release of VAX/VMS

VAX-11/730 Dual RL02 System

- Tailoring facility

The VAX/VMS tailoring facility is only required (and therefore only available) on the VAX-11/730 Dual RL02 configuration, where the size of the RL02 system disk incurs space constraints.

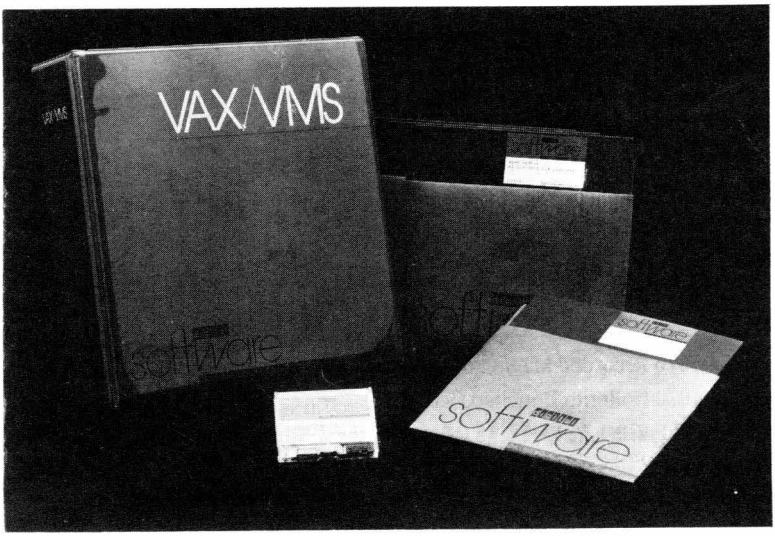
Tailoring is not supported on other processor or disk configurations. Tailoring VAX/VMS on the VAX-11/730 Dual RL02 configuration allows users to enjoy the full functionality of VAX/VMS, while providing a compact version of the operating system tailored to the users' needs on one RL02 system disk (not all of VAX/VMS can reside on the system disk at one time).

VAX/VMS is only supported on a single RL02 system disk in this environment either for application execution or for program development. The tailoring facility generates a single RL02 system disk leaving the second spindle free for mounting (user removable) volumes. Optional Software products can only be installed on the system disk. Due to space constraints, there is no guarantee that these products can be installed if user code and data reside on the system disk. The execution environment supports all application programs as long as they are NOT DEPENDENT on optional software run-time components which are not supported in the Dual RL02 environment.

VAX/VMS Distribution

The software installation guides contain a complete list of the modules included in the binary kit, as well as instructions for their installation.

A source kit is available for users who wish to retrieve and modify selected source modules. (Source modules are useful as templates for user-written device drivers, although this same information can be obtained from the microfiche listings supplied with the binary kit.) Retrieval of selected source modules can occur once the source kit is copied to disk. The source kit can be used for a complete rebuilding of the system, except as noted below. The kit includes the tools (including source patches) that Digital used to build the binary kit; however, any patches released after building the binary kit are not reflected in the source kit.



Although every attempt is made to include accurate source modules, corresponding compiler-version modules, and supporting command procedures, Digital does not warrant the ability to build a complete binary kit of the system. Digital will neither warrant nor supply updates and support services for the compiler-version binary modules. To build the EDTCAI software, the optional VAX BASIC product is required. No supporting documentation is provided, and source modules for intermediate updates of VAX/VMS are not available. Source kits are available only on major releases, (i.e., Versions 1.0, 2.0, 3.0, etc.) and are not updated with any maintenance updates. Depending on how much of the source kit is needed, up to three RP06 disk drives or equivalent disk space can be required for processing the source modules after copying them from tape. The following

components of VAX/VMS are not included in the Version 3.0 source kit:

- Unsupported bundled components such as TECO
- Components from RSX-11M and RSX-11S such as PIP, FLX, PDP-11 SORT, and RMS-11 and other RSX utilities

In addition, Digital does not warrant the results of using the source kit to change selected portions of the system.

Sources listings on microfiche for the system software components are provided on an "as is" basis without Digital warranty expressed or implied.

Standards

VAX/VMS is based on the following American National Standards Institute (ANSI), U.S. Federal Information Processing (FIPS), and International Standards Organization (ISO) standards:

- X3.4-1977 American Standard Code for Information Interchange
- X3.6-1973 Perforated Tape Code for Information Exchange
- X3.18-1974 One-inch Perforated Paper Tape for Information Exchange
- X3.41-1974 Code Extension Techniques for Use with 7-bit ASCII
- X3.42-1975 Representation of Numeric Values in Character Strings
- X3.27-1978 Magnetic Tape Labels and File Structure, Level 1 and Level 2. (Level 3 without user file labels and buffer offset)
- FIPS PUB 79
- X3.39-1973 Recorded Magnetic Tape (1600 BPI, PE)
- X3.22-1973 Recorded Magnetic Tape (800 BPI, NRZI)
- X3.54-1976 Recorded Magnetic Tape (6250 BPI, GCR)
- X3.26-1970 Hollerith Punched Card Code
- FIPS PUB 1, 2, 3-1, 7, 13, 14, 15, 16, 22, 25, 26, 35, and 37, but not FIPS PUB 17-1 or 46; other FIPS PUBs are not applicable
- ISO 646-1973 7-bit Coded Character Set for Information Exchange
- ISO 1001-1979 Magtape Labelling and File Structure, Level 3
- ISO 2022-1973 Code Extension Techniques for Use with ISO 646
- ISO 3307-1975 Representations of Time of the Day

Source Code Information

Machine readable source code as coding examples on RK07 and RL02 disk cartridge, and 1600 BPI magtape distribution media is provided to allow users to more easily access system services. In addition, listings are provided on microfiche to enhance serviceability.

This source code is provided on an "AS IS" basis without any warranty of any kind, either express or implied.

Minimum Hardware Required

For VAX-11/730 Systems

Any VAX-11/730 system with at least one of the following:

- Two RL02 disk drives and at least one megabyte of memory
- One RL02 disk drive and one R80 disk drive with at least one megabyte of memory

For VAX-11/750 Systems

Any VAX-11/750 system with at least one of the following:

- Two RK07 disk drives and at least 512 kilobytes of memory
- One RM03/RM05/RM80 disk drive and one TE16/TS11/TU77 magnetic tape and at least 512 kilobytes of memory
- One UDA (at least one microcode level Rev. 3) with an RA60/80/81 disk drive and either an RL02 or RA60 disk drive, or a TU77/78/80 tape drive with at least 512 kilobytes of memory

For VAX-11/780 Systems

Any VAX-11/780 system at ECO REV. 3 or later with at least one of the following:

- Two RK07 disk drives and at least 512 kilobytes of memory
- One RM03/RM05/RM80/RP05/RP06/RP07 disk drive and one TE16/TU45/TU77/TU78 magnetic tape and at least 512 kilobytes of memory
- One UDA (at least at microcode level Rev. 3) with an RA60/80/81 disk drive and a RA60 or a TU78/80 tape drive with at least 512 kilobytes of memory
- For systems with a CI780, the minimum memory requirement is two megabytes
- One CI780, one HSC50 controller with a RA60/80/81 and a RA60 or a RK07 or a TE16/TU45/TU77/TU78 magtape and at least 2 megabytes of memory

For VAX-11/782 Systems

- The same requirements as for the VAX-11/780 apply except that the minimum amount of shared memory (MA780) in this environment is 1 megabyte, and the minimum local memory required for diagnostic purposes is 256 kilobytes.
- The two CPUs of the attached processor VAX-11/782 system must be at the same ECO level. Both CPUs must have the same CPU options, (i.e., if one CPU has an FP780, both must have an FP780).
- The primary CPU has all the input and output adapters and interfaces connected to it. The secondary (or the attached) is a bare CPU with 256 kilobytes of local memory for diagnostic purposes. Any input and output devices on the secondary are ignored.

Optional Hardware

Additional memory may be required if additional devices are included in the configuration. Additional memory and/or secondary storage may be required if multiple optional software products are being used concurrently.

NOTE: Combinations of hardware options are subject to limitations such as bandwidth, physical configuration restraints and electrical loads/power.

(VAX configurations are described in the *VAX Systems and Options Summary.)*

For VAX-11/782 Systems

All of the VAX-11/780 optional hardware applies to the VAX-11/782 except for the following CPU options:

- DR780
- KU780 (user writable control store)
- VAX/VMS runs (or resides) in the MA780 shared memory on a VAX-11/782 attached processor configuration. The maximum amount of shared memory (MA780 memory) that can be on the system is eight megabytes (four MA780s with two megabytes on each).
- RP07 running at 2.2 Mb/sec (1.3 Mb/sec is supported on VAX-11/782)

For VAX-11/780 Systems

CPU Options

- Additional memory up to a system total of 32 megabytes
- DR780 high-performance, general purpose interface
- Up to two MA780 multiport memory controllers per system with up to 2048 kilobytes per MA780 controller
- H7112 memory battery back-up (required for powerfail/recovery)
- FP780 floating-point accelerator
- DW780 UNIBUS adapter, up to a system total of four
- KE780 G and H floating point microcode
- KU780 User Writable Control Store
- One CI780 interface with up to 16 interconnected nodes (a node being an 11/780, 11/782 or an HSC50). The HSC50 allows storage access from up to 4 processors with a maximum of 24 disk drives per HSC50.

UNIBUS Disk Systems

- Up to four UNIBUS adaptors
- Up to eight disk drives per UNIBUS (RK06 and/or RK07)

  NOTE: RK06 is not supported as a system device.
- Up to two UDAs per UNIBUS (at least at microcode level Rev. 3) and any combination of RA60/80/81 disk drives, up to four drives per UDA
- Up to four RL02 disk drives per system (not supported as a system disk)
- Up to two RX02 disk drives per system (not supported as a system disk)

MASSBUS Disk Systems

- Up to four MASSBUS adapters can be connected to a VAX-11/780. MASSBUS adapters are available in MASSBUS ADAPTER/DISK SUBSYSTEM combinations, (REM03, REM05, REM80, REP05, REP06, REP07) that include a MASSBUS adapter and disk drive, (RM03, RM05, RM80, RP05, RP06, RP07) respectively. Up to seven additional disk drives can be added to a subsystem. Different disk drive types can be attached to the same disk subsystem; this gives a total of 32 disk drives per VAX-11/780 system.
- Refer to *MASSBUS Magnetic Tape Systems* for information on disks and tapes configured on the same MASSBUS

MASSBUS Magnetic Tape Systems

- MASSBUS adapters are also available in MASSBUS ADAPTER/TAPE SUBSYSTEM combinations, (TEU77, TEE16, TEU45, TEU78) that include a MASSBUS adapter and a specific tape formatter and transport (TU77, TE16, TU45, TU78), respectively. Up to three additional TU77 or TU78 magnetic tape transports can be added to each TEU77 or TEU78 subsystem respectively. Up to seven additional TE16 or TU45 magnetic tape transports can be added to each TEE16 or TEU45 subsystem, respectively. Different magnetic tape transports can *not* be mixed on the same TEXXX subsystem. A TU78 Master (which includes TM78 formatter and a TU78 transport) can be attached to any MASSBUS tape subsystem.
- With disks and magnetic tape transports mixed on the same MASSBUS, the following rules apply:

  Disks *can* be added to a magnetic tape subsystem, with up to seven add-on disks per TEXXX subsystem

  Tape transports *cannot* be added to a disk subsystem
- A TU78 Master (which includes a TM78 formatter and a TU78 transport) can be attached to a disk subsystem.

The combination of disks and tape formatters must not exceed eight on a single MASSBUS.

UNIBUS Magnetic Tape Systems

- TS11 or TU80 magnetic tape subsystems, up to a total of four per UNIBUS

Card Readers

- Up to a system total of two CR11 card readers

Line Printers

Up to system total of 16 LA11, LP11, LP11-A, LP11-B, LP11-C, LP11-D, LP11-E, LP11-G, LP11-R, LP11-S, LP11-V, LP11-W, LP11-Y, LP11-Z, LP27 line printers, and the LN01 Laser Printer (at ECO DEC007)

Terminals and Terminal Line Interfaces

- Up to a system total of 48 DZ11 or DZ32 8-line multiplexers or 24 DZ11 16-line multiplexers or 10 DMF32 multipurpose communications interfaces can be connected. The combination of 8-line and 16-line multiplexers per UNIBUS is not to exceed 96 asynchronous lines. The following is the list of terminals that are supported and can interact with VAX/VMS and its associated utilities: VT52; VT100, VT101, VT102, VT105, VT125, VT131, VT132, VT180, Rainbow 100, and the Professional 350 are supported in VT100 mode; LA12, LA34, LA36, LA38, LA100, LA120, and LQP02 are supported in hard copy mode.

  The VT131 and VT132, when operating in an application environment, are supported in block mode. When interfacing with VAX/VMS and its associated utilities, they are not only supported in VT100 (or interactive) mode, and not in block mode.

  The characteristics of the application software and system loading may impose constraints on aggregate throughput. Assuming that the processor is only being used for terminal handling from a user program and that all active terminal lines are contained on the minimum number of controllers, the aggregate terminal throughput is up to 80K characters per second on VAX-11/780 (using a DMF32), or up to 16K characters per second (using a DZ11 controller).

  To prevent buffer overruns on input the terminals use the ASCII control character DC1 and DC3 for synchronization, as defined by Digital's DEC STD 111, Revision A. When used with EDTCAI, the VT1nn series of terminals should be run at 600-2400 baud by no more than four, concurrent EDTCAI users.

Real-Time Devices

- Up to a total of two LPA11-K microprocessor controllers per UNIBUS for laboratory data acquisition I/O devices, with each LPA11-K able to accommodate up to two AD11-Ks, one AA11-K, one KW11-K, five DR11-Ks, and two AM11-Ks
- One DR11-W general purpose 16-bit parallel DMA interface

For VAX-11/750 Systems

CPU Options

- Additional memory up to a system total of eight megabytes
- H7112 memory battery back-up (required for powerfail/recovery)
- DW750 second UNIBUS adapter
- One DR750 high-performance, general purpose interface
- KU750 User Writable Control Store
- FP750 floating point accelerator

UNIBUS Disk Systems (11/750 may have up to two UNIBUS adapters)

- Up to eight RK07 disk drives per system
- Up to four RL02 disk drives per system (not supported as a system device)
- Up to two RX02 dual-drive subsystems per system (not supported as a system device)
- Up to two UDAs per UNIBUS (at least at microcode level Rev. 3) and any combination of RA60/80/81 disk drives, up to four drives per UDA

MASSBUS Disk Systems

- Up to three MASSBUS adapters can be connected to a VAX-11/750. MASSBUS adapters are available in MASSBUS ADAPTER/DISK SUBSYSTEM combinations (RGM03, RGM05, RGM80, RGP06, RGP07) that include a MASSBUS adapter and disk drive, (RM03, RM05, RM80, RP06, RP07) respectively. Up to seven additional disk drives can be added to a subsystem. Different disk drive types can be attached to the same disk subsystem, this gives a total of 24 disk drives per VAX-11/750 system.
- Refer to *MASSBUS Magnetic Tape Systems* for information on disks and tapes configured on the same MASSBUS.

MASSBUS Magnetic Tape Systems

- MASSBUS adapters are also available in MASSBUS ADAPTER/TAPE SUBSYSTEM combinations. (TGU77, TGE16) that include a MASSBUS adapter, a tape formatter and a transport (TU77, TE16 respectively). Up to three additional TU77 magnetic tape transports can be added to a TGU77 subsystem. Up to seven TE16 magnetic tape transports can be added to each TGE16 subsystem. Different magnetic tape transports cannot be mixed on the same TGxxx subsystem.
- With disks and magnetic tape transports mixed on the same MASSBUS, the following rules apply:

  Disks *can* be added to a magnetic tape subsystem, with up to seven add-on disks per TGU77 subsystem

  Tapes *cannot* be added to a disk subsystem.

UNIBUS Magnetic Tape Systems (11/750 may have up to two UNIBUS's)

- TS11 or TU80 magnetic tape subsystems, up to a system total of two

Card Readers

- One CR11 card reader

Line Printers

- Up to a system total of four LA11, LP11-A, LP11-B, LP11-C, LP11-D, LP11-E, LP11-G, LP11-R, LP11-S, LP11-V, LP11-W, LP11-Y, LP11-Z, LP27 line printers, and the LN01 Laser Printer (at ECO DEC007)

Terminals and Terminal Line Interfaces

- Up to a system total of 16 DZ11 or DZ32 8-line multiplexers or eight DZ11 16-line multiplexers or eight DMF32 multipurpose communications interfaces can be connected. The combination of 8-line or 16-line multiplexers per UNIBUS is not to exceed 64 asynchronous lines. The following is the list of terminals that are supported and can interact with VAX/VMS and its associated utilities: VT52; VT100, VT101, VT102, VT105, VT125, VT131, VT132, VT180, Rainbow 100, and the Professional 350 are supported in VT100 mode; LA12, LA34, LA36, LA38, LA100, LA120, LQP02 are supported in hard copy mode.

  The VT131 and the VT132, when operating in an application environment, are supported in block mode. When interacting with VAX/VMS and its associated utilities, they are only supported in VT100 (or interactive) mode, and not in block mode.

  The characteristics of the application software and system loading may impose constraints on aggregate throughput. Assuming that the processor is only being used for terminal handling from a user program and that all active terminal lines are contained on the minimum number of controllers, the aggregate terminal throughput is up to 60K characters per second on VAX-11/750 (using a DMF32), or 16K characters per second (using a DZ11 controller).

  To prevent buffer overruns on input the terminals use the ASCII control characters DC1 and DC3 for synchronization, as defined by DIGITAL's DEC STD 111, Revision A. When used with EDTCAI, the VT1nn series of terminals should be run at 600-2400 baud by no more than two concurrent EDTCAI users.

Real-Time Devices

- Up to a system total of two (one per UNIBUS) LPA11-K microprocessor controllers for laboratory data acquisition I/O devices, each accommodating up to two AD11-Ks one AA11-K, one KW11-K five DR11-Ks, and two AM11-Ks
- One DR11-W general purpose 16-bit parallel DMA interface per system

For VAX-11/730

CPU Options

- Additional memory up to a system total of five megabytes
- FP730 floating point accelerator
- Up to two RL02 disk drives can be added to the dual RL02 and the R80/RL02 Package Systems

UNIBUS Disk Systems (11/730 has ONE UNIBUS)

- Up to eight RK07 disk drives on one RK711 controller
- Up to four RL02 disk drives on one RL211 controller
- One RX211 floppy disk subsystem (two RX02 drives) not supported as a system device
- One UDA per UNIBUS (at least at microcode level Rev. 3) and any combination of RA60/80/81 disk drives, up to four drives per UDA

UNIBUS Magnetic Tape Systems

- One TS11 or TU80 magnetic tape subsystem

Card Reader

- CR11 card reader

Line Printers

- One LP32 line printer per system, connected to a DMF32
- One LP11 line printer per system with built-in controller

Terminals and Terminal Line Interfaces

- Up to a system total of three DMF32 multi-purpose communications interfaces, (8 asynchronous lines per DMF32), or 2 DMF32 interfaces and one DZ11 or DZ32 8-line multiplexer. The number of asynchronous lines per system not to exceed 24.

  The following terminals are supported and can interact with VAX/VMS and its associated utilities: VT152; VT100, VT101, VT102, VT105, VT125, VT131, VT132, VT180, Rainbow 100, and the Professional 350 are supported in VT100 mode; LA12, LA34, LA36, LA38, LA100, LA120, and LQP02 are supported in hard copy mode.

The VT131 and VT132, when operating in an applications environment, are supported in block mode. When interacting with VAX/VMS and its associated utilities they are only supported in VT100 (or interactive) mode, and not in block mode.

The characteristics of the application software and the system loading may impose constraints on aggregate throughput. Assuming that the processor is only being used for terminal handling from a user program and that all active terminal lines are contained on the minimum number of controllers, the aggregate terminal throughput is up to 35K characters per second on VAX-11/730 (using a DMF32).

Real-Time Devices

- One DR11-W general purpose 16-bit parallel DMA interface per system (optional RL02 distribution (QC00B-PH) is required for example driver)

Prerequisite Software

None

RL02 Distribution Kits

The distribution kit for the VAX-11/730 consists of a PRIMARY disk (RL02) that is part of the QC001-AH kit, which is delivered as part of the VAX-11/730 supported package systems, and an OPTIONAL disk (RL02) which is not part of the QC001-AH or QC001-HH kit. The OPTIONAL Disk is not distributed in the VAX-11/730 package systems.

The distribution kit for the RA80/RL02 VAX-11/750 configuration consists of two RL02 disks labeled "primary" and "optional". Both disks are included in all

supported VAX-11/750 package systems that require RL02 distribution. The optional RL02 disk is also included in the QD001-HH kit.

The optional RL02 contains the following:

- RSX development tools (TKB, etc.)—RSX run-time environment is on the PRIMARY disk
- BLISS support files—required by the BLISS compiler only
- Obsolete utilities (DSC, VFY)—replaced by BACKUP, ANALYZE/DISK_-STRUCTURE.
- Coding examples (on microfiche provided)
- System executive map (on microfiche provided)
- EDTCAI, the EDT editor instruction course—EDT is provided on the PRIMARY disk
- VAX/VMS, Version 3.0 to Version 2.0 accounting file conversion utility. For users who wish to translate the Version 3.0 accounting file back to the Version 2.0 format.

The licensed VAX-11/730 VAX/VMS user can order this OPTIONAL disk if required (QC00B-PH).

VAX/VMS is fully operational without the OPTIONAL disk (apart from the above facilities).

For customers on Software Product Services, who have purchased the OPTIONAL kit:

- Interim maintenance versions of VAX/VMS will have patches appropriate to both PRIMARY and OPTIONAL disk distributions
- For full version updates customers will be sent the updated OPTIONAL kit as a component of the service.

Training Credits

FIVE (5)—Training Credits apply only to options that include support services. Consult the latest Educational Services Catalog at your local Digital office for the available courses, course requirements, and guidelines.

Software Installation

Digital Installed

VAX/VMS Operating System Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, microfiche, support services	QC001-AH	QD001-AH QD001-AM QD001-AV QD001-AJ	QE001-AM QE001-AV QE001-AJ
Single-use license-only option, no binaries, no documentation, no microfiche, no support services	QC001-DZ	QD001-DZ	QE001-DZ
Installation, Warranty, and Training Credits	QC001-AZ	QD001-AZ	QE001-AZ
Sources license, sources, no support services	QC001-MM	QD001-MM	QE001-MM
Source license, additional listings on microfiche, no support services	QC001-FR	QD001-FR	QE001-FR
Update/Unsupported Options Users of VAX/VMS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC001-HH	QD001-HH QD001-HM QD001-HV QD001-HJ	QE001-HM QE001-HV QE001-HJ
Right to copy for single-use, no binaries, no documentation, no support services	QC001-HZ	QD001-HZ	QE001-HZ
Sources/Listings Update Options The following options are available to licensed users as updates to sources and/or listings options. The update is distributed in source form on the appropriate medium and includes no installation or other services unless specifically stated.	QC001-NM	QD001-NM	QE001-NM

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Miscellaneous Options			
Documentation-only kits	QC001-GZ	QD001-GZ	QE001-GZ
Optional RL02 disk	QC00B-PH	QD00B-PH*	N/A

*The optional RL02 disk is included in all supported VAX-11/750 RL02/RA80 package systems.

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

NOTE: Only one binary supported license, regardless of CPU type, is required before the purchase of an unsupported license-only option. The applicable media to accompany a single-use license-only option, if required, can be obtained by ordering the applicable update kit at list price.

The following key (G, H, J, M, R, V, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC001-AH = binaries on RL02 Disk Cartridge.

G = TU58 DECtape II Cartridge*
H = RL02 Disk Cartridge
J = RA60 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
R = Microfiche
V = RK07 Disk Cartridge
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used only in a stand-alone, lightly loaded environment. If used as a file device on a heavily-loaded system, it can degrade system performance.

The first purchase of a Digital supported License for this software product must include either:

- Single-use license-only option (QX001-DZ) and
- Update option-binaries and documentation (QX001-Hx) and
- Installation, Warranty, and Training Credits option (QX001-AZ)

or

- Single-use license, binaries, documentation and support services (QX001-Ax)

The tables below describe the physical hardware configurations supported by VAX/VMS in terms of CPU type and communication interface. The numbers given in the tables are "load costs".

How to use this table

The maximum system configuration, with a mix of device types, is computed by adding the load costs (in load units) for each device up to the limit for a given processor type.

Example

When a VAX-11/780 is used to route messages in a decnet network: If the system uses a DMR11 (HDX) at 500 kilobits/sec, a DMR11 (HDX) at 19.2 kilobits/sec, and the sychronous line of a DMF32 at 19.2 kilobits/sec; when the network is fully utilized, processor loading totals 11 load units. Therefore, it would not be advisable to add any device with a load cost greater than five units (e.g., DEUNA link or high speed DMR11 link).

CPU	Maximum Load (in Load Units)
VAX-11/780 or 782	16
VAX-11/750	10
VAX-11/730	5

Load Units Per Device at Speeds Shown (When device is in active use)
Line Speed (Kilobits/second)

Device Type	9.6-19.2	56-250	500	1000	10000	70000
VAX PSI Devices	4	8	N/A	N/A	N/A	N/A
DMC11 (FDX)	1	4	16	16	N/A	N/A
DMC11 (HDX)	1	2	8	8	N/A	N/A
DMR11 (FDX)	1	4	16	16	N/A	N/A
DMR11 (HDX)	1	2	8	8	N/A	N/A
DMP11 (FDX)	1	4	16	N/A	N/A	N/A
DMP11 (HDX)	1	2	8	8	N/A	N/A
DMF32	2	N/A	N/A	N/A	N/A	N/A
CI780* (780 only)	N/A	N/A	N/A	N/A	N/A	16
DEUNA†	N/A	N/A	N/A	N/A	8	N/A

*The CI780 is supported by DECnet-VAX. The effective maximum data rate through the CI780 using DECnet-VAX is limited to 1000 kilobits/second at each node. Mass storage transfers over the CI780 from the HSC50 do not use DECnet-VAX.

†DECnet-VAX supports up to two DEUNAs on a single system. Note that when two DEUNAs are used, each must be connected to a unique Ethernet.

NOTE: The DUP11 is only supported by the optional PSI, IBM and CDC emulators; however, the DUP11 driver and associated documentation are included in the VAX/VMS kit. Up to a system total of four on 11/780, two on 11/750, and one on 11/730, each operating at a maximum of 9.6 kilobits per second is supported.

The characteristics of the software (including the optional DECnet-VAX and IBM emulators) using these devices may impose additional constraints on throughput.

VAX/VMS supports a maximum of 32 tributaries controlled by all the DMP11 control stations on a single node.

The DMF32 tributary station is supported only on VAX-11/730.

Maximum throughput for a specific tributary node is equal to the maximum aggregate data rate for the control node, divided by one plus the tributaries.

VAX ADE Application Development Environment

Description

VAX ADE is a nonprogrammer's development software package for small applications requiring processing of character, numeric and/or date-oriented information. It is designed specifically as a productivity tool for use by nontechnical personnel, and runs under the VAX/VMS Operating System.

VAX ADE allows users to

- Create their own information base
- Add, change or delete data
- Perform calculations on data
- Produce simple bar graphs
- Write/print reports

Features

- Allows nontechnical personnel to automate simple applications without requiring knowledge of programming techniques or languages
- English words for Commands, such as MAKE, SAVE, SORT
- Users can graduate to using VAX ADE's more complex facilities and functions if, and when, they wish.
- Provides prompting to the user after each input
- Provides extensive "HELP" messages to explain all Commands or input required.
- Uses full screen handling capabilities
- Allows multiple users to copy VAX ADE-developed data
- Allows for user protection of data, e.g. for Self only, Group, or World
- Allows transfer of data to and from other applications software that use RMS sequential files, e.g. VAX COBOL, VAX BASIC, VAX DATATRIEVE
- Allows transfer of data to and from list processing format files used in Word Processing software
- Performs simple arithmetic calculations such as
  Add column A to column B, divide by column C,
  put answer in column D
  Produce running totals
  Produce subtotals
  Produce grand totals
  Calculate averages

Operations

Environment

VAX ADE uses Commands, Verbs, and Reports for application building, processing, and report printing. It assigns a temporary file called a "Worksheet", which the user fills with data through the video terminal, and then files (SAVES) on the system as a Table. The data is displayed on the terminal in columnar format and various commands can be used to manipulate the information.

Commands

VAX ADE uses a series of versatile, easily understood words to instruct (command) the system. For example, MAKE a new Worksheet, CHANGE (data) in Worksheet columns, LIST (data) in Worksheet, SAVE Worksheet as a Table, EXIT from ADE.

Verbs

Verbs (procedures) can be created by the user to perform a number of Commands in an often-used sequence to shortcut command input time, and to allow unattended use of that series of Commands.

NOTE: VAX ADE does not perform looping, GOTO, or IF-THEN-ELSE statements.

Reports

The Report Writer prints information in columnar formats and allows for

- Boxing of column headings and/or selected data
- Centering of headings
- Automatic page numbering
- Automatic column width specification
- Inclusion of simple bar graphs
- Selective listing of columns from Worksheet or Table, for example, not all columns in a Worksheet or Table have to be printed

Minimum Hardware Required

Any valid VAX/VMS system configuration with

- At least 1600 blocks of disk space
- At least 1 megabyte of main memory
- VT100 or VT52 terminal

VAX/730 Systems

- An R80/RL02 configuration is required for VAX/730 systems.

NOTE: For interactive use of VAX ADE, it is recommended that terminals be run on lines with transfer rates of at least 1200 baud.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX ADE Application Development Environment Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC425-AG	QD425-AG	QE425-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC425-DZ	QD425-DZ	QE425-DZ
Update/Unsupported Options Users of VAX ADE whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC425-HG	QD425-HG	QE425-HY
Right to copy for single-use, no binaries, no documentation.	QC425-HZ	QD425-HZ	QE425-HZ
Miscellaneous Options Documentaton-only kits	QC425-GZ	QD425-GZ	QE425-GZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC425-AG = binaries on TU58 Disk Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded system, it can degrade system performance.

VAX APL

Description

APL (A Programming Language) is a concise programming language that can be used for a wide range of applications. It simplifies the handling of numeric and character data organized as lists and tables.

VAX APL is a native-mode, sharable, reentrant interpreter that runs under the VAX/VMS Operating System. It provides a built-in function editor, debugging aids, system communication facilities and a file system. VAX APL can execute lines of code immmediately or store the code for later execution.

VAX APL uses virtual memory to create a "workspace" that can expand dynamically as needed and utilizes the VAX Floating Point and Character String instructions.

Features

- Contains all APL primitive functions and operators described in *Development of an APL Standard* by Falkoff and Orth in the APL 79 Conference Proceedings
- Extensive set of system commands, functions, and variables
- User active workspace and symbol table size are dynamically variable, limited only by available virtual memory
- Set of mnemonics for access to the interpreter without a special terminal
- Facilities for functions to trap, diagnose, and signal errors
- Output ASCII characters (including escape sequences) to terminal
- Manipulate functions as data
- Supports data internally as 1-bit booleans, 32-bit integers, 64-bit D-floating double precision numbers and 8-bit APL characters
- Allows access to external data, such as 8-bit numeric bytes, single precision Floating Point, and 8-bit ASCII characters
- Commands can be entered from a file or a terminal, allowing for "batch-like" processing within the APL environment. VAX APL can be run under the VAX/VMS batch control system with no modification to APL workspaces or user input conventions.
- VAX Record Management System (RMS) to support file system input and output with both sequential and relative file access and to support APL component file I/O
- VAX/VMS mailboxes and event flags to share data synchronously
- Execution of VAX/VMS commands with output returned to APL

Minimum Hardware Required

Any valid VAX/VMS system configuration.

For VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems

Optional Hardware

- FP730 Floating Point Accelerator
- FP750 Floating Point Accelerator
- FP780 Floating Point Accelerator

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX APL
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC020-AG	QD020-AG	QE020-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC020-DZ	QD020-DZ	QE020-DZ
Update Options Users of VAX APL whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC020-HG	QD020-HG	QE020-HY
Right-to-copy for single-use, no binaries, no documentation	QC020-HZ	QD020-HZ	QE020-HZ
Miscellaneous Options Documentation-only kits	QC020-GZ	QD020-GZ	QE020-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC020-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

Refer to preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX BASIC

Description

VAX BASIC is an interactive, sharable language processor for the VAX/VMS Operating System. VAX BASIC takes full advantage of the VAX floating point, decimal, and character instructions.

VAX BASIC provides a high performance program development environment for both applications development and timesharing, by generating in-line VAX native mode instructions. It combines the interactivity of immediate mode program debugging with the power of a structured programming language integrated with key components of the VAX Information Architecture.

In addition to elementary BASIC features, VAX BASIC provides:

- BASIC Programming Support Environment
  - RUN commands for immediate execution of BASIC programs
  - Dynamic linking (LOAD) of separately compiled BASIC modules at RUN
  - EDIT command can invoke the system editor directly
  - HELP (INQUIRE) for on-line assistance
  - SEQUENCE command for generating line numbers
  - RESEQUENCE command for renumbering program lines
  - Direct execution of unnumbered statements (immediate mode)
  - Direct execution of DEC Command Language (DCL) statements
  - Optional Line-by-Line Syntax Checking
- Compile-Time Directives
  - Text inclusion through %INCLUDE and %INCLUDE %FROM %CDD
  - OPTION statment specifies compiler defaults from source modules
  - Conditional compilation (%IF)
  - Listing and cross-reference output control (%NOLIST, %LIST, %CROSS)
- Structured Programming Constructs
  - 31 character alphanumeric statement labels
  - 31 character variable names, allowing ($), (_) and (.)
  - DECLARE statement removes requirement for (%) and ($) suffixes
  - Explicit declarations provide access to many VAX data types
  - Most program lines will not need line numbers
  - Statement condition/repeat modifiers simplify structure
  - IF . . . THEN . . . ELSE . . . END IF conditional blocks
  - SELECT . . . CASE . . . END SELECT multiway decision blocks
  - EXIT and ITERATE statements for iterative statement blocks
  - OTHERWISE out-of-range clause for ON GOTO and ON GOSUB statements

- EXTERNAL statement allows access to global variables, functions, and constants, and allows data typing of parameters to aid in minimizing run-time mismatches
- Language Subsets and Subset Flaggers
  - BASIC-PLUS-2 Subset Flagger for cross-system development
  - Declining Feature Flagger for program maintenance/conversion
  - Qualifier for ANSI Minimal BASIC conforming program execution
- Access to VAX Information Architecture
  - RECORD structure for user-defined data types (similar to PASCAL)
  - RECORD structure retrieval from the Common Data Dictionary
- Exception Handling (ON ERROR) for main and subprograms
- Multiline Statements and Multistatement Lines
- Program segmentation
  - Single and multiline user-defined functions using DEF
  - SUB and FUNCTION programs as individually compiled modules
  - CALL statement passes parameters BY VALUE, REFerence, or DESCriptor
  - Ability to invoke EXTERNAL function procedures from BASIC
  - Up to 254 actual arguments per call on external modules
  - COMMON and MAP statements for creating static storage areas
  - Recursive CALL/function invocation
- Implicit or Explicit data typing allowed
  - Specification of data types permitted on COMMON, DECLARE, DEF, DIMENSION, EXTERNAL, FUNCTION, MAP, RECORD, and SUB statements.
  - Default data allocation rules can be specified with DCL options, BASIC commands, or by the OPTION statement in program text.
  - By default all declarations are implicit, however the option TYPE = EXPLICIT can be used to require explicit declaration of all variables.
  - Integer data type:

BYTE (8 bit) with range of	−128 to	+127
WORD (16 bit) with range of	−32768 to	+32767
LONG (32 bit) with range of	−2147483648 to	+2147483647

  - Real data type allows:

SINGLE (6 digits) with range of	.29x10**-38 to	1.70x10**38
DOUBLE (16 digits) with range of	.29x10**-38 to	1.70x10**38
GFLOAT (15 digits) with range of	.56x10**-308 to	.90x10**308
HFLOAT (33 digits) with range of	.84x10**-4932 to	.59x10**4932

  - Packed DECIMAL type supports up to 31 digits.
  - STRING data type, allowing both static (in MAP or COMMON) and dynamic length

- Symbolic names for control characters BEL, BS, HT, LF, VT, FF, CR, SO, SI, ESC, and DEL
- Ability to invoke all VAX/VMS system services via CALL or FUNCTION references
- Creation of user-defined program constants through DECLARE CONSTANT
- Full support of VAX Symbolic Debugger
- File Organizations and Access Methods
  - Sequential I/O
  - Relative I/O
  - Multikey Indexed I/O operations, including support for integer, string, decimal and segmented string keys
  - Block I/O (random access to 512 byte sequential file)
  - Virtual Arrays (arrays mapped onto disk structures)
  - Record File Address (RFA) access for high performance applications
- Dynamic record definition and variable allocation via MAP DYNAMIC
- Extended Report Formatting Capabilities
  - Suppression of zero fields
  - Zero fill, blank fill, or asterisk fill numeric fields
  - Commas in large numeric value
  - CR (credit) or DR (debit) indicators
  - Floating currency symbol for numeric fields
  - Currency and decimal symbols can be changed for foreign usage
  - FORMAT$ function accepts full PRINT USING editing syntax
- Arrays up to 32 dimensions, declarable at run-time
- Matrix Manipulation Capabilities
- Compatibility with key RSTS/E BASIC-PLUS features including:
  - FIELD Statement
  - CVT and SWAP% functions
  - Virtual arrays
  - Selected nonprivileged SYS calls

VAX BASIC uses the full printable ASCII character set, and 8-bit character codes within constants and I/O operations.

Subprograms and function programs compiled by VAX BASIC can be included by the LOAD command for dynamic linking when RUN is used. User-created libraries can be searched automatically when using RUN.

Subprograms and function programs written in other VAX/VMS native mode languages can be linked (by the VAX/VMS LINKER utility) with VAX BASIC programs and/or subprograms and invoked by the CALL statement in VAX BASIC. Similarly, VAX BASIC program modules can be invoked by other VAX/VMS languages.

Minimum Hardware Required

Any valid VAX/VMS system configuration with

- At least 3500 free blocks of disk space available on the public disk structure for installation
- At least 2000 free blocks of disk space available on the public disk structure for use

NOTE: To execute G_ and H_ floating point data type extended range instructions directly on the VAX/11-780, both the KU780 and the KE780 hardware options must be present. To executive these instructions directly on the VAX-11/750, the KU750 hardware option must be present. The VAX-11/730 does not require any additional hardware options to execute G_ and H_ floating point instructions.

Optional Hardware

FP730 Floating Point Accelerator

FP750 Floating Point Accelerator

FP780 Floating Point Accelerator

KE780 G & H Microcode for VAX-11/780

KU750 User Control Store Hardware and G & H Format Microcode for VAX-11/750

KU780 User Control Store Hardware for VAX-11/780

Prerequisite Software

VAX/VMS Operating System

Optional Software

BASIC Transportability Package
VAX Common Data Dictionary (CDD)

Training Credits

None

Software Installation

Customer Installed

VAX BASIC
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC095-AG	QD095-AG	QE095-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC095-DZ	QD095-DZ	QE095-DZ
Update/Unsupported Options Users of VAX BASIC whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC095-HG	QD095-HG	QE095-HY
Right to copy for single-use, no binaries, no documentation.	QC095-HZ	QD095-HZ	QE095-HZ
Miscellaneous Options			
Documentaton-only kits	QC095-GZ	QD095-GZ	QE095-GZ
BASIC Beginners' Documentation-only kits	QX095-GZ	QX095-GZ	QX095-GZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC096-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX BLISS-32 Implementation Language

Description

BLISS-32 is a high-level, systems implementation language for VAX. BLISS-32 supports development of modular software according to structured programming concepts by providing an advanced set of language features. BLISS-32 provides access to most of the hardware features of the VAX systems to facilitate programming of real-time and/or hardware dependent applications. BLISS-32 is especially intended for the development of operating systems, compilers, run-time system components, database file systems, communications software, and utilities, etc., for use on a VAX hardware system.

The BLISS-32 compiler runs in native mode under the VAX/VMS Operating System. It translates BLISS-32 source programs into relocatable object modules that can be linked for execution. BLISS-32 compiled code is optimized for execution efficiency.

The following features of BLISS-32, while sometimes described in VAX or VAX/VMS terminology, are machine-independent concepts. Collectively, this set of common features is known as "Common BLISS" and can be used in a transportable manner to develop programs for more than one computer architecture.

Common BLISS Features

- Separately compiled modules for modularity and convenient development. Object modules are relocatable and can be linked with object modules produced by the VAX MACRO assembler or other native mode languages.
- BLISS-32 provides expressions for describing the actions to be performed and declarations for allocating, describing, and initializing data, for defining macros and literals, etc.
- "Type-free"—all data is manipulated as longwords of 32 bits. Interpretation of data is provided by language operators.
- Operators provide a set of operations for integer and floating point arithmetic, for comparison, maximization, and minimization of signed integer, unsigned integer, and address values, and Boolean operations.
- Field references—allow values to be retrieved from or assigned to any contiguous field of 1 to 32 bits located anywhere in the VAX virtual address space.
- Character sequence functions—provide efficient run-time manipulation of character data. Operations include moving, concatenating, comparing, and translating character sequences, as well as searching for particular characters or substrings of characters.
- IF, CASE, SELECT, and SELECTONE—allow the choice of an expression or group of expressions to be executed on programmed tests.
- DO, WHILE, and UNTIL—allow general loops that cycle as long as a programmed test is satisfied. The test can be made at either the beginning or the end of the loop.

- INCR and DECR—allow counted loops that execute a computed number of times under control of a loop variable.
- LEAVE—allows both early termination of the processing of a named block and continuation after the named block. LEAVE may be considered a restricted form of forward-only GOTO, as there is no general GOTO in BLISS-32.
- OWN and GLOBAL—provide static storage allocation; GLOBAL names are made available to the Linker and resolve EXTERNAL data declarations in other modules.
- LOCAL, STOCKLOCAL, and REGISTER—allow dynamic stack-like allocation using either the execution stack or the general registers.
- STRUCTURE—allows programmed definition of arbitrary data structures in terms of an accessing algorithm for locating elements of a structure. Built-in declarations for VECTORs, BLOCKs, BITVECTORs, and BLOCKVECTORs provide for commonly needed structures.
- ROUTINE—provides subroutines or procedures in BLISS-32. Routines are recursive and reentrant and can be linked in shareable images for use by multiple processes.
- REQUIRE—allows source text from other files to be automatically included in the module being compiled.
- LIBRARY—allows special compiler-produced binary declaration files to be included in the module being compiled. The effect is substantially the same as REQUIRE, but is more efficient because a restricted set of declarations can be precompiled into internal form.
- MACRO and KEYWORDMACRO—allow compile-time definition of both positional and keyword oriented macros. Macro definition and replacement are in terms of source lexical units lexemes (atoms, tokens) rather than character text. Macro calls and macro declarations can be nested and recursive.
- %IF, %THEN, %ELSE, and %FI—allow conditional compilation of BLISS source depending on programmed, compile-time tests. These can be used to control expansion of macros or in their own right.
- Lexical Functions—allow a variety of compile-time operations such as concatenation of strings, construction of names, testing properties of macro parameters, testing compiler qualifiers, generating compiler diagnostic messages, and controlling macro expansion.

The following features of BLISS-32 are specialized for use on VAX. They provide precise means to tailor BLISS-32 programs to the special capabilities of the VAX and VAX/VMS environment.

- LINKAGE—allows definition of specialized calling sequences for time critical or unusual applications. Options allow for use of CALLS/CALLG/RET or JSB/BSB/RSB type call and return instructions, for passing parameters in VAX general registers or in parameter blocks, for controlling the preservation and use

of registers by a routine, and for the sharing of registers across a set of routines as high-speed, common storage. Built-in linkage declarations for BLISS and FORTRAN fully support the VAX calling sequence conventions.

- PSECT—allows use of link-time program sections for efficient use of the virtual address space. By default generated code sections are position independent.
- BUILTIN—allows use of VAX machine-specific functions for access to VAX features not otherwise provided by the BLISS-32 language. Machine specific functions generally correspond to VAX instructions such as ADAWI, BISPSW, CRC, HALT, INDEX, MTPR, PROBER, REMQUE, etc. Over 80 such functions are provided.
- ENABLE, together with SIGNAL, SIGNAL_STOP, and SETUNWIND functions—allow use of the VAX/VMS condition handling and error message reporting mechanisms.

The BLISS-32 compiler performs global and local optimization to produce efficient and compact generated code. Each routine definition is treated as a complete unit in compiling the code for that routine. While industry terminology varies, the following generally characterizes the optimizations employed: common subexpression elimination, removal of loop invariants, constant folding, block register allocation, peephole replacement, test instruction elimination, jump vs. branch instruction resolution, branch chaining, and cross-jumping.

The BLISS-32 compiler optionally produces a listing file that shows the source text compiled and the generated code in a format that closely resembles a VAX MACRO assembly listing. Multiple listing options allow selective inclusion or exclusion of source generated code, use of source names in the listing in place of machine register names (where feasible), macro expansion and tracing information, and use of names from library files.

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration.

BLISS-32 compiler performance varies with the virtual memory working set allowed for it.

- With large-scale compilation of complex programs, a working set allocation of over 300 pages (150 Kbytes) can be desirable for efficient system utilization.
- In an environment where only a single BLISS compilation occurs at any time, a system configuration of 512 Kbytes of memory is required.
- In a multiuser environment, where several concurrent compilations occur, a minimum of one megabyte is recommended.

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Training Credits

None

Optional Software

None

Software Installed

Customer Installed

Software Product Support

VAX BLISS-32 Implementation Language includes standard warranty services.

VAX BLISS-32 Implementation Language Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC106-AG	QD106-AG	QE106-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC106-DZ	QD106-DZ	QE106-DZ
Update Options Users of VAX BLISS-32 Implementation Language whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC106-HG	QD106-HG	QE106-HY
Right to copy for single-use, no binaries, no documentation.	QC106-HZ	QD106-HZ	QE106-HZ
Miscellaneous Options Documentation-only kits	QC106-GZ	QD106-GZ	QE106-GZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD106-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX BLISS-16 Implementation Language

Description

BLISS-16 is a high-level, systems implementation language intended for the development of systems software such as operating systems, compilers, run-time system components, database and file systems, communications software, and utilities for use on PDP-11 hardware systems. An advanced set of language features supports development of modular software according to structured programming concepts. Access to many of the hardware features of the PDP-11 is provided in order to facilitate programming of real-time and/or hardware-dependent applications.

The BLISS-16 cross-compiler runs in native mode under the VAX/VMS Operating System. This cross-compiler translates BLISS-16 source programs into relocatable PDP-11 object modules optimized for time and space efficiency.

Many features of BLISS-16 are machine-independent. Collectively, this set of common features is known as "Common BLISS" and can be used to develop transportable programs that will run on the VAX-11, DECsystem-10, and DECsystem-20 as well as the PDP-11.

Common BLISS-16 Features

- Separately compiled modules for modularity and convenient development. Object modules are relocatable and can be linked with other BLISS-16 object modules or object modules produced by the compiler and other PDP-11 language processors.
- Provides expressions for describing the logical procedures to be performed and declarations for allocating, describing, and initializing data, for defining macros and literals, etc.
- "Type-free"—all data is manipulated as words of 16 bits. Interpretation of data is provided by language operators.
- Operators provide a set of functions for integer arithmetic, for comparison, maximization, and minimization of signed integer, unsigned integer, address values, and for Boolean operations.
- Field references—allow values to be retrieved from or assigned to any contiguous field of from 1 to 16 bits within a 16 bit word.
- Character sequence functions—provide efficient run-time manipulation of character data. Operations include moving, concatenating, comparing and translating character sequences, as well as searching for particular characters or substrings of characters.
- IF, CASE, SELECT, and SELECTONE—allow the choice of an expression or group of expressions to be executed based on programmed tests.

- DO, WHILE, and UNTIL—allow general loops that cycle as long as a programmed test is satisfied. The test can be made at either the beginning or the end of the loop.
- INCR and DECR—allow counted loops that execute a computed number of times under control of a loop variable.
- LEAVE—allows early termination of the processing of a named block and continuation after the named block. LEAVE can be considered a restricted form of forward-only GOTO, as there is no general GOTO in BLISS-16.
- OWN and GLOBAL—provide static storage allocation; GLOBAL names are made available to the linker to resolve EXTERNAL data declarations in other modules.
- LOCAL, STACKLOCAL, and REGISTER—allow dynamic stack-like allocation using either the execution stack or the general registers.
- STRUCTURE—allows the programmed definition of arbitrary data structures in terms of an accessing algorithm for locating elements of a structure. Predefined declarations for VECTOR, BLOCK, BITVECTOR, and BLOCKVECTOR provide commonly needed structures.
- ROUTINE—provides subroutines or functions in BLISS-16. Routines may be recursive and reentrant.
- REQUIRE—allows source files to be automatically included in the module being compiled.
- LIBRARY—allows special compiler-produced binary declaration files to be included in the module being compiled. The effect is substantially the same as REQUIRE, but is more efficient because a restricted set of declarations are precompiled into internal form.
- MACRO and KEYWORDMACRO—allow compile-time definition of both positional and keyword oriented macros. Macro definition and replacement are in terms of source lexical units called lexemes (atoms, tokens) rather than character text. Macro calls and declarations can be nested and recursive.
- %IF, %THEN, %ELSE, and %FI—allow conditional compilation of BLISS source depending on programmed, compile-time tests. These can be used to control expansion of macros.
- BLISS Language Functions—allow a variety of compile time operations such as string concatenation, name construction, testing of macro parameter properties, testing compiler qualifiers, generating compiler diagnostic messages,and controlling macro expansion.

Special PDP-11 Features

- LINKAGE—allows definition of specialized calling sequences for real-time or unusual applications. Options allow for JSR, EMT, TRAP, IOT, INTERRUPT, or RSX-11 AST type call and return sequences for passing parameters in PDP-11 general registers or on the stack, for controlling the preservation and use of

registers by a routine, and for the sharing of registers across a set of routines as high-speed common storage. Linkage declarations permit routines written in BLISS-16 to call or be called by routines written in FORTRAN, BLISS-11, and MACRO-11.

- ENVIRONMENT—specifies the hardware instructions available on the target PDP-11 (EIS or non-EIS) and controls the optional generation of position independent code.
- BLISS-16 generated object code can be mapped to run under I/D space.
- BLISS-16 generated object code is compatible with current versions of Digital supported operating system environments, including:

IAS	
RSTS/E	RSX-11S
RSX-11M	RT-11
RSX-11M-PLUS	VAX/VMS AME

- PSECT—allows use of link-time program sections for efficient use of the address space.
- BUILTIN—allows use of PDP-11 machine specific functions for access to PDP-11 features not otherwise provided by the BLISS language such as floating-point and multiword precision integer arithmetic. Machine specific functions generally correspond to PDP-11 instructions such as HALT, NOP, RESET, WAIT, BPT, SWAB, MFPS, MTPS, MFPD, and MTPI.
- ENABLE together with SIGNAL, SIGNAL_STOP, and SETUNWIND functions—allow the condition handling or the response to an unusual event signaled during the execution of a program.

The BLISS-16 compiler performs global and local optimization to produce efficient and compact code. Each routine definition is treated as a complete unit in compiling the code for that routine.

While industry terminology varies, the following generally characterize some of the optimizations employed: common subexpression elimination, removal of loop invariants, constant folding, block register allocation, peephole replacement, test instruction elimination, jump vs. branch instruction resolution, branch chaining, cross-jumping, constant propagation, and redundant store elimination.

The BLISS-16 compiler optionally produces a listing file that shows the source text compiled and the generated code in a format that closely resembles a PDP-11 MACRO assembly listing. Multiple listing options allow selective inclusion or exclusion of source and generated code, source names and source line numbers as commentary to the assembly listing (where feasible), macro expansion and tracing information, and identification of names acquired from library files. A listing file that can be assembled by MACRO-11 can be requested.

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration.

BLISS-16 compiler performance, under VAX/VMS, varies with the virtual memory working set allowed for it.

- With large-scale compilation of complex programs, a working set allocation of over 300 pages (150 Kbytes) may be desirable for efficient system utilization.
- In an environment where only a single BLISS compilation occurs at any time, a system configuration of 512 Kbytes of memory is required.
- In a multiuser environment, where several concurrent compilations occur, a minimum of one megabyte is recommended.

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX BLISS-16 Implementation Language Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC014-AG	QD014-AG	QE014-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC014-DZ	QD014-DZ	QE014-DZ
Update/Unsupported Options —Users of VAX BLISS-16 Implementation Language whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC014-HG	QD014-HG	QE014-HY
Right to copy for single-use, no binaries, no documentation.	QC014-HZ	QD014-HZ	QE014-HZ
Miscellaneous Options Documentaton-only kits	QC014-GZ	QD014-GZ	QE014-GZ

**VAX-11/782 is a multiprocessor which will be considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD014-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX C

Description

VAX C is an extended implementation of the C programming language, originally developed at Bell Laboratories. The VAX C compiler runs under the VAX/VMS Operating System and generates optimized, shareable, and position-independent code.

As a native-mode VAX/VMS language, VAX C is integrated into the VAX/VMS common language environment. All VAX/VMS system services are thus available to programs written in VAX C. VAX C supports VAX Record Management Services (RMS), including sequential, relative, and indexed file organizations and associated access methods, in addition to the stream file-access conventional among most C implementations. VAX C programs can invoke, as functions, modules written in other VAX/VMS languages. Additionally, programs written in VAX C generate limited debug and traceback records for use with the VAX Symbolic Debugger. The Debugger allows the C programmer to set breakpoints, examine and modify the contents of user variables, and selectively halt or continue program execution.

Features

- Structured programming control flow constructs
  - *if . . . else* construct for simple selection
  - *switch* statement for multichoice selection with an arbitrary number of *case* statements
  - *while, do,* and *for* statements for iterative execution
- Flow modification statements
  - *break*
  - *continue*
  - *goto*
- Data types for numeric, nonnumeric, and systems programming
  - Byte, word, and longword signed and unsigned integers
  - Integer constants in decimal, octal, and hexadecimal radices
  - Single-character variables and constants
  - Single- and double-precision floating point numbers
  - Pointer variables containing the addresses of other variables
  - Data aggregates including arrays, structures, and unions
- *auto, static, register,* and *extern* storage allocation classes for variables
- Large set of concise arithmetic, relational, and logical operators
- Set of library functions for I/O, character and string handling, mathematical computations, memory allocation, and emulation of selected UNIX features

- Preprocessor control statements for
  - File inclusion
  - Identifier substitution
  - Conditional compilation
- Separate compilation capabilities
- User-defined or enumerated (*enum*) data type
- Compiler generated listing file including optional:
  - Inline machine code
  - Expanded preprocessor substitution listing
  - Storage allocation map
  - Cross referencing of variables
  - Compilation statistics
- Integration into the VAX/VMS Common Language Environment:
  - Generation of limited debug and traceback records for VAX Symbolic Debugger support
  - Facility for interfacing with the VAX/VMS calling standard
  - Access to the VAX Common Run-time Library for general purpose routines and support of multi-language environments
  - Access to the data management facilities of VAX/VMS's Record Management Services (RMS) via direct calls or calls to the Common Run-time Library
- Keywords (*globalref*, *globaldef*, and *globalvalue*) for sharing data among program modules
- Extensive global and local optimizations of generated code for increased performance and reduced size under VAX/VMS
- Keywords (*readonly* and psect name specification) for control of data attributes and data placement

Compatibility With Other C Implementations

VAX C represents a more current definition and implementation of the language than is described in the initial guiding document for C, *The C Programming Language*. Some incompatibilities among implementations do, however, exist. In general, many programs written in C for other compilers can be successfully recompiled under VAX C.

The C language has been closely associated with the UNIX Operating System which itself was largely written in C. Over 150 UNIX-specific routines have thus been included in the run-time library available with the VAX C compiler. Routines selected for inclusion in this library are primarily those for which a reasonable emulation is possible under VAX/VMS. Inherent architectural differences

between UNIX and VAX/VMS necessarily preclude the likelihood of every C program written for a UNIX environment compiling and executing unaltered. Programs exploiting highly machine dependent or UNIX-specific features will require some conversion effort.

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration that includes at least

- 512 kilobytes of physical memory
- Two megabytes of virtual page file quota
- 250 page minimum working set
- 1600 blocks of permanent disk storage
- 2600 blocks of disk storage temporarily required during installation procedure

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems

Optional Hardware

- FP780 Floating Point Accelerator (for VAX-11/780)
- FP750 Floating Point Accelerator (for VAX-11/750)
- FP730 Floating Point Accelerator (for VAX-11/730)

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX C
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC015-AG	QD015-AG	QE015-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC015-DZ	QD015-DZ	QE015-DZ
Update/Unsupported Options Users of VAX C whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC015-HG	QD015-HG	QE015-HY
Right-to-copy for single-use, no binaries, no documentation, no support services	QC015-HZ	QD015-HZ	QE015-HZ
Miscellaneous Options Documentation-only kits	QC015-GZ	QD015-GZ	QE015-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD015-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX COBOL

Description

COBOL is a high-level language for business data processing. VAX COBOL runs under the VAX/VMS Operating System, taking full advantage of the system facilities. It is based upon the 1974 ANSI COBOL Standard X3.23-1974 and includes features planned for the next COBOL standard.

VAX COBOL supports features defined in the following modules of the 1974 ANSI COBOL standard:

- Full Level 2 Nucleus Module
- Full Level 2 Table Handling Module
- Full Level 2 Sequential I/O Module
- Full Level 2 Relative I/O Module
- Full Level 2 Indexed I/O Module
- Full Level 1 Report Writer Module
- Full Level 2 Segmentation Module
- Full Level 2 SORT/MERGE Module
- Full Level 2 Library Module
- Full Level 2 Interprogram Communications Module

New features found in the proposed COBOL standard and documented in the Draft Proposed X3.23 American National Standard Programming Language COBOL include:

- EVALUATE statement
- In-line PERFORM
- Scope-delimited statements
- INITIALIZE statement
- Contained programs
- Reference modification
- External file and data declarations
- Debug lines
- De-edited MOVE operations
- BY CONTENT argument passing
- Symbolic characters
- OPEN EXTEND on relative and indexed files

Two features are provided to access the VAX Information Architecture from COBOL. The Data Manipulation Language (DML) interfaces with VAX DBMS. VAX DBMS must be installed to use this feature. The COPY FROM DICTIONARY statement, a DIGITAL extension to COBOL, allows access to common record definitions stored in the VAX Common Data Dictionary (CDD). The VAX CDD must be installed to use this feature.

VAX COBOL supports the following DIGITAL extensions to COBOL:

- RMS-STS, RMS-STV, and RMS-FILENAME special registers
- File sharing and record locking features
- VALUE IS EXTERNAL—access to link-time constants
- USAGE IS POINTER—address data type
- VALUE IS REFERENCE—compile-time address evaluation
- SET TO REFERENCE—run-time address evaluation
- SUCCESS/FAILURE class conditions
- Thirty-one character user-names
- ACCEPT AT END statement
- Single-quote-delimited non-numeric literals
- Hyphen/underscore equivalencing in user-names
- Non-numeric literal argument passing
- Conditional compilation

The VAX COBOL compiler produces an object module from a source program. The compiler is capable of producing a source listing with embedded diagnostics indicating line and position of error, a machine language listing, a cross reference listing, and maps of file names, data names, procedure names, external program names, and subschema information. The cross reference listing and maps may be produced either in alphabetical order or in order of declaration. The cross reference listing distinguishes destructive references to data from read-only references.

Object modules produced by the compiler can be linked with native mode object modules produced by other language processors including VAX BASIC, VAX FORTRAN, and VAX PL/I. VAX COBOL is supported by both the VAX Common Run-Time Library and the VAX Symbolic Debugger.

The VAX COBOL product includes a COBOL compiler, the REFORMAT Utility, and the VAX COBOL-74 Translator Utility. The REFORMAT Utility converts source programs from DIGITAL terminal format to ANSI-standard COBOL format and vice versa. The VAX COBOL-74 Translator Utility is used for converting PDP-11 COBOL and VAX COBOL-74 specific features to VAX COBOL.

Minimum Hardware Required

Any valid VAX-11/780 or VAX-11/782 system under VAX/VMS at ECO REV 4 or later.

Any valid VAX-11/750 or VAX-11/730 system under VAX/VMS.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

VAX DBMS and VAX Common Data Dictionary (CDD) required to use COBOL Data Manipulation Language features.

VAX Common Data Dictionary (CDD) required to use COPY FROM DICTIONARY feature.

Training Credits

None

Software Installation

Customer Installed

VAX COBOL
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC099-AG	QD099-AG	QE099-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC099-DZ	QD099-DZ	QE099-DZ
Upgrade Options Customers who are currently licensed users of VAX COBOL-74 may obtain this new product by purchasing a license to an upgrade kit for use on the same CPU as their previous license.		QD115-AG	QE115-AY
Single-use license-only upgrade option, no binaries, no documentation, no support services.		QD115-DZ	QE115-DZ

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Update/Unsupported Options Users of VAX COBOL whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC099-HG	QD099-HG	QE099-HY
Right-to-copy for single-use, no binaries, no documentation	QC099-HZ	QD099-HZ	QE099-HZ
Miscellaneous Options Documentation-only kits	QC099-GZ	QD099-GZ	QE099-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD099-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX CORAL 66

Description

CORAL 66 is a high-level, block-structured programming language. It is the standard, general purpose language prescribed by the British Government for real-time and process control applications. It is defined in the "Official Definition of CORAL 66" published in 1973 by Her Majesty's Stationery Office (ISBN 011 4702217).

The language is designed to replace assembly level programming in modern industrial and commercial applications. It is used for long life products where ease of maintenance and flexibility are required.

The VAX CORAL 66 compiler is implemented in accordance with the Official Definition. In addition, the compiler provides the following features:

- BYTE and DOUBLE (64 bit floating point) numeric types
- Generation of reentrant code at the procedure level
- LONG numeric type supported and implemented as a standard VAX 32 bit integer, for compatibility with PDP-11 CORAL

Floating Point Processor Support

The FP780 Floating Point Processor option of the VAX-11/780 computer system can be used to give improved floating point operation performance.

Run-Time Library

The VAX CORAL 66 Run-Time Library (RTL) is a set of object modules selectively linked with compiler-produced object modules by the operating system's linker to produce an executable image (program). The RTL is reentrant and can be made into a shareable image for concurrent use by multiple processes.

The VAX CORAL 66 RTL provides the following capabilities:

- Stream, record, and block input/output
- Terminal interface handling

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration with

- 760 blocks of disk storage
- 3650 blocks required for peak usage

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

Supports any mass storage, unit-record, or terminal device supported by the prerequisite software.

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX CORAL 66
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC067-AG	QD067-AG	QE067-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC067-DZ	QD067-DZ	QE067-DZ
Update/Unsupported Options Users of VAX CORAL 66 whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC067-HG	QD067-HG	QE067-HY
Right-to-copy for single-use, no binaries, no documentation	QC067-HZ	QD067-HZ	QE067-HZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD067-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DEC/CMS Digital Equipment Corporation Code Management System

Description

VAX DEC/CMS is a program librarian for software development and evolution on a VAX/VMS Operating System. It is comprised of a set of commands that enables software developers to manage the files of an ongoing project.

Features

- Store ASCII text files in a project library
- Retrieve previous file generations
- Obtain a report of file modification, including when, why, and by whom the modification was made
- Determine the origin of each line of a file, either as an annotated listing or as comments in the file
- Manage concurrent modifications
- Merge separately developed modifications
- Store related files together as a single element
- Relate the generation of one element to the corresponding generations of other elements

Each CMS command is invoked from VAX/VMS's command level to perform a specific function, such as reserving a file for modification or obtaining a report of development status. Each command returns to VAX/VMS's command level, where the user may edit, compile, and test in the usual manner. Since VAX DEC/CMS allows the user to work with sequential ASCII files, all of the standard editors and compilers can still be used.

All text files for the project are stored in a project library which the user identifies at the beginning of each session by means of the CMS SET LIBRARY command. ASCII text files can be stored in the project library, including source programs, command files, documentation, and test data.

A project library is a collection of elements, each consisting of one or more related files; for example, a source file, and the command file that translates from source code to object code might constitute an element of the library. Commands generally operate on entire elements, retrieving or storing all files of an element at the same time.

For each element, the library stores successive generations or historical instances of the element's files. Once an element generation exists in the library, it never changes. A modification to a generation is stored as a new generation. Successive generations, each a modification of the previous, form a line of descent. Typically, each element generation will have one successor, which is the main line of descent. VAX DEC/CMS allows two or more successors to a generation, forming variant lines of descent.

Generation expressions allow the user to retrieve a particular generation or the latest in a particular line of descent. A generation or line of descent can be identified by a generation number, or by a user-defined class name. A class can denote a base level, a release, the current stable version, a debugging version, or any other characteristic agreed on by users for their project.

Historical generations of source and other text files are retained efficiently by storing only their differences. VAX DEC/CMS determines the differences. This information enables VAX DEC/CMS to report the generation of origin for each line of a file, i.e. the generation in which the line was most recently inserted or modified. This origin information can be optionally inserted as comments on each line of the file itself.

A history is kept of all file movements into and out of the project library. In addition, a list of reservations is kept for all modifications that are in progress at any time. A user who wishes to reserve, for modification, an element that is previously reserved by someone else, is informed and asked for permission to continue. If the user chooses to proceed, the occurrence is recorded as an unusual event. The other users involved will similarly be informed and queried, when they attempt to put their modifications back into the library.

Concurrent modifications are not lost; they are stored in the library on different lines of descent. Modifications on different lines of descent can be merged, and the result can be edited to resolve any conflicting modifications.

Principal VAX DEC/CMS Subcommands

- RESERVE—places a copy of a generation in the user's working directory and notes that the user is working on a modification for it. The entire element is reserved against concurrent modification by another user. A user can have several elements reserved at the same time. A remark can optionally be inserted into each line to show the origin of the line (see ANNOTATE). A qualifier allows another generation of the same element to be merged into the copy supplied to the user.
- FETCH—similar to RESERVE, except that the element is not reserved for modification. The copy placed in the working dictionary cannot be used to create a new generation of the same element.
- REPLACE—creates a new generation of an element that the user has reserved. The files of the new generation are moved to the project library from the user's working dictionary.
- UNRESERVE—Cancels an existing reservation of an element.
- ANNOTATE—produces an annotated listing of any element in the libary. The annotations describe the element and its ancestors, and indicate the origin of each line of the element (i.e., the generation in which each line was inserted or most recently modified).

- SHOW—Displays chronological and status information. For any generation, the command can give the author, creation data, creating command, and author's remark. This information can also be obtained for a generation's ancestors or descendents. The command can also list all elements of the library, all that are reserved, or all that have a generation in a given class. All or a portion of the project history can be displayed, and the display can be restricted to unusual events.
- CREATE—creates a new element or class.
- INSERT—puts an element generation into a class.
- SET LIBRARY—identifies the user's project library at the start of a session.
- VERIFY—performs consistency checks on the library, and recovers from a malfunction by voiding a partially completed transaction.

Performance Considerations

Response time performance might appear to be less than expected because of the checking and processing done, for certain operations, ensuring the safety and accuracy of the user's file. It is not appropriate to compare these CMS commands to the VMS COPY command.

Minimum Hardware Required

Any valid VAX/VMS operating system configuration having sufficient on-line mass storage to accommodate VAX DEC/CMS and the project libraries. Most projects will require no more storage than they are now using. The VAX DEC/CMS system requires 600 blocks for operation and an additional 3000 blocks during installation.

VAX-11/730 System

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX DEC/CMS Digital Equipment Corporation Code Management System Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC007-AG	QD007-AG	QE007-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC007-DZ	QD007-DZ	QE007-DZ
Update Options—Users of VAX DEC/CMS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC007-HG	QD007-HG	QE007-HY
Right to copy for single-use, no binaries, no documentation.	QC007-HZ	QD007-HZ	QE007-HZ
Miscellaneous Options Documentaton-only kits	QC007-GZ	QD007-GZ	QE007-GZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD007-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DIBOL

Description

VAX DIBOL (Digital Interactive Business Oriented Language) is a high-level, procedural language designed specifically for data processing in the business environment. The VAX/VMS Operating System provides a timesharing environment for DIBOL program development and program execution. The VAX DIBOL language implementation takes full advantage of the VAX architecture featuring a native-mode compiler, interpreter, subroutine library, and utilities. VAX DIBOL is highly compatible with DIBOL-11, retaining all the capabilities and advantages of DIBOL-11, while providing an expansion path for applications requiring the power of VAX/VMS.

VAX DIBOL consists of a DIBOL compiler, a DIBOL program debugging aid called the DIBOL Debugging Technique, and a set of utility programs that facilitate data handling and report generation. The language provides a means of using the data management facilities of the VAX/VMS Operating System. These facilities, known as Record Management Services (RMS), provide the following data organization and data access options:

- Sequential access method
- Random or relative access method
- Indexed sequential access method

VAX DIBOL conforms to the VAX procedure calling standard, and programs and subroutines are shareable.

DIBOL Statements

A DIBOL statement has one or more elements. The first element is usually an English language-like verb that characterizes an action to be performed. The other elements of the statement are arguments, which consist of symbolic data names, references to statement labels, and expressions of data values or relationships. Arguments specify the objects of the action performed by the statement. DIBOL statements fall into the following six functional groups:

- Compiler Directive and Declaration—Provides instructions to the compiler that provide information about the program. These statements are not executable at run time. The compiler directive statements are START, ENDC, .IFDEF, .IFNDEF, .TITLE, .PAGE, and .INCLUDE. Declaration statements are similar to compiler directives, except they can affect execution of the program. Declaration statements are END, PROC, and SUBROUTINE.
- Data Declaration—defines and identifies the characteristics of the data that is processed by a DIBOL program, such as whether they are alphanumeric or numeric, their size, and their symbolic names. The data declaration statements are COMMON, RECORD and Field Definition.

- Data Manipulation—Performs calculations, conversions, and value assignments. The DIBOL data manipulation statements are INCR, LOCASE, UPCASE, and the assignment statement.
- Control—Modifies the normal sequential order of statement execution in the DIBOL program. The control statements are CALL, XCALL, GOTO, IF, OFFERROR, ONERROR, RETURN, SLEEP, and STOP.
- Intertask Communications—Facilitates the exchange of information between programs. The DIBOL intertask communications statements are SEND AND RECV.
- Input/Output—Controls the transmission and reception of data between memory and system input/output devices, such as disks, line printers, or terminals. These input/output statements include ACCEPT, CLOSE, DELETE, DISPLAY, FORMS, LPQUE, OPEN, READ, READS, STORE, UNLOCK, WRITE and WRITES.

Program Structure

A VAX DIBOL program is separated into two major parts: a Data Division and a Procedure Division. The Data Division contains the non-executable data declaration statements that define the characteristics and identity of the data that is used by the program. The Procedure Division contains all the program statements that implement the actions or tasks to be performed. The .TITLE directive can be used to place headings on a DIBOL program listing, thus providing clearer program documentation. PROC and END statements are used to define the program structure. The PROC statement separates the Data Division statements from the Procedure Division statements; and the END statement specifies the end of the program.

Data Types

VAX DIBOL allows program data to be stored either in numeric form, such as numbers used for calculation, or in alphanumeric form, such as names and addresses.

Subroutine Library

VAX DIBOL external subroutine capability allows the user to develop subroutines to perform special purpose functions, without having to recode the routine in each program. A program can include any of the DIGITAL-provided subroutines, or a user can develop subroutines for specific applications.

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX DIBOL
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC018-AG	QD018-AG	QE018-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC018-DZ	QD018-DZ	QE018-DZ
Update/Unsupported Options Users of VAX DIBOL whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC018-HG	QD018-HG	QE018-HY
Right to copy for single use, no binaries, no documentation, no support services	QC018-HZ	QD018-HZ	QE018-HZ
Miscellaneous Options Documentation-only kits	QC018-GZ	QD018-GZ	QE018-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD018-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DSM

Description

VAX DSM is a multiuser, data management system that includes Digital Standard MUMPS (DSM). This high-level interpretive language is an extension of the American National Standard MUMPS specification X11.1-1977; also included are the enhancements to the MUMPS language proposed by the MUMPS Development Committee as of 1982. The shareable, reentrant interpreter operates under the VAX/VMS Operating System to take advantage of the packed decimal and character string instruction set, the virtual memory, and the I/O capabilities of the operating system.

The DSM language is directed primarily toward the processing of variable-length string data, making interactive data base systems easier to implement and maintain. The VAX DSM language includes the following extensions to the ANSI standard MUMPS specifications:

- String Subscripts for local and global variables
- A $ZCALL function for procedure calls to VAX/VMS system services, routines in the VAX Common Run-Time Library, or routines written in languages other than DSM
- Language elements for access to a subset of the I/O options of VAX/VMS, including terminals, mailboxes and VAX RMS sequential, relative, and ISAM files

VAX DSM provides a language precompiler to optimize routine execution in an application environment. The precompilation process is totally transparent; during precompilation, the interpreter performs the following operations:

- Strips comments
- Checks syntax
- Optimizes routine references
- Transforms numeric constants into an internal representation
- Converts arithmetic expressions into Reverse Polish Notation
- Optimizes postconditional evaluation

The DSM language allows the user to symbolically reference data that is stored on disks through special variables called global variables, or simply, globals. Subscripted globals form an external system of arrays, the data of which form a common data base that can be made available to one or more users in the system.

VAX DSM globals are implemented as VAX RMS ISAM files. The mapping of global arrays into ISAM files is handled entirely by VAX DSM and is transparent to the user. VAX DSM globals can be accessed by DECnet and other VAX/VMS languages.

VAX DSM provides a symbolic debugger that permits the user to step through an application program and to set break points. Also provided is a trace facility and the ability to set watch points. At any break or watch location the user can monitor the current state of the call stack and local symbol table. This facility aids in the development and maintenance of DSM applications.

A journaling facility exists to provide a record on secondary storage (disk or magnetic tape) of all operations that modify the data base (global variable SET and KILL). Journaling can be done on a global-by-global basis or on a group or system wide basis. In the event of a data base degrade, it is possible to restore the data base from the journal files.

VAX DSM uses a detached process called the DSM Job Controller to implement a hierarchical locking facility for DSM applications. In addition, the DSM Job Controller provides system manager and operator control functions over processes running the DSM image.

VAX DSM supports a high degree of code and data sharing through the use of VAX/VMS virtual memory sections. Virtual memory sections can be either private or shared and are used to map DSM precompiled application routines into virtual memory. Shared sections can be created dynamically by a process, or they can be permanently present in the system for access by a number of users.

VAX DSM provides utility routines written in the DSM language to help the application programmer develop and maintain the software and data for their applications and to help the system manager control the running of applications.

VAX DSM provides built-in interfaces to selected system services and mathematical functions. Such functions include the ability to mount a magnetic tape, spawn a DCL process, and create logical names. These interfaces are implemented through use of the special $ZCALL function.

Minimum Hardware Required

Any valid VAX/VMS system configuration that includes

- 2 megabytes of physical memory
- 2 megabytes of virtual page file
- 3300 blocks of disk storage

VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX DSM
Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC130-AG	QD130-AG	QE130-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC130-DZ	QD130-DZ	QE130-DZ
Update/Unsupported Options Users of VAX DSM whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC130-HG	QD130-HG	QE130-HY
Right-to-copy for single-use, no binaries, no documentation	QC130-HZ	QD130-HZ	QE130-HZ
Miscellaneous Options Documentation-only kits	QC130-GZ	QD130-GZ	QE130-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD130-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX FORTRAN

Description

VAX FORTRAN is an implementation of full language FORTRAN-77 conforming to American National Standard FORTRAN, ANSI X3.9-1978. It includes optional support for programs conforming to the previous standard, ANSI X3.9-1966. VAX FORTRAN meets the Federal Information Processing Standard Publication (FIPS-69) requirements for a flagger. The flagger optionally produces diagnostic messages for syntax and/or source form elements, which do not conform to the Full-Level ANSI FORTRAN X3.9-1978 Standard. The shareable, reentrant compiler operates under the VAX/VMS Operating System and takes advantage of the VAX floating point and character string instruction set and the VAX/VMS virtual memory system.

VAX FORTRAN includes the following extensions to the ANSI standard:

- Language elements for keyed and sequential access to VAX RMS multikey ISAM files
- A set of data types beyond those specified for full language FORTRAN-77:
  -LOGICAL*1, BYTE
  -LOGICAL*2
  -INTEGER*2
  -COMPLEX*16, DOUBLE COMPLEX
  -REAL*16
- Explicit specification of storage allocation units for data types (e.g., REAL*8, INTEGER*4)
- Data initialization in type declaration statements
- IMPLICIT NONE statement
- DO WHILE, ENDDO statements
- Bit manipulation functions
- Hexadecimal and octal constants and Z and O format edit descriptors applicable to all data types
- ENCODE, DECODE statements
- ACCEPT, TYPE input/output statements
- DEFINE FILE statement
- USEROPEN subroutine invocation at file OPEN time
- INCLUDE statement
- NAMELIST—directed I/O
- 31-character identifiers that can include dollar sign ($) and underline (_)
- Comments allowed at end of each source line
- Debug statements in source

- Language elements that support the VAX extended range and extended precision floating point architectural features:

  64-bit G_ floating data type, with an 11-bit exponent and 53-bit mantissa, which provides a range of 0.56*10**-308 to 0.09*10**308 and a precision of 15 decimal digits

  128-bit H_ floating data type, with a 15-bit exponent and a 113-bit mantissa, which provides a range of 0.84*10**-4932 to 0.59*10**4932 and a precision of 33 decimal digits

NOTE: To execute G_ and G_ floating data type extended range instructions directly on the VAX-11/780, both the KU780 and the KE780 hardware options must be present. To execute these instructions directly on the VAX-11/750, the KU750 hardware option must be present. The VAX-11/730 does not require any additional options for G_ and H_ floating data type instruction execution.

Additional features

- Support for calls to VAX/VMS system service procedures
- Generation of symbol tables for the VAX-11 symbolic debugger
- Generation of Cross Reference Listings
- Generation of shareable code
- Up to 255 actual arguments in a CALL statement
- Up to 250 named COMMON blocks per subprogram

VAX FORTRAN compiler optimizations include

- Constant folding
- Optimizations of arithmetic IF, logical IF, and block IF-THEN-ELSE
- Common subexpression elimination
- Removal of invariant expressions from DO loops
- Allocation of general registers across DO loops
- In line expansion of statement functions

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration

Optional Hardware

- FP730 Floating Point Accelerator
- FP750 Floating Point Accelerator
- FP780 Floating Point Accelerator
- KU780 User Control Store Hardware for VAX-11/780
- KE780 G & H Microcode for VAX-11/780
- KU750 User Control Store Hardware and G & H Format Microcode for VAX-11/750

NOTE: To execute G & H floating extended range instructions directly on the VAX-11/780, both the KU780 and KE780 must be present.

To execute G & H floating directly on the VAX-11/750, the KU750 must be present.

The VAX-11/730 does not require an additional option for G & H floating instructions.

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX FORTRAN
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC100-AG	QD100-AG	QE100-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC100-DZ	QD100-DZ	QE100-DZ
Sources license, sources, no support services Note: VAX FORTRAN sources are written in VAX BLISS-32; therefore, a VAX BLISS-32 compiler is required for compilation	QC100-EM	QD100-EM	QE100-EM

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Update/Unsupported Options Users of VAX FORTRAN whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC100-HG	QD100-HG	QE100-HY
Right-to-copy for single-use, no binaries, no documentation	QC100-HZ	QD100-HZ	QE100-HZ
Sources Update Options The following options are available to licensed users as updates to sources. The update is distributed in source form on the appropriate medium and includes no installation or other services unless specifically stated.	QC100-NM	QD100-NM	QE100-NM
Miscellaneous Options Documentation-only kits	QC100-GZ	QD100-GZ	QE100-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, M, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC100-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
M = 9-track 1600 BPI Magtape (PE)
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX PASCAL

Description

VAX PASCAL is an implementation of the Pascal* language that accepts programs compatible with either level of the ISO Specification for Computer Programming Language Pascal (Draft Proposal 7185). Containing extensions to the draft ISO standard, VAX PASCAL generates optimized, sharable code that takes full advantage of the VAX hardware floating point and character instruction sets and the virtual memory capabilities of the VAX/VMS Operating System. The language contains control statements, data types, and predeclared procedures and functions.

Major Pascal Language Elements

- INTEGER, REAL, CHAR, BOOLEAN, enumerated, and subrange data types
- ARRAY, RECORD, SET, and FILE structured data types
- FOR, REPEAT, and WHILE repetitive control statements CASE, IF-THEN, and IF-THEN-ELSE conditional statements
- BEGIN . . . END compound statement
- GOTO statement
- GET, PUT, READ, WRITE, READLN, and WRITELN input and output procedures
- Standard set of functions and procedures

VAX PASCAL Extensions

- DOUBLE (D_floating or G_floating) and QUADRUPLE data types that support the VAX extended range and extended precision floating point architectural features:
  - —64-bit G_floating data type, with an 11-bit exponent and 53-bit mantissa, which provides a range of 0.56*10**-308 to 0.09*10**308 and a precision of 15 decimal digits
  - —128-bit H_floating data type, with a 15-bit exponent and a 113-bit mantissa, which provides a range of 0.84*10**-4932 to 0.59*10**4932 and a precision of 33 decimal digits
- VARYING data type denoting variable-length character strings up to 65,535 characters
- Concatenation operator and set of predefined character string functions including INDEX, LENGTH, and SUBSTR
- Language elements providing sequential and random access to VAX RMS relative files and sequential and keyed access to VAX RMS multi-key indexed files
- Optional attribute specification on types, type identifiers, routines, and compilation units

*K. Jensen and N. Wirth, *Pascal User Manual and Report*, 2nd ed., Springer-Verlag, New York 1974

- MODULE capability for combining procedures, functions, and other declarations for compilation separate from the main program
- ENVIRONMENT and INHERIT attributes to control separate and independent compilation
- UNSIGNED and SINGLE predefined types
- VALUE initialization section and optional value initialization in declaration section program level
- Exponentiation operator (**)
- OTHERWISE clause for CASE statement
- Binary, hexadecimal, and octal constants
- External procedure and function declarations
- Nonpositional passing of parameters
- Default values for parameters
- Ability for functions to return structured types (other than file types)

As a native-mode VAX/VMS language, VAX PASCAL is integrated into the VAX/VMS common language environment. This integration provides VAX PASCAL users with:

- Support for VAX interlanguage calling standard
- Access to all VAX/VMS system services
- Access to the facilities of the VAX Symbolic Debugger
- Callable interfaces to the VAX/VMS Common Runtime Library
- Callable interfaces to VAX utilities, such as SORT and to optional products, for example VAX DATATRIEVE
- 31-character identifiers that can include dollar sign ($) and underscore (_)

Options available to VAX PASCAL users at compile time include:

- Run-time checks for array, character string, and subrange bounds
- Run-time checks for arithmetic overflow, valid case selector values, and null pointer variables
- Generation of information for use by the VAX Symbolic Debugger and the run-time error traceback mechanism
- Creation of an environment file facilitating separate compilation
- Cross-reference listing
- Creating in the listing file a representation of the object code generated by the compiler
- Printing of information-level messages, flagging uses of non-standard Pascal features

Source Code Information

The following source code modules are provided on all available distribution media for this product: LIBDEF.PAS, MTHDEF.PAS, PASCAL.CLD, PASCAL.HLP, PASCAL.FDL, PASCTEST.PAS, PASDEF.PAS, PASSTATUS.PAS, SIGDEF.PAS, PAS2KIT.COM, PAS2STAR1.COM, PAS2STAR2.PAS, PAS2STAR3.PAS, VAXPASUPD.MEM. The source code modules are provided in order to install and describe the product, and include sample test program, help file, and system definition inclusion files.

This source code is provided on an "AS IS" basis without any warranty of any kind either express or implied.

Minimum Hardware Required

Any valid VAX/VMS system configuration

Optional Hardware

- FP780 Floating Point Accelerator
- FP750 Floating Point Accelerator
- FP730 Floating Point Accelerator
- KE780 G_ and H_ Format Microcode for VAX-11/780
- KU780 User Control Store Hardware for VAX-11/780
- KU750 User Control Store Hardware and G_ and H_ Format Microcode for VAX-11/750

NOTE: To execute G_ and H_ floating extended range instructions directly on the VAX-11/780, both the KU780 and KE780 must be present. To execute these instructions directly on the VAX-11/750, the KU750 must be present. The VAX-11/730 does not require an additional option for G_ and H_ floating instructions.

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX PASCAL
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC126-AG	QD126-AG	QE126-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC126-DZ	QD126-DZ	QE126-DZ
Sources license, sources, no support services	QC126-DZ	QD126-DZ	QE126-DZ
Update/Unsupported Options Users of VAX PASCAL whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC126-HG	QD126-HG	QE126-HY
Right-to-copy for single-use, no binaries, no documentation	QC126-HZ	QD126-HZ	QE126-HZ
Sources/Listings Update Options The following options are available to licensed users as updates to sources and/or listings options. The update is distributed in source form on the appropriate medium and includes no installation or other services unless specifically stated.	QC126-NM	QD126-NM	QE126-NM
Miscellaneous Options Documentation-only kits	QC126-GZ	QD126-GZ	QE126-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, M, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD126-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge* Z = No hardware dependency
M = 9-track 1600 BPI Magtape (PE) Y = RX01 Floppy Diskette

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX PL/I

Description

VAX PL/I is an extended implementation of the ANSI X3.74, American National Standard PL/I General Purpose Subset. VAX PL/I extensions to the subset language are either selective, full language PL/I features or system-specific features. VAX PL/I consists of a set of run-time support routines, a HELP facility, INCLUDE files for system services, and a shareable compiler. the compiler runs under the VAX/VMS Operating System and generates optimized position-independent machine code.

Compiler generated code is in-line, with the exception of some built-in function calls and I/O operations. The VAX Run-Time Library performs all out-of-line operations. VAX hardware instructions directly implement many high-level language operations.

All VAX/VMS system services are available to programs written in PL/I via the CALL statement; furthermore, VAX PL/I supports RMS, the VAX/VMS Record Management System. A set of ENVIRONMENT options provides access to a large subset of RMS features. All RMS file organizations are supported: sequential, relative, and indexed.

VAX PL/I supports the VAX interlanguage calling standard. In addition, all VAX/VMS system services and system utilities (run-time library, SORT, etc.) are available via the PL/I CALL statement. A library of predefined ENTRY declarations minimizes the coding required to utilize VAX/VMS system services.

VAX PL/I is a comprehensive and powerful language that supports scientific computation, commercial data handling and data organization, and extensive string manipulation capabilities. Block-structuring provides for easier to understand programs that are as a result less error prone.

Features

- A full complement of VAX datatypes: binary integer (FIXED BINARY), floating point (FLOAT BINARY, FLOAT DECIMAL), decimal (FIXED DECIMAL), character strings—fixed or varying length (CHARACTER [VARYING]), fixed length bit strings (BIT), edited numeric data in character format (PICTURE), address manipulation (AREA, OFFSET and POINTER), entry point (ENTRY) and label, which can be subscripted (LABEL).
- Language elements that support the VAX extended range and extended precision floating point architectural features include:

  64-bit G_ floating data type, with an 11-bit exponent and 53-bit mantissa, which provides a range of 0.56*10**-308 to 0.09*10**308 and a precision of 15 decimal digits

  128-bit H_ floating data type, with a 15-bit exponent and a 113-bit mantissa, which provides a range of 0.84*10**-4932 to 0.59*10**4932 and a precision of 33 decimal digits

NOTE: To execute G_ and H_ floating data type extended range instructions directly on the VAX-11/780, both the KU780 and the KE780 hardware options must be present. To execute these instructions directly on the VAX-11/750 the KU750 hardware option must be present. The VAX-11/730 does not require any additional options for G_ and H_ floating data type instruction execution.

- An assignment operator (=) that operates on equivalent arrays of data as well as scalar variables. A scalar can be assigned to an entire array.
- Three storage classes

  AUTOMATIC: variables are allocated upon block entry

  STATIC: variables are allocated at compile time. Static data can be EXTERNAL, or globally shared. The special attribute, GLOBALDEF, provides program section (PSECT) control of data

  BASED: variable allocation is dynamically controlled by the programmer

  INITIAL values can be specified for AUTOMATIC and STATIC variables
- Storage control

  ALLOCATE statement with SET option for explicit dynamic storage allocation

  FREE space previously allocated by the ALLOCATE statement

  POINTER AND OFFSET datatypes for address manipulation of scalar and aggregate data

  AREA as an address base for variables of OFFSET type (user controlled allocation only)
- A powerful set of structured program control statements

  DO statement with TO, BY, WHILE, and REPEAT options

  IF...THEN...ELSE conditional statement

  CALL statement and function reference (RETURN)

  GO TO statement for transfer of control
- Condition handling

  ON statement to establish ON-units (for ENDFILE, ENDPAGE, KEY, UNDEFINEDFILE, FIXEDOVERFLOW, OVERFLOW, ZERODIVIDE, ERROR, FINISH, ANYCONDITION and VAXCONDITION conditions)

  REVERT statement to cancel ON-units

  RESIGNAL statement that allows conditions to be passed to other ON-units
- Input/Output control

  OPEN and CLOSE file control statements

  READ, WRITE, DELETE and REWRITE record-oriented I/O statements

  GET and PUT stream-oriented I/O statements (with FILE, STRING, EDIT, LIST, PAGE and SKIP options)

  ENVIRONMENT and OPTIONS clauses provide access to RMS features

- Program structuring statements

  PROCEDURE blocks: Internal (nested) and EXTERNAL

  BEGIN...END blocks, allowing local variable declaration

  DO groups that provide compound statement capabilities

  ENTRY statement that allows a routine to have multiple entry points

- Built-in functions

  A full set of arithmetic functions: ABS, CEIL, DIVIDE, FLOOR, MAX, MIN, MOD, ROUND, SIGN, TRUNC

  A full set of mathematical (transcendental) functions: ACOS, ASIN, ATAN, ATAND, ATANH, COS, COSD, COSH, EXP, LOG, LOG10, LOG2, SIN, SIND, SINH, SQRT, TAN, TAND, TANH

  String functions: BOOL, COLLATE, COPY, INDEX, LENGTH, STRING, SUBSTR, TRANSLATE, VERIFY

  Conversion functions: BINARY, BIT, CHARACTER, DECIMAL, FIXED, FLOAT, UNSPEC, RANK, BYTE

  Condition-handling functions: ONARGSLIST, ONCODE, ONFILE, ONKEY

  Array-handling functions: DIMENSION, HBOUND, LBOUND

  Storage functions: ADDR, NULL, OFFSET, POINTER

  Timekeeping functions: DATE, TIME

  File control functions: LINENO, PAGENO

  Pseudovariables (functions allowed on left-hand side of an assignment): PAGENO, STRING, SUBSTR, UNSPEC

- Additionally, built-in subroutines are provided for

  File-handling: DISPLAY, EXTEND, FLUSH, NEXT_VOLUME, REWIND, SPACEBLOCK

  Condition-handling: RESIGNAL

- Preprocessor statements

  %REPLACE statement for compile-time replacement of arithmetic, bit-, or character-string constants

  %INCLUDE statement for compile-time source copying, with full library support for INCLUDE modules and default user-specified and system libraries

Compiler Options

Compile time command qualifiers provide a variety of options

- /[NO]CHECK: Produce extra code to check array and string references
- /[NO]CROSSREFERENCE: Produce a symbol cross-reference
- /[NO]DEBUG: Causes DEBUG information to be included with the object code
- /[NO]GFLOAT: Specifies the default floating point representation
- /[NO]LIST: Controls the production of a listing file

- /ENABLE: Selects specific listing options if /LIST specified
- /[NO]MACHINECODE: Causes machine code to be listed with the source
- /[NO]OBJECT: Controls the production of an object file
- /[NO]OPTIMIZE: Controls optimizations performed by the compiler
- [NO]WARNINGS: Controls the printing of compiler warning messages
- /LIBRARY: Indicates the associated file is a library of source text modules specified by %INCLUDE statements

Optimizations

VAX PL/I generates efficient object code. Optimizations include

- Subexpression elimination
- Allocation of local variables to registers
- Removal of invariant computations from loops
- Simplification of Boolean expressions
- Extensive special case code generation
- Pattern replacement in generated code

Industry PL/I Compatibility

VAX PL/I provides many of those PL/I features often used by mainframe PL/I programmers. Conversion effort depends upon the individual program and the set of PL/I features used by the programmer. Well-structured programs that do not rely on system-specific or implementation-specific features convert with a minimum of effort (from no changes to a few percent of the lines in the program). Programs that use implementation-specific features such as ENVIRONMENT and OPTIONS can require a larger conversion effort.

DIGITAL does not provide any special programs or other conversion aids. The user is responsible for determining the extent of any conversion effort and for providing the appropriate conversion tools to convert programs and data.

Unusual conversion requirements may be necessary if programs use the machine dependent representation of data. The VAX architecture organizes bytes within an integer differently than most other vendors' hardware. This can lead to different results when UNSPEC or DEFINED operations are used to convert between BIT and FIXED BINARY data.

Minimum Hardware Required

Any valid VAX/VMS system configuration with

- 512 kilobytes of physical memory
- Two megabytes of virtual page file quota
- 250 page minimum working set
- 1200 blocks of disk storage (compiler, run-time system, HELP files, and INCLUDE libraries)

VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

- FP780 Floating Point Accelerator
- FP750 Floating Point Accelerator
- FP730 Floating Point Accelerator
- KU780 User Control Store Hardware for the VAX-11/780
- KE780G_H_ Format Microcode for the VAX-11/780
- KU750 User Control Store Hardware and G_ and H_ Format Microcode for the VAX-11/750

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

VAX PL/I
Ordering Information

Options	Systems		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC114-AG	QD114-AG	QE114-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC114-DZ	QD114-DZ	QE114-DZ
Update/Unsupported Options—Users of VAX PL/I whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC114-HG	QD114-HG	QE114-HY
Right to copy for single-use, no binaries, no documentation.	QC114-HZ	QD114-HZ	QE114-HZ
Miscellaneous Options Documentaton-only kits	QC114-GZ	QD114-GZ	QE114-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC114-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

Refer to the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX Common Data Dictionary (CDD)

Description

The VAX Common Data Dictionary (CDD) provides a single logical data dictionary for a VAX/VMS system containing definitions for VAX COBOL, VAX DATATRIEVE, VAX BASIC, and VAX DBMS. The CDD contains all VAX DATATRIEVE definitions (records, domains, tables, procedures, and graphic plots). The VAX Common Data Dictionary also contains the VAX DBMS schema, storage schema, and sub-schema definitions. The CDD contains record definitions that VAX COBOL and VAX BASIC can optionally include at compile time. VAX Common Data Dictionary is prerequisite software for both VAX DBMS and VAX DATATRIEVE. It must be installed prior to installing either VAX DBMS or VAX DATATRIEVE.

This logical dictionary is built from one or more physical dictionary files. The CDD maintains a hierarchical directory of the customer's data descriptions within this dictionary.

The CDD provides security based on its hierarchical directory. Each directory and data description can have its own Access Control List. Each entry in the Access Control List specifies a class of user and the type of access allowed to the directory or data description. A user class is defined by selecting UIC, user name, password, and terminal class parameters.

Entries in the CDD are created, modified, or deleted by using any one of the following methods:

- CDD Data Definition Language Utility (CDDL)
- VAX DATATRIEVE
- VAX DBMS Data Definition Language (DDL)
- VAX DBMS Database Operator (DBO) utility

VAX Common Data Dictionary has its own Dictionary Management Utility (DMU). The DMU allows the user to create and maintain directories, sub-dictionaries, history lists, and access control lists. The DMU provides facilities to list, rename, copy, backup and restore directories and data descriptions. The DMU has a complete Help text facility.

The Verify/Fix Utility (CDDV) is supplied to validate or repair dictionary files. The CDDV also has a complete Help text facility.

The dictionary can be simultaneously accessed and updated by any number of concurrent users. VAX CDD uses the VAX/VMS Lock Manager to make certain that users do not interfere with one another.

Minimum Hardware Required

Any valid VAX/VMS system configuration with

- At least 1MB of main memory
- Mass storage with a minimum of 5000 disk blocks available during the installation process for VAX CDD system software and a minimum of 1300 disk blocks available following installation

VAX-11/730 Systems

- An R80/RL02 configuration is required for 11/730 systems

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

Optional Software

VAX BASIC

VAX COBOL

VAX DATATRIEVE

VAX DBMS

Training Credits

None

Software Installation

Customer Installed

VAX Common Data Dictionary (CDD)
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC897-AG	QD897-AG	QE897-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC897-DZ	QD897-DZ	QE897-DZ
Update/Unsupported Options—Users of VAX Common Data Dictionary whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC897-HG	QD897-HG	QE897-HY
Right to copy for single-use, no binaries, no documentation.	QC897-HZ	QD897-HZ	QE897-HZ
Miscellaneous Options Documentation-only kits	QC897-GZ	QD897-GZ	QE897-GZ

**VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD897-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX DATATRIEVE

Description

VAX DATATRIEVE is a query and report system for the VAX/VMS Operating System. It provides a uniform access method for data stored by RMS and VAX DBMS files on VAX/VMS. Using VAX DATATRIEVE, a novice or experienced user can retrieve or modify data without considering the underlying storage method or physical location.

VAX DATATRIEVE presents information in several different formats. Information can be displayed as a report or as a simple table. Thus displayed, information can be printed on a hard-copy device. Information can also be displayed with user-defined VAX FMS and VAX TDMS forms or presented graphically on a VT125. Hard copy of the graphic display is available. DATATRIEVE also provides an efficient way to access information stored on other VAX/VMS systems linked by DECnet-VAX.

Modes of Operation

VAX DATATRIEVE can be used interactively to retrieve, modify, store, or delete data using a simple set of commands. Frequently used combinations of commands can be stored as named procedures and invoked by name. Programs written in other VAX languages can call VAX DATATRIEVE, allowing them to be independent of underlying data storage methods and physical location.

Data Dictionary

VAX DATATRIEVE is dictionary driven. All data descriptions are stored in and retrieved from the VAX Common Data Dictionary (CDD). VAX DATATRIEVE includes commands to store, examine, modify, and delete definitions in the CDD, and can use definitions stored by other VAX layered products, such as the VAX DBMS DDL (Data Definition Language).

Protection

Protection is handled by VAX Common Data Dictionary. VAX DATATRIEVE can access data only through definitions in the VAX Common Data Dictionary. Locking the definition prevents the user from accessing the data. Access control can be based on name, login account, password, or terminal class (local, remote, or dial-up).

Remote Data Access

VAX DATATRIEVE provides access to data on remote VAX nodes. When VAX DATATRIEVE accesses data across a Phase III DECnet link to another VAX system, it uses the data definition from the dictionary on the system with the data. Processing is divided between the host and remote systems to minimize traffic over the communications link.

For the Nonprogrammer

VAX DATATRIEVE provides the novice-user with a tutorial mode, called GUIDE mode.

VAX DATATRIEVE offers ADT, the Application Design Tool for the more experienced user, who wants to define his own data structures. ADT takes the user step-by-step through the definition of a domain based on an RMS file.

If VAX DATATRIEVE is used on the same information by experienced and novice users, the novice user can use the full power of the language by invoking procedures designed by the more experienced user.

For the Programmer

VAX DATATRIEVE is a highly structured nonprocedural language that provides automatic access optimization, data type conversion, and data validation. Looping and control structures, such as IF THEN ELSE, BEGIN END, REPEAT, WHILE, CHOICE and FOR (each record) can be combined and nested to create complex, powerful commands.

VAX DATATRIEVE responds to programming errors with a clear, explicit error message. The user can issue an EDIT command to invoke a text editor with the erroneous statement as input text, correct the mistake, and resubmit the command.

Data Definition

VAX DATATRIEVE stores the fixed attributes of each record in the record definition. In addition to COBOL-like attributes, DATATRIEVE accepts validation criteria, fields whose values are computed at runtime, missing value expressions, and default values.

VAX DATATRIEVE supports most data types used by VAX FORTRAN, VAX COBOL, VAX PL/I, VAX C, and VAX BASIC.

Views

A VIEW is an alternative description of data. It can restrict a user by including only some of the data items in a record, or it can combine data items from several files. Information can be linked through common values (or set linkages in VAX DBMS) to produce complex hierarchical structures. Using a predefined view, even a novice user can access and display data from several files at once with the same commands used on a single file. Data accessed through a view can be printed and modified, but data cannot be stored or erased using a view.

Program Access

VAX DATATRIEVE can be called from any language that supports the VAX/VMS calling standard. DATATRIEVE automatically converts data from its storage format to the format expected by the program. All of the features of interactive VAX DATATRIEVE are available through the call interface, and use the same syntax.

Storage Methods

VAX DATATRIEVE can access information stored in VAX RMS files (sequential, relative, or indexed) and VAX DBMS databases. Both types of data can be combined into a single VIEW. If access to a database involves explicit set walking, or if records must be manually connected or disconnected from sets, the user must employ VAX DATATRIEVE language extensions that exist only for VAX DBMS access. However, by the use of views and implicit set walking, DATATRIEVE can access information in a database using the same syntax used for data from an RMS file.

Report Generation

The VAX DATATRIEVE REPORT statement produces formatted reports without formatting statements, but allows the user to override its default format when necessary. A title, column headers, and page numbers are produced automatically. Simple (AT TOP OF . . . AT BOTTOM OF . . .) statements create page headers, page trailers, headerssr and trailers for control breaks, or a report summary. The language constructs used within the REPORT statement are a subset of VAX DATATRIEVE, and include all the statistical functions. Reports can be generated from data stored in VAX RMS files, VAX DBMS data bases, or DATATRIEVE VIEWS that combine the two, without any change in the syntax of the REPORT statement.

Graphics

VAX DATATRIEVE includes a number of predefined plots invoked with a single command that takes standard record selection expressions as arguments and creates bar, pie, line and scattered point plots of the information selected. Plots can be displayed only on a VT125. Hardcopy can be obtained by an LA34-VA attached to the VT125.

Compatibility

VAX DATATRIEVE is largely upward compatible from DATATRIEVE. An extract utility is provided to extract the contents of a DATATRIEVE dictionary in a format to be entered into the VAX Common Data Dictionary. Some syntactic and semantic differences do exist between DATATRIEVE and VAX DATATRIEVE, and procedures copied with the extract utility can require modification.

Source Code Information

The following source code modules are provided with binary, single-use license options on all magnetic distribution media:

- Function definitions
- Text definitions
- Macro library for function and text definitions
- Message text
- Sample callable DATATRIEVE programs

- DATATRIEVE dictionary object definitions:
  - plots
  - domains
  - records
  - procedures
  - tables
- CDDL definition and language include files for the DAB
- Language include files for literal values, external symbols and routine entry point definitions

This source code is provided on an "AS IS" basis without any warranty of any kind, either express or implied.

Minimum Hardware Required

Any valid VAX/VMS system configuration with

- A minimum of 1MB of memory
- Mass storage with a minimum of 9000 disk blocks for VAX DATATRIEVE system software

VAX-11/730 Systems

- An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

Any device supported by the prerequisite software

VT125 for graphics

Prerequisite Software

VAX/VMS Operating System

VAX Common Data Dictionary

Optional Software

VAX DBMS

VAX FMS

DECnet-VAX

VAX TDMS

Training Credits

None

Software Installation

Customer Installed

VAX DATATRIEVE
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC898-AH	QD898-AH QD898-AM QD898-AV	QE898-AM QE898-AV
Single-Use, License-Only Option, no binaries, no documentation, no support services.	QC898-DZ	QD898-DZ	QE898-DZ
Update/Unsupported Options Users of VAX DATATRIEVE whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC898-HH	QD898-HH QD898-HM QD898-HV	QE898-HM QE898-HV
Right to copy for single-use, no binaries, no documentation	QC898-HZ	QD898-HZ	QE898-HZ
Upgrade Options Customers who are currently licensed users of PDP-11 DATATRIEVE/VAX may obtain VAX DATATRIEVE by purchasing a license to an upgrade kit for use on the same CPU as their previous license.	QC910-AH	QD910-AH QD910-AM QD910-AV	QE910-AM QE910-AV
Single-use, license-only option, no binaries, no documentation, no support services.	QC910-DZ	QD910-DZ	QE910-DZ
Miscellaneous Options Documentation-only kits	QC898-GZ	QD898-GZ	QE898-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (H, M, V, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC898-AH = binaries on RL02 Disk Cartridge.

H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

See the preceding table for available options.

VAX TDMS (Terminal Data Management System)

Description

VAX TDMS (Terminal Data Management System) is a product designed for the implementation of interactive, forms-intensive applications running on the VAX/VMS Operating System. As a terminal subsystem, VAX TDMS can reduce application development and maintenance effort. VAX TDMS replaces application program logic, specific to terminal interactions, with definitions that are external to the program. VAX TDMS provides:

- A Screen Editor to define FORMs that format data on the terminal
- A nonprocedural language to define the exchange of data between an application program and its associated terminal. These predefined exchanges are called REQUESTs and are external to the program.
- Utilities that enable the creation, modification, and storage of FORM definitions and REQUEST definitions.
- A "Record Level" programming interface which the application program uses to invoke and execute the predefined REQUESTs. The application program calls the program interface passing it the REQUEST name and the program record buffers used in the exchange of data with the terminal.

VAX TDMS applications range from database inquiry/response/update to real-time uses such as the periodic display of an industrial process. VAX TDMS is typically used as a terminal subsystem in terminal data management applications such as inventory control, manufacturing, distribution and other form-intensive applications.

VAX TDMS is a fully integrated member of the VAX Information Architecture. As such, all VAX TDMS definitions are stored in the VAX CDD (Common Data Dictionary). Additionally, VAX TDMS requires record definitions stored in the CDD by the CDD Data Definition Language, by VAX DATATRIEVE, or by VAX DBMS.

VAX DATATRIEVE can use VAX TDMS FORMs to DISPLAY/READ data.

There are four major steps involved in the implementation of a VAX/TDMS application.

1. Defining The REQUEST

   A REQUEST defines what information will be displayed at the terminal and what information will be collected from the terminal. The TDMS REQUEST replaces code that would otherwise have to be designed, written, and debugged in the application program.

The REQUEST identifies the FORM and the record definitions to be used in the exchange of data with the terminal. INPUT and OUTPUT statements define the mapping between the FORM fields and the record fields in execution of the REQUEST.

2. Defining The FORM

   A FORM definition describes the format of the data that is displayed on the terminal at run time. The FORM definition also specifies, for each field, what validation procedures should be invoked. VAX TDMS field validation includes range checks, list checks and picture validations.

3. Defining The Record

   Data records that are used in a REQUEST and TDMS application program must be defined in the VAX CDD. The record definition specifies the type, structure and length of the record and is created the VAX CDD Data Definition Language, VAX DATATRIEVE, or VAX DBMS. During the execution of a REQUEST, VAX TDMS performs the necessary data type conversion required to transfer data between the FORM and the Record.

4. The Application Program

   A VAX TDMS application program performs application specific processing and controls the flow of information between the terminal and the database. The application communicates at a record level with the terminal by calling VAX TDMS to execute REQUESTs and it communicates with the database using the subsystem of choice; i.e., VAX RMS, VAX DATATRIEVE, or VAX DBMS.

   If the application program is written in VAX COBOL or VAX BASIC it can, at compile time, use the "copying" features of those languages to include record definitions directly from the CDD. Applications written in languages that do not support these "copying" features must define the records in the application program itself and in the CDD.

   Applications can be written in any VAX native mode language that adheres to the VAX Procedure Calling and Condition Handling standard.

   Specific languages supported are:

- VAX BASIC
- VAX BLISS-32
- VAX C
- VAX COBOL
- VAX DIBOL
- VAX FORTRAN
- VAX PASCAL
- VAX PL/1
- VAX DATATRIEVE

Components

There are four major components that make up the VAX TDMS software:

1. The Form Definition Utility

   The VAX TDMS Form Definition Utility (FDU) provides all of the capabilities needed to create or modify FORM definitions and store them in the Common Data Dictionary. The VAX TDMS FDU includes a Screen Editor that is used to create a screen image of the FORM and assign specific attributes. These include FORM field video attributes, FORM field validation procedures, and the order in which the input fields should be processed.

2. The Request Definition Utility

   The VAX TDMS Request definition Utility (RDU) provides all of the capabilities needed to create and modify REQUESTs and store them in the CDD. RDU validates each REQUEST to make sure that FORM and record definitions exist and that all transfers of data between FORM and record fields are valid. The RDU also builds REQUEST Library Files that the VAX TDMS run time system accesses during the execution of REQUESTs. The REQUEST library capability is provided to avoid run time access to the VAX CDD and thus improve TDMS application performance.

3. Programming Call Interface

   The VAX TDMS programming interface is the means by which an application program executes a VAX TDMS REQUEST. A REQUEST defines an exchange of data between the program and its associated terminal. The application program calls the program interface passing it the REQUEST name and the program record buffers used in the exchange of data with the terminal. This record level interface thus eliminates the need for character level or field level communication with the terminal.

   The Programming Call Interface also allows application programs to perform additional operations. These operations include the ability to, write text to or read text from the reserved message line on a terminal, enable or disable a facility that traces the action of a REQUEST, and cancel a REQUEST in progress.

4. Software Event Logger

   The VAX TDMS Software Event Logger records internal TDMS software errors that occur during the execution of a VAX TDMS program. The VAX TDMS Software Event Logger includes a utility that can generate a report for a given time period.

Optional Run Time System

VAX TDMS Run Time System is a license to use a subset of the VAX TDMS components. When the product components that are needed to run an executable VAX TDMS image are the only portion of VAX TDMS to be used on a given CPU, the user may copy these components to the given CPU. It is the user's responsibility to transport the VAX TDMS Run Time Only components and the user developed software from the VAX TDMS system to the target VAX TDMS run time system.

The VAX TDMS Run Time System includes the following modules:

TSSSHR.EXE
ACMSHR.EXE
SWLPROC.EXE
SWLUP.EXE
TDMSTRTUP.COM
TDMSEDIT.COM
SWLUP.HLB

Minimum Hardware Required

Any valid VAX/VMS Operating System configuration with:

- At least 1 megabyte of memory
- One of the following terminals:

  VT100, VT100 with AV0, VT101, VT102, or VT125 (forms can be created with the interactive Form Definition Utility)

  VT52[1] (for application execution only)

  PC100, PC278, PC325, PC350 and VT131 Supported in VT102 compatibility mode

NOTE: Runtime support for the VT52 is generally the same as the VT100. When a VT100-specific feature is requested in a form definition, that feature will be either simulated or ignored when the form is displayed on a VT52.

Forms using scrolled areas and 132 column forms cannot be used on a VT52.

- Mass storage with a minimum of 12,500 disk blocks (peak usage during installation) for VAX TDMS system software

For VAX-11/750, VAX-11/780, and VAX-11/782 Systems:

One RK07 or RL02 disk drive or one 9-track 1600 BPI magnetic tape unit for installation of the software

For VAX-11/730 Systems:

An RL02/R80 configuration for installation of the software

Optional Hardware

Additional supported terminals (number dependent on application load).

Prerequisite Software

VAX/VMS Operating System

VAX Common Data Dictionary

Optional Software

VAX DATATRIEVE

VAX DBMS

Training Credits

None

Software Installation

Customer Installed

VAX TDMS
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC706-AH	QD706-AH QD706-AM QD706-AV	QE706-AM QE706-AV
Single-use license-only option, no binaries, no documentation, no support services.	QC706-DZ	QD706-DZ	QE706-DZ
Update/Unsupported Options Users of VAX TDMS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC706-HH	QD706-HH QD706-HM QD706-HV	QE706-HM QE706-HV
Right to copy for single use, no binaries, no documentation, no support services.	QC706-HZ	QD706-HZ	QE706-HZ

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Special Run Time System License Option When the product components that are needed to run an executable VAX TDMS image (program) are the only portion of VAX TDMS to be used on a given CPU, a license for the VAX TDMS runtime only components can be obtained. If any other component of VAX TDMS is to be used, a VAX TDMS license must be obtained.	QC711-DZ	QD711-DZ	QE711-DZ
Right to copy for single use, no binaries, no documentation, no support services.	QC711-HZ	QD711-HZ	QE711-HZ
Upgrade Options Customers who are currently licensed users of VAX FMS may obtain this new product by purchasing a license to an upgrade kit for use on the same CPU as their previous license.	QC713-AH	QD713-AH QD713-AM QD713-AV	QE713-AM QE713-AV
Single-use license-only option, no binaries, no documentation, no support services.	QC713-DZ	QD713-DZ	QE713-DZ
Miscellaneous Options Documentation-only kits	QC706-GZ	QD706-GZ	QE706-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (H, M, V, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC706-AH = binaries on RL02 Disk Cartridge.

H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

Refer to preceding table for available options.

VAX FMS

Description

The VAX FMS Forms Management System is designed to aid in the development of application programs that use video forms. VAX FMS manages the forms for application programs that use DIGITAL's family of VT100-compatible terminals. Forms defined using FMS provide the programmer with the ability to use the following features of DIGITAL's family of VT100-compatible terminals:

- Individual character attributes of reverse video, bold, blinking, and underline
- Line attributes of double width, double height and scrolled
- Screen wide attributes such as 80 or 132 column lines and reverse video
- Alternate character sets including the VT100 "special graphics character set" for line drawing

VAX FMS form data structures are used by the Form Driver during time to display forms, and to access and validate data entered by the terminal operator. Forms can be created and modified interactively with the interactive editing facility (FMS/EDIT) or they can be defined as a source form description with the Form Language and then converted to a form data structure using the Form Language Translator (FMS/TRANSLATE).

Forms usually reside in form library files on disk and are retrieved as needed by application programs at execution time. This arrangement results in a high degree of independence between form data structures and application programs. Forms can be modified without recompilation or relinking of the application program. Forms can also be converted into an object module and linked with application programs to create memory-resident forms, or forms can be dynamically loaded into memory by the application program.

VAX FMS applications use the FMS Form Driver to control the display of forms, their associated data fields, and the input and output of data into fields. All data input from the terminal and output to the terminal is passed as ASCII strings.

Data for each field in an FMS form is validated by the Form Driver. Field-validation characters are used to construct a "field validation picture." During program execution, characters input or output to the field are compared to the picture to determine if they are valid. In most instances, the field picture can contain several different field validation characters and also fieldmarker characters. Field-marker characters, used to improve the readability of the displayed form, are transparent to the application program.

Attributes from the following list can be assigned to each individual field:

- Name of the Field
- A default value
- A help message
- Autotab
- Clear Character
- Display Only
- Fixed Decimal
- Indexed
- Left Justify
- Right Justify
- Must Fill
- No Echo
- Response Required
- Supervisor Only
- Uppercase
- User action routines and associated data parameters
- Zero Fill
- Zero Suppress

The attributes assigned to each field are checked for validity when the form is created. Some combinations of attributes are not legal. Each form has attributes that apply to the form as a whole. These attributes include:

- Name of the form
- Name of an associated help form
- Screen background (black, white, or do not change)
- Screen width (80 columns, 132 columns, or do not change)
- Screen area to clear when displaying the form
- Terminal character set
- User action routines and associated data parameters
- Video attributes to be used if the field being worked on is to be highlighted at run time
- The order in which fields are to be accessed
- Named Data

VAX FMS Facilities

The FMS/EDIT command invokes the interactive editing facility that is used by the form developer to create and modify video forms. The creation of forms with the interactive editing facility is accomplished in phases. The Layout phase is used to specify the visual appearance of the form, the background text, and what types of characters are to be valid input to the fields. While laying out a form on the screen, one has available a set of 48 function keys and key combinations. These keys perform functions such as cursor movement, delete and undelete, cut and paste, box drawing, video attribute assignment, centering, and displaying help. Additional phases are used to assign form and field attributes, to enter Named Data, and to assign field access order. Named Data and all form and field attributes, including user action routines, are specified by filling in questionnaires. Highlighting is used to indicate which field is being referred to during the field attribute and the field order assignment phases. Finally, the Test phase allows the devloper to interact with a form just as the end user would.

The optional Form Language Translator provides an alternate means for defining forms. The Form Language is a free form, keyword-oriented, declarative language that provides the means to create and modify source form descriptions with a text editor or program. The FMS/TRANSLATE command is used to convert the source form descriptions (contained in a text file) to form data structures. The data structures created are equivalent to those created with the FMS interactive editor. Existing form data structures can be converted back into Form Language source code for modification or documentation by using the FMS/DESCRIPTION/FULL command.

The VAX FMS Forms Management System provides additional facilities to aid in the appplication program development process. The facilities are invoked with the following commands:

- FMS/LIBRARY—To create and maintain form libraries.
- FMS/DIRECTORY—To obtain a directory list of forms in a library or in form files.
- FMS/DESCRIPTION/FULL—To obtain text files containing Form Language descriptions of the forms.
- FMS/DESCRIPTION/BRIEF—To obtain a brief description of the fields in a form and summary information about the form.
- FMS/DESCRIPTION/DECLARATIONS—To obtain data division code that can be edited by the user to create a COBOL Data Division or DATATRIEVE Domain Definition reflecting the names, lengths, and order of fields on the screen.
- FMS/MEMORY_RESIDENT—To generate an object module containing one or more form data structures that when linked with the application program will allow access to the forms through virtual memory.
- FMS/VECTOR—To generate an object module containing a vector table of addresses that point to the user action routines that are linked with the application program.

- FMS/TEST—To invoke the form testing facility.
- FMS/UPGRADE—To convert FMS V1.1 forms or libraries to FMS V2.0 forms or libraries. FMS V1.1 forms are not compatible with V2.0; they must be upgraded for use with VAX FMS V2.0.

The Form Driver is the run time component of VAX FMS. It consists of reentrant, shareable subroutines that are called by application programs to control the interaction of the terminal, the user, and the application program. The Form Driver provides facilities for managing multiple work areas (each of which contains a single form data structure). Multiple forms can be displayed on a single terminal screen.

Form Driver subroutines provide for terminal input and output, display of forms, manipulation of the screen, basic input validation and formatting, calling user action routines, and responding to the terminal operator's requests for help. Input and output can be specified one field at a time or on a whole form basis.

The Form Driver has a number of features to facilitate fine tuning of the application human interface. A timeout facility allows the application program to continue execution after waiting a specified period of time for the operator to enter the next character. Field video attributes, cursor position, and Insert/Overstrike mode can be dynamically altered by Form Driver calls in the application program. Field highlighting, controlled by the Form Driver, causes the video attributes of each field to be altered as the cursor enters the field and to be restored to their original state when the operator exits the field.

Named Data

The Form Driver supports the creation of parameter-driven applications by providing Named Data. Named Data are form constants that can be stored as part of the form data structure and retrieved at execution time by calls in the application program. Named Data allow information needed by the application program—such as form linkage, operator messages, and other human language information, and data validation criteria for user subroutines—to be defined, stored, and modified independently of the application program.

User Action Routines

User action routines (UARs) are procedures written by the user, in any DIGITAL supported VAX/VMS programming language. UARs are associated with forms and fields during the creation of form data structures and are automatically called by the Form Driver under the following conditions:

-when processing for a field is finished

- before and after processing the terminal operator's help request

- when the terminal operator presses a function key

The Form Driver transfers program control to the user action routine under the circumstances defined. The user action routine has available to it (through Form Driver calls) a parameter string of 80 characters (defined as part of the form), which can be used to give processing information and the current Form Driver context.

VAX FMS Sample Application Program

The Sample Application program is a supported VAX FMS demonstration program. The Sample Application program, included in the distribution kit, is used to certify proper installation of VAX FMS. The documentation for VAX FMS gives examples from the Sample Application program. The sample programs (each of the documented programming languages) and form descriptions are included in the documentation and in the distribution kit.

Minimum Hardware Required

Any valid VAX/VMS system configuration except the VAX-11/730 with dual RL02 disk drives.

A VT100 or VT100-compatible terminal is required for the creation of forms with the interactive form editing facility. Forms can be created on any terminal with the Form Language. The form test facility and application programs that use FMS can execute on both VT52 and VT100-compatible terminals.

Terminal	For Application Execution	For Form Development
VT100	Y	Y
VT100 with AVO	Y	Y
VT52	Y	Flg Only*
VT125	Y	Y
VT101	Y	Y
VT102	Y	Y
VT103	Y	Y
VT131	Y	Y
VT180	Y	Y
VK100 (VT52)	Y	Flg Only*
VK100 (ANSI)	See Note 1	See Note 1
PC100	See Note 2	See Note 2
PC350	See Note 2	See Note 2

Key: Y = Fully Supported (Forms can be created with the interactive form editing facility or with the Form Language.)

* = Forms can be created only with the Form Language on these terminals.

Note 1: Forms to be displayed on a VK100 cannot use the following VAX FMS features:
- Wide forms (132 columns)
- Bold video attribute

In addition, because the blinking and underline video characteristics on VK100 terminals are different from those on VT100 terminals the visual effects will differ.

Note 2: PC100 and PC350 are supported in VT102 mode.

Optional Hardware

Additional terminals as specified in the MINIMUM HARDWARE REQUIRED section.

Prerequisite Software

VAX/VMS Operating System

One of the VAX FMS supported languages or VAX DSM is required for the development of application programs that use FMS.

Optional Software

The VAX FMS Form Language Translator is available as optional software.

The following languages are supported with VAX FMS:

VAX BASIC

VAX BLISS-32

VAX C

VAX COBOL

VAX FORTRAN

VAX PASCAL

VAX PL/1

and VAX DATATRIEVE

VAX DSM supports VAX FMS. Application programs that call VAX DBMS through the Standard Call Interface can use VAX FMS. VAX CDD may be used in application programs that call VAX FMS. However, storage of form definitions in the CDD is not supported by VAX FMS.

Training Credits

None

Software Installation

Customer Installed

VAX FMS
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
VAX/FMS, Single-use license, binaries, documentation, support services. Form Language Translator not included.	QC800-AG	QD800-AG	QE800-AY
VAX/FMS, Single-use license-only option, no binaries, no documentation, no support services. Form Language Translator not included.	QC800-DZ	QD800-DZ	QE800-DZ
Update/Unsupported Options Users of VAX FMS whose specified support category warranty has expired can order under license the following software option as an update to an earlier version. The option can also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated. Form Language Translator not included.	QC800-HG	QD800-HG	QE800-HY
VAX/FMS, Right to copy for single use, no binaries, no documentation, no support services. Form Language Translator not included.	QC800-HZ	QD800-HZ	QE800-HZ
Form Language Translator, binaries, support services (Q*800-A* is a prerequisite)	QC802-AG	QD802-AG	QE802-AY
Single-use license for Form Language Translator only, no binaries, no documentation, no support services.	QC802-DZ	QD802-DZ	QE802-DZ

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Update/Unsupported Options Users of VAX FMS Form Language Translator whose specified support category warranty has expired can order under license the following software option as an update to an earlier version. The option can also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC802-HG	QD802-HG	QE802-HY
Form Language Translator, Right to copy for single use, no binaries, no documentation, no support services.	QC802-HZ	QD802-HZ	QE802-HZ
Special license option When the Form Driver is the only portion or component of VAX FMS to be run on a given CPU, the Purchaser can obtain a license for the Form Driver only. If any other component of FMS is to be used, the Purchaser must obtain the VAX FMS and/or VAX FMS Form Language Translator license.	QC801-DZ	QD801-DZ	QE801-DZ
Special license option, form driver only for five (5) systems.	QC803-DZ		
Special license option, Form Driver only for ten (10) systems.	QC804-DZ		
Special license option, Form Driver only for twenty-five (25) systems.	QC805-DZ		
Special license option, Form Driver only for fifty (50) systems.	QC806-DZ		
Special license option, Form Driver only for one-hundred (100) systems.	QC807-DZ		
Miscellaneous Options Documentation-only kits	QC800-GZ	QD800-GZ	QE800-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD800-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

See the preceding table for available options.

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX ACMS (Applications Control and Management System)

Description

VAX ACMS (Application Control and Management System) is a software product providing tools to define, monitor, and control on-line applications. ACMS utilities are used to define characteristics of applications, user and device access to those applications, and menus from which users select tasks they are authorized to run. Designed to supply the operational environment for tasks defined with VAX ACMS/AD, ACMS can also be used to monitor and control existing applications that run on the VAX/VMS operating system. Such applications can be implemented as VMS images, DCL commands or command procedures, or VAX DATATRIEVE procedures.

The principal features of VAX ACMS are:

- Utilities to define access and control characteristics for users and devices
- A utility to create, modify, and delete menu and application definitions as well as to create the runtime versions of those definitions
- A set of terminal user commands to run tasks, get help information, and exit the ACMS environment if so authorized
- A facility to record system activity
- A utility to change ACMS system parameters

As an application control product, VAX ACMS is designed for use in environments where controlling user access, monitoring and controlling applications independently, and providing a menu interface are important. The product can be used to manage a wide variety of on-line applications, including inventory control, manufacturing and distribution, and accounting.

VAX ACMS is a member of the VAX Information Architecture. All ACMS definitions are stored in the VAX CDD (Common Data Dictionary). In addition, ACMS uses VAX TDMS for menu processing.

Components

There are six major components that make up the VAX ACMS software:

1. Access Definition Utilities

   VAX ACMS provides two utilities for authorizing access to the system. The User Definition Utility defines which authorized VAX/VMS users have access to VAX ACMS. It also defines which menu a user sees upon logging in to ACMS or, alternately, defines the user as one who sees a command prompt rather than a menu after login. The second access utility, the Device Definition Utility, defines which terminals can access the ACMS system and who can log in to them. With these two utilities, a user or terminal can be restricted to VAX ACMS, restricted to VAX/VMS, or allowed controlled access to both environments.

2. VAX ACMS Application Definition Utility (ADU)

   The VAX ACMS Application Definition Utility (ADU) provides a set of English-like clauses used to define an application's operational characteristics and its menus. The application and menu definitions are then stored in the VAX Common Data Dictionary (CDD).

   Characteristics defined for a menu include the items or tasks a user can select from the menu and the descriptive text that appears on the screen for these items. Characteristics defined for an application include the tasks that are part of the application, UICs of the users who can access each task, and the processes or "servers" that handle the processing work for tasks. Control characteristics such as VMS username can be defined for each server.

   ADU commands are used to store definitions in the CDD and to change or delete the definitions. In addition, an ADU command creates databases used by VAX ACMS at runtime.

3. Terminal User Interface

   The terminal user can select a task either from a menu defined with the Application Definition Utility or in response to a selection prompt. The method of task selection is originally defined through the User Definition Utility, but can be overridden by a terminal user command.

   VAX ACMS provides a standard menu format using a predefined VAX TDMS REQUEST. A user with knowledge of TDMS can modify the menu REQUEST, creating a menu different from the standard.

   Menus defined with VAX ACMS can be hierarchical in structure, with entries that do not refer to a task but that take the user to another menu. It is possible to select a task directly without having to select an item at each level of the hierarchy.

4. Operator Control Facility

   The Operator Control Facility provides a set of DCL commands and qualifiers that perform operator functions such as starting and stopping applications, changing application or task characteristics, and displaying information about applications, tasks, users, and system components. A group of tasks that has been defined as an application can be operated as a unit. For example, one application can be started or stopped without affecting others on the system.

5. Audit Trail Facility

   The ACMS Audit Trail Facility gathers and files information about application activity. A report facility then formats the information, providing specific or summary information about users and tasks.

6. ACMSGEN Utility

   VAX ACMS includes a utility called ACMSGEN for changing ACMS system parameters such as quotas, process names, and priorities for system components. Changing these parameters can control such system characteristics as the maximum number of users allowed to log in.

Optional Runtime System

The VAX ACMS Runtime System is a license to use a subset of the VAX ACMS components on a given CPU. When the only product components needed on a CPU are those that allow the ability to define ACMS users and devices, to run predefined applications under ACMS control, and to tune the ACMS system, the user may obtain a license to copy the necessary components to the target CPU. It is the user's responsibility to transport the VAX ACMS runtime components and the user developed software from the full ACMS system to the target runtime system.

Minimum Hardware Required

Any valid VAX/VMS system configuration with:

- At least 2 megabytes of memory
- One of the following terminals supported by VAX TDMS:
  - VT100, VT100 with AVO, VT101, VT102, or VT125
  - VT52 (for application execution only)
  - PC100, PC278, PC325, PC350, or VT131, in VT102 compatability mode
- Mass storage with a minimum of 21,500 (peak usage during installation) disk blocks for VAX ACMS system software.

For Vax-11/780 and VAX-11/782 Systems:

- One RK07 or RA60 disk drive or one 9-track 1600 BPI magnetic tape unit for installation of the software.

For VAX-11/750 Systems:

- One RK07, RL02, or RA60 disk drive or one 9-track 1600 BPI magnetic tape unit for installation of the software.

For VAX-11/730 Systems:

- An RA60 disk drive or an RL02/R80 configuration for installation of the software.

Optional Hardware

Additional terminals, of the type listed above (number dependent on application load).

Prerequisite Software

VAX/VMS Operating System

VAX Common Data Dictionary

VAX Terminal Data Management System

Optional Software

VAX DATATRIEVE

VAX DBMS

VAX ACMS/AD

Training Credits

None

Software Installation

Customer Installed

VAX ACMS (Application Control and Management System) Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC076-AH QC076-AJ	QD076-AH QD076-AJ QD076-AM QD076-AV	QE076-AJ QE076-AM QE076-AV
Single-use license-only option, no binaries, no documentation, no support services.	QC076-DZ	QD076-DZ	QE076-DZ
Update/Unsupported Options Users of VAX ACMS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC076-HH QC076-HJ	QD076-HH QD076-HJ QD076-HM QD076-HV	QE076-HJ QE076-HM QE076-HV
Right to copy for single-use, no binaries, no documentation, no support services.	QC076-HZ	QD076-HZ	QE076-HZ
Runtime System License When the product components needed to run a predefined application, authorize users and devices, and change ACMS system parameters are the only portion of VAX ACMS to be used on a given CPU, a license for the VAX ACMS runtime only components can be obtained. If any other component of VAX ACMS is to be used, a VAX ACMS license must be obtained.	QC076-DZ	QD076-DZ	QE076-DZ
Documentation-only kits	QC076-GZ	QD076-GZ	QE076-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (H, J, M, V, Z) represents the distribution media for the product and must be specified at the end of the order number. For example, QE076-AM = binaries on 9-track 1600 BPI magtape (PE).

H = RL02 Disk Cartridge
J = RA60 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

VAX DBMS
Database Management System

Description

VAX DBMS is a multiuser, general purpose CODASYL-compliant database management system that runs under the VAX/VMS Operating System. It creates, updates, and maintains databases ranging in complexity from simple hierarchies to complex networks with multilevel relationships. It supports full concurrent access and update in a multiuser environment without compromising the integrity and consistency of the user's database.

VAX DBMS is based upon the March 1981 Working Document of the ANSI Data Definition Language Committee.

Features

- Full concurrent access and update capabilities in multiuser environment
- Record locking and journaling
- Automatic transaction and verb rollback
- Multiple database support (one database per process)
- Integrated with VAX Common Data Dictionary (CDD) facility
- Schema, Subschema, and Storage Schema Data Definition Languages (DDL)
- FORTRAN Data Manipulation Language (DML)
- High-level call interface for VAX languages that adhere to the VAX calling standard
- Automatic subschema definition extraction from the CDD for BASIC, BLISS, COBOL, DIBOL, MACRO, PASCAL, and PL/1 when using the high level call interface
- Easy-to-use utility command language
- Interactive DML utility (DBQ) with video display of subschema structure diagrams on VT100 compatible terminals
- On-line database verification, while allowing retrieval operations only
- Off-line full and incremental database backup and restore
- Ability to redo a committed transaction (Roll forward)
- Simple restructuring without reloading a database
- Sorted sets implemented with B-trees; prefix and suffix compression for sort keys

Data Definition

VAX DBMS provides three levels of data definition languages; the schema DDL defines the logical structure of the database, the storage schema DDL defines the physical structure of the database, and the subschema DDL defines an application program view of the schema.

The schema DDL is the only DDL that must be written. The DDL compiler produces a default subschema and a default storage schema for every schema it compiles.

The schema DDL defines the records, sets, and areas composing the database. A record is a collection of data items. A set is a relationship between records having one owner record and one or more member records in some specified order. An area is a logical subdivision of the database that contains records.

The storage schema DDL defines the representation of storage records, storage sets, and storage areas (which are equivalent to VAX/VMS files). It also defines the placement of records within the database, the storage set parameters, and the representation of data items within a storage record. Most database tuning is accomplished by changing the storage schema.

The subschema DDL defines a logical subset of the database in terms of records, sets, and realms (a collection of one or more areas). Many subschemas can be written to provide different views of the database for different application programs.

All database structure definitions are established and maintained by the DDL compiler and stored in the VAX Common Data Dictionary (CDD) where they can be retrieved by VAX DBMS Utilities and VAX DATATRIEVE.

Data Manipulation

Application programs must call the Database Control System (DBCS) for all database operations. The specific database operations supported are: CONNECT, DISCONNECT, ERASE, FETCH, FIND, GET, MODIFY, RECONNECT, and STORE for manipulating database records and sets; FREE and KEEP for saving and purging database currencies and keeplists; COMMIT, READY, and ROLLBACK for controlling the permanence of all database operations; ALSO, EMPTY, MEMBER, OWNER, NULL, and WITHIN conditions for testing the state of the database, currencies, and keeplists.

Application programs written in COBOL and FORTRAN perform database operations with a set of Data Manipulation Language (DML) statements included in the source. COBOL DML statements are compiled by the VAX COBOL compiler. FORTRAN DML statements are translated by the VAX DBMS FORTRAN DML Preprocessor into FORTRAN source code that is compiled by the VAX FORTRAN compiler. Application programs written in other languages that conform to the

VAX calling standard can access a database by passing DML statement text strings to the Interactive DML Utility (DBQ). The VAX DBMS Operator Utility (DBO) extracts the subschema definitions from the CDD to create work area definitions in BASIC, BLISS, COBOL, DIBOL, MACRO, PASCAL, and PL/1.

Run-Time Environment (Integrity and Consistency Features)

The Database Control System (DBCS) controls access to VAX DBMS databases. The DBCS ensures the integrity and consistency of user databases by automatically locking records that have been modified, records representing currencies, and records on keeplists. Optionally, the DBA can request that all records read in a particular database be locked for the life of the database transaction. Users can not modify data in records that are locked by another user. Users can not read data that another user has modified but not yet committed. When a user process terminates or executes a ROLLBACK or COMMIT operation, all locks are released. Locking of entire areas can be used to improve performance in certain applications.

All database changes between READY and COMMIT or ROLLBACK operations are recorded in a recovery-unit journal. When a user performs the COMMIT operation, all database changes are made permanent, whereas a ROLLBACK operation will undo all database changes. The DBCS automatically backs out any uncommitted database updates if a program error or system failure occurs. The DATABASE MONITOR process resolves all interprocess record lock conflicts. The database monitor returns an error to the "youngest" transaction(s) in deadlock situations.

Long-term after images can optionally be saved and used by the DBO utility to recover from storage device or system software failures.

Security and Protection Features

VAX DBMS uses standard VAX/VMS file security (SYSTEM, OWNER, GROUP, WORLD) to protect database storage areas (files). An application program can only access records defined in its SUBSCHEMA. It is the responsibility of the Database Administrator (DBA) to define storage areas and realms, and to set up for file protection, access modes to prevent unauthorized access to sensitive data.

Further database security and protection can be provided by preventing access to DDLs stored in the VAX Common Data Dictionary (CDD). The CDD supports a hierarchical security system based on access control lists. It is the responsibility of the DBA to define CDD access control lists to prevent unauthorized access to sensitive database definitions.

Utilities

Interactive DML Utility (DBQ)—Provides on-line, procedural database access and update capabilities by interactively processing generic Data Manipulation Language (DML) statements. DBQ also provides DISPLAY, IF-THEN-ELSE, LOOP, MACRO, MOVE, SET, and SHOW statements. The current position in a subschema is displayed graphically (on a VT100 compatible terminal) as the user navigates through the database.

Database Operator Utility (DBO)—Provides the Database Administrator with all of the functions required to create, maintain, delete, and control VAX DBMS databases. It provides the following major functions:

- Creating, initializing, and deleting databases
- Reporting on VAX DBMS information in the VAX Common Data Dictionary
- Extracting DDL information from the VAX Common Data Dictionary
- Deleting DDL information in the VAX Common Data Dictionary
- Verifying the integrity of internal database structures on-line while allowing retrieval operations only
- Modifying the contents of corrupted database storage areas (This function is not recommended or required for normal use.)
- Producing formatted database dumps
- Producing full and incremental database backup off-line
- Restoring the database from backup and long-term journals
- Controlling and displaying the status of the DBCS Monitor process
- Creating Static analysis of database space usage
- Displaying DBMS statistics for active databases
- Generating a User Work Area (UWA) for application programs using the high-level call interface

Product Assistance Facilities

VAX DBMS provides extensive help facilities for the Interactive DML Utility (DBQ), the Database Operator Utility (DBO), and the DDL compiler. The help files contain all necessary information on the use of each of these facilities, as well as complete specifications on writing generic DML, and schema, subschema, and storage schema DDL.

VAX DATATRIEVE provides an optional interface to VAX DBMS database structures. This provides the VAX DBMS user with a high-level, non-procedural query and report generating facility.

Components

DDL Compiler (DDL)—Used by the Database Administrator (DBA) to create and maintain database structure definitions including records, sets, areas, and realms in the VAX Common Data Dictionary. It compiles the schema, subschema, and storage schema DDLs, and generates default subschemas and default storage schemas. It is invoked with the VAX/VMS DCL command "DDL."

FORTRAN DML Preprocessor (FDML)—Preprocesses FORTRAN DML application programs. It translates FORTRAN DML statements into FORTRAN calls to the DBCS and data definition statements and passes the complete FORTRAN source program to the VAX FORTRAN Compiler.

Database Control System (DBCS)—Controls access to VAX DBMS databases. The DBCS is a shareable image that is linked with any application program that accesses the database.

Database Monitor Process—Controls all interprocess database communication, long-term journaling, and record locking.

Interactive DML Utility (DBQ)—Provides interactive DML access to any VAX DBMS database.

Database Operator Utility (DBO)—Used by the DBA to create, maintain, delete, and control all VAX DBMS databases. It is invoked with the VAX/VMS DCL command "DBO."

Installation Verification Procedures (IVP)—Verifies the correct installation of all VAX DBMS components and builds the PARTS database that is used in examples throughout the documentation. The IVP also verifies that the correct hardware/microcode needed to run VAX DBMS is installed.

Minimum Hardware Required

For VAX-11/780 Systems

Any valid VAX-11/780 system at ECO REV 4 or later, or any valid VAX-11/782 system with

- A minimum of one megabyte of memory
- One RK07 disk drive or one 9-track 1600 BPI magnetic tape unit for installation of the software
- Mass storage with a minimum of 17,000 disk blocks for VAX DBMS system software and sufficient space for database storage areas
- Magnetic tape or disk units to dump and reload user-established database storage areas
- WCS microcode version 123 or later

For VAX-11/750 Systems

Any valid VAX-11/750 system at FCO level 3 or later with

- A minimum of one megabyte of memory
- One RK07 disk drive or one 9-track 1600 BPI magnetic tape unit for installation of the software
- Mass storage with a minimum of 17,000 disk blocks for VAX DBMS system software and sufficient space for database storage areas
- Magnetic tape or disk units to dump and reload user-established database storage areas

For VAX-11/730 Systems

Any valid VAX-11/730 system with

- An R80/RL02 configuration
- A minimum of one megabyte of memory
- One RL02 disk drive for installation of the software
- Mass storage with a minimum of 17,000 disk blocks for VAX DBMS system software and sufficient space for data base storage areas
- Magnetic tape or disk units to dump and reload user-established data base storage areas.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

VAX Common Data Dictionary

Optional Software

VAX BASIC
VAX BLISS-32
VAX C
VAX COBOL
VAX DATATRIEVE
VAX DIBOL
VAX FORTRAN
VAX PASCAL
VAX PL/I

Training Credits

THREE (3)—Training Credits apply only to options that include support services. Consult the latest Educational Services Catalog at your local DIGITAL office for the available courses, course requirements, and guidelines.

Software Installation

Digital Installed

VAX DBMS
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC899-AH	QD899-AH QD899-AM QD899-AV	QE899-AM QE899-AV
Single-use, license-only option, no binaries, no documentation, no support services.	QC899-DZ	QD899-DZ	QE899-DZ
Update Options Users of VAX DBMS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC899-HH	QD899-HH QD899-HM QD899-HV	QE899-HM QE899-HV
Right to copy for single use, no binaries, no documentation	QC899-HZ	QD899-HZ	QE899-HZ
Miscellaneous Options Documentation-only kits	QC899-GZ	QD899-GZ	QE899-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (H, M, V, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD899-AM = binaries on 9-track 1600 BPI Magtape (PE)

H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
V = RK07 Disk Cartridge
Z = No hardware dependency

See preceding table for available options.

DECnet-VAX, VAX/VMS Network Software (Full Function and End Node)

Description

DECnet-VAX allows a suitably configured VAX/VMS system to participate as a routing or end node in DECnet computer networks. Using DECnet-VAX Version 3.1, DECnet computer networks can contain up to 1023 nodes given proper network planning. DECnet-VAX interfaces are standard components of VAX/VMS for use on a local, standalone system. The DECnet-VAX software, when installed on a VAX/VMS system, enables communication between different, networked systems that use the same protocols.

DECnet-VAX is a Phase IV network product and is warranted for use only with Phase III and Phase IV products supplied by Digital.

DECnet-VAX offers task-to-task communications, file management, downline system and task loading, network command terminals, and network resource sharing capabilities using the Digital Network Architecture (DNA) protocols. DECnet-VAX communicates with adjacent and non-adjacent Phase III and Phase IV nodes (adjacent nodes control opposite ends of a point-to-point communication line).

VAX/VMS programs written in VAX MACRO and native mode high-level language can use DECnet-VAX capabilities, but programs executing in PDP-11 compatibility mode cannot use DECnet-VAX.

The network functions available to a DECnet-VAX user depend, in part, on the configuration of the rest of the network. Each DECnet product offers its own functions and its own set of features to the user. Networks consisting entirely of DECnet-VAX Phase IV nodes have all the functions described here. Networks that combine DECnet-VAX nodes with other DECnet products may limit the functions available to the DECnet-VAX user because some DECnet-VAX features may not be supported by all DECnet products. Conversely, a user of another DECnet implementation will not necessarily have access to all DECnet-VAX functions.

Adaptive Routing

Adaptive routing is the mechanism by which one or more nodes in a network can route or forward messages between another pair of nodes in the same network. This routing capability will forward such messages even if no direct physical link exists between the pair of nodes apart from the sequence of physical links that includes the routing nodes.

A DECnet-VAX node must function as a routing node whenever multiple lines are used by that node. DECnet-VAX end nodes provide all the capabilities of DECnet-VAX routing nodes except that end nodes cannot route messages on behalf of other nodes in the network. Since end nodes do not route messages, they do not need to store or update routing databases. Consequently, end nodes initiate less overhead message traffic than routing nodes.

For this same reason, end node operation consumes less processing power than routing node operation. The Full Function DECnet-VAX software must be installed on a node in order for that node to operate as a routing node. For a node to operate as an end node, either the Full Function or the End Node DECnet-VAX software must be installed on that node. Full Function DECnet-VAX software allows a node to be set up as either a routing node or as an end node.

Although two adjacent routing nodes can be connected by more than a single physical link, messages will be sent over only one of the links. All other lines will serve as "hot standbys," such that the least cost path available between two nodes is the one that will be used for message traffic. A line cost parameter set by the system manager determines the line over which all messages will be sent from node to adjacent node.

Task-to-Task Communication

Using DECnet-VAX, a VAX/VMS program written in VAX MACRO or a native mode, high-level language can exchange messages with other user programs. The two user programs can be on the same node, on adjacent Phase III or Phase IV nodes, or on any two non-adjacent Phase III or Phase IV nodes connected in the same network by Phase III or Phase IV routing nodes and intervening physical links. DECnet imposes no special data formatting requirements on the user.

For most applications, task-to-task communication can be programmed in a transparent manner, where the remote task is treated as a full duplex, record-oriented device. Transparent operation is provided via the following interfaces: System Service calls, RMS calls (OPEN, GET, PUT, CLOSE), and high-level language I/O statements (which are mapped to RMS calls). A non-transparent mode of task-to-task communication is offered via the System Service interface that extends the capabilities provided by the transparent mode. These capabilities include support for interrupt messages and multiple inbound connect requests.

Command Language File Management

Most VAX/VMS Digital Command Language (DCL) commands can be used to perform network file operations. These include: COPY, SUBMIT, TYPE, DELETE, DIRECTORY, CREATE, OPEN, READ, WRITE, CLOSE, ANALYZE, SEARCH, PRINT, BACKUP, DIFFERENCES, DUMP, PURGE, CONVERT, and APPEND. The operation of these commands is transparent except for those commands which invoke processing on a specific system (i.e., SUBMIT and PRINT/REMOTE). Only a node name added to a file specification is required to invoke the network capabilities via one of these commands.

Using the COPY command, a user can transfer sequential, relative, and indexed-sequential (ISAM) files between DECnet nodes which support compatible file structures and record formats. Between two VAX/VMS systems, sequential or relative files with fixed length, variable length, or variable length with fixed control field records can be transferred. Similarly, multikeyed indexed files with variable or fixed length records are supported.

The SUBMIT command allows command files residing on a remote node to be submitted for execution at the remote node. The command file must be in the format expected by the node responsible for execution. Conversely, DECnet-VAX allows VAX/VMS command files to be received from other systems and executed.

Network Resource Access

File Access—File access is supported to and from remote DECnet systems transparent to VAX MACRO and native mode, high-level language programs using RMS. User programs can sequentially read, create and delete files on a remote node.

Record Access—User programs can perform record level operations such as get, put, update, delete, find, and rewind to access and modify files residing on a remote VAX/VMS node. In addition to sequential access to a file, several other access methods are supported through RMS using DECnet-VAX. These include random access by relative record number, random access by key value, random access by Record File Address (RFA), and block I/O access by virtual block number.

Down-Line System Loading

Initial memory images for DECnet-11S nodes in the network can be stored on VAX/VMS file system devices and loaded on request into adjacent DECnet-11S nodes. Load requests can come from the local DECnet-VAX operator or from the remote node.

Down-Line Task Loading

Initial task images for DECnet-11S nodes can be stored on VAX/VMS file system devices and loaded into remote nodes. Programs already executing on DECnet-11S nodes can be checkpointed to the host file system and later restored to main memory in the DECnet-11S node. Overlays for DECnet-11S tasks can also be stored on VAX/VMS file system devices. These features simplify the operation of network systems that do not have mass storage devices.

Upline Dumping

Memory images of adjacent RSX-11S nodes connected by DECnet can be written onto a file on a VAX/VMS system. This facility helps a programmer understand what may have caused the RSX-11S system to crash.

Network Command Terminal

The DCL command, SET HOST, allows a terminal user on one DECnet-VAX node to establish a logical connection to another DECnet-VAX node. This connection makes the terminal appear as if it were physically connected to the remote system and the operator can use all the standard system and network utilities supported by that remote node. This capability is particularly useful for doing remote program development and allows the terminal users on smaller application oriented systems to utilize the resources of larger development oriented systems.

VAX/VMS MAIL Utility

VAX/VMS MAIL allows transmission of text messages between users of a standalone VAX system. The DECnet-VAX software allows users to send and receive VAX/VMS MAIL to or from users of other VAX/VMS systems that operate within the same DECnet network.

VAX/VMS PHONE Utility

The VAX/VMS PHONE Utility allows users to send and receive data interactively from one user's terminal to another user's terminal. DECnet-VAX increases the scope of PHONE to allow active users on different VAX systems in the same network to exchange information.

Network Management

The Network Control Program (NCP) performs three primary functions: displaying statistical and error information, controlling network components, and testing network operation. These functions can be performed locally or executed at remote Phase III or Phase IV nodes that support these functions.

An operator can display the status of DECnet activity at any Phase III or Phase IV node in the network. The user can choose to display statistics related to the node itself or the communication lines, including traffic and error data. The local operator can also perform many network control functions such as starting and stopping lines, activating the local node, and down-line loading DECnet-11S systems.

DECnet-VAX provides network event logging to a terminal device or disk file. The NCP utility can be used to enable and disable the event logging facility.

NCP can also be used to test components of the network. NCP enables transmission and reception of test messages over individual lines either between nodes or through other controller loopback arrangements. The messages can then be compared for possible errors. NCP allows performance of a logical series of tests that will aid in isolating network problems.

Integrated Interfaces

DECnet-VAX interfaces are standard parts of the VAX/VMS operating system for use on a local, standalone system. Users can develop programs and procedures based upon these interfaces for such functions as file access and task-to-task communication. As a user's processing requirements grow, the user can add DECnet-VAX software to VAX/VMS and build a network. Since the DECnet-VAX interfaces stay the same, the programs and procedures developed can be used in the network environment without their modification.

Communications

DECnet-VAX uses DEUNA, DMC11, DMR11, DMP11, DMF32, or CI780 communications controllers to interface with other network nodes. The DMC11, DMR11, and DMP11 are DMA UNIBUS peripherals which implement line control and error recovery procedures in microcode. Each of these devices use the Digital Data Communications Message Protocol (DDCMP) to provide full- or half-duplex communication over point-to-point synchronous lines or multipoint lines in the case of the DMP11 or DMF32. The DMF32 synchronous line uses the DDCMP protocol implemented in the software.

The DEUNA, when used in conjunction with the H4000 transceiver, allows DECnet-VAX to utilize Ethernet as its datalink transmission media.

VAX PSI is the software product that provides an interface to X.25 Packet Switch Networks. When DECnet-VAX is used in conjunction with VAX PSI, DECnet-VAX can utilize the PSN as though it was a standard datalink to transmit messages between DECnet nodes.

The C1780 employs a unique protocol to provide services similar to those of DDCMP.

VAX/VMS systems can be used as either a control or a tributary node in a multipoint DMP11 environment. DECnet-VAX multipoint supports up to sixteen tributaries on a single multipoint line. The DMF32 may also be used to attach a VAX-11/730 system as a tributary node. The DMP11 can be used in point-to-point communication configurations in DMC11 compatibility mode. The DMR11 is supported only in DMC11 compatibility mode.

DECnet-VAX Operation

DECnet-VAX is implemented under VAX/VMS as an Ancillary Control Process (ACP) and a network device driver with Digital-supplied executive level components and user-level programs.

The normal VAX/VMS protection has been incorporated in the operation of DECnet-VAX. For example, incoming connects including file access and file transfer requests are protected by the normal VAX/VMS login and file protection mechanisms. Outgoing connects including file access and file transfer requests can include user password information that is implicitly specified via NCP, or explicitly specified by the user for verification on the remote node.

DECnet-VAX Configuration and Performance

The process of configuring a DECnet-VAX node is based primarily on trade-offs of cost, performance, and functionality, within the realm of satisfying the user's application requirements. It can be readily expected that network applications will range from low-speed, low-cost situations to those of relatively high performance and functionality. The performance of a given DECnet-VAX node is a

function not only of the expected network traffic and resultant processing, but also of the amount of concurrent processing specific to that node. Thus node performance depends on many factors, including

- CPU type
- Number of device interrupts per unit time
- Communication line characteristics
- Number and size of buffers
- Message size and frequency of transmission
- "Local" applications
- Size and frequency of route-through traffic

It is important to note that the rate at which user data can be transmitted (throughput) over a communications line can sometimes approach, but will never exceed, the actual line speed. The reason is that the actual throughput is a function of many factors, including the line quality, protocol overhead, topology and network application(s), as well as the factors cited in this section.

Minimum Hardware Required

Any valid VAX/VMS system configuration with one of the following communication devices:

- DEUNA-AA Ethernet controller interface
- DMC11-AR, -DA remote synchronous interface V.24/EIA RS-232-C
- DMC11-AL, -MD high speed local synchronous interface
- DMC11-AL, -MA high speed local synchronous interface
- DMC11-AR, -FA CCITT V.35 synchronous interface, speed up to 250 kilobits/second
- DMR11-AA remote synchronous interface, V.24/EIA RS-232-C
- DMR11-AC high speed local synchronous interface integral modem for local connection
- DMR11-AB CCITT V.35 synchronous interface, speed up to 1,000 kilobits/second (clocked by modem)
- DMR11-AE EIA RS-422 synchronous interface, speed up to 1,000 kilobits/second (clocked by modem)
- DMP11-AA EIA RS-232-C up to 19.2 kilobits/second or RS-423-A (up to 56 kilobits/second) synchronous communication interface
- DMP11-AB CCITT V.35 synchronous communication interface. Maximum data rate 56 kilobits/second.
- DMP11-AC Local synchronous communication interface with integral modem (switch selectable speeds: 56, 250, 500 or 1000 kilobits/second. Maximum data rate 500 kilobits/second FDX or 1000 kilobits/second HDX.

- DMP11-AE — RS-422-A remote synchronous communication interface. The maximum data rate is 1000 kilobits/second.
- DMF32-AA, -AB — Synchronous line support for EIA RS-232-C or RS-423-A interface up to 19.2 kilobits/second.
- CI780-AA, -AB — Interconnect for VAX-11/780 and 11/782 systems within a maximum distance of 90 meters. The effective maximum data rate of the CI780 using DECnet-VAX is limited to 1000 kilobits/second between any pair of nodes.
- VAX-11 PSI — Consult the VAX-11 PSI SPD (25.40.xx) for supported communications interfaces

NOTE: The following RS-422/423 signals are not supported by the DECnet-VAX or VAX/VMS software:

NS — New Signal
SR — Signaling Rate Selector
LL — Local Loopback
RL — Remote Loopback
SS — Select Standby

Optional Hardware

Additional communication devices from the above, up to the maximum defined in the Configuration and Performance section, but not to exceed the maximum defined in the Communications Devices section of the VAX/VMS SPD (25.01.xx).

Prerequisite Software

VAX/VMS Operating System

Optional Software

VAX DATATRIEVE

VAX PSI

Training Credits

No training credits are included with a DECnet software license. Training courses on DECnet software are scheduled at regular intervals in Digital's Training Centers. Arrangements should be made directly with Digital's Educational Services Department.

Software Installation

Optional Digital installation is recommended for this software product. Digital recommends that only those customers who have sufficient technical resources should attempt its installation without Digital's assistance.

Digital Installation Service is available, provided the customer requests this service within 30 days of product delivery (F.O.B. Digital plants).

Support Category

Digital Supported

Prerequisite Support

A Network Profile and DECnet Customer Support Plan covering all intended network nodes and their support may be required.

DECnet-VAX Full-Function Software Options Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, 90-day warranty, no installation	QCD05-AG	QDD05-AG	QED05-AY
Single-use license-only option, no binaries, no documentation, no support services	QCD05-DZ	QDD05-DZ	QED05-DZ
Update/Unsupported Options* Users of DECnet-VAX Full Function Software whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QCD05-HG	QDD05-HG	QED05-HY
Right to copy for single-use, no binaries, no documentation	QCD05-HZ	QDD05-HZ	QED05-HZ

*(Prerequisite is Q*D03-A* or Q*D05-A*)

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QCD03-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

DECnet-VAX End Node Software Options Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, 90-day warranty, no installation	QCD04-AG	QDD04-AG	QED04-AY
Single-use license-only option, no binaries, no documentation, no support services	QCD04-DZ	QDD04-DZ	QED04-DZ
Update/Unsupported Options* Users of DECnet-VAX End Node Software whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QCD04-HG	QDD04-HG	QED04-HY
Right to copy for single-use, no binaries, no documentation	QCD04-HZ	QDD04-HZ	QED04-HZ

*(Prerequisite is Q*D04-A*)

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QCD03-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

The tables below describe the physical hardware configurations supported by DECnet-VAX in terms of CPU type and communication interface. The numbers given in the tables are "load costs."

How to use this table

The maximum system configuration, with a mix of device types, is computed by adding the load costs (in load units) for each device up to the limit for a given processor type.

Example

When a VAX-11/780 is used to route messages in a DECnet network: If the system uses a DMR11 (HDX) at 500 kilobits/sec, a DMR11 (HDX) at 19.2 kilobits/sec, and the synchronous line of a DMF32 at 19.2 kilobits/sec; when the network is fully utilized, processor loading totals 11 load units. Therefore, it would not be advisable to add any device with a load cost greater than five units (e.g., DEUNA link or high speed DMR11 link).

CPU	Maximum Load (in Load Units)
VAX-11/780 or 782	16
VAX-11/750	10
VAX-11/730	5

LOAD UNITS PER DEVICE AT SPEEDS SHOWN
(When device is in active use)

	Line Speed (Kilobits/second)					
Device Type	**9.6–19.2**	**56–250**	**500**	**1000**	**10000**	**70000**
DEUNA‡	N/A	N/A	N/A	N/A	8	N/A
DMC11 (FDX)	1	4	16	16	N/A	N/A
DMC11 (HDX)	1	2	8	8	N/A	N/A
DMR11 (FDX)	1	4	16	16	N/A	N/A
DMR11 (HDX)	1	2	8	8	N/A	N/A
DMP11* (FDX)	1	4	16	N/A	N/A	N/A
DMP11* (HDX)	1	2	8	8	N/A	N/A
DMF32*	2	N/A	N/A	N/A	N/A	N/A
CI780†	N/A	N/A	N/A	N/A	N/A	16
VAX-11 PSI Devices	4	8	N/A	N/A	N/A	N/A

*Point-to point or multipoint control node (DMP) or tributary (DMP or DMF). However, use of the DMF32 as a tributary station is supported only on the VAX-11/730.

†DECnet-VAX supports up to 16 VAX/VMS systems connected to one SC008 star coupler via C1780 interfaces. The effective maximum data rate through the CI780 using DECnet-VAX is limited to 100 kilobits/second at each node.

‡DECnet-VAX supports up to two DEUNAs on a single system. Note that when two DEUNAs are used, each must be connected to a unique Ethernet.

DECnet-VAX supports a maximum of 32 tributaries controlled by all the DMP11 control stations on a single node, a maximum of 16 tributaries can be controlled on one multipoint line.

Maximum throughput for a specific tributary node is equal to the maximum aggregate data rate for the control node, divided by one plus the number of active tributaries.

In order to achieve a viable configuration the user and/or a Digital software specialist must perform a level of application analysis which addresses the factors above. In the preceding tables, the following definition applies:

Maximum Line Speed—The fastest clock rate at which the number of devices specified can be driven under DECnet-VAX. The actual maximum data throughput can not be calculated by multiplication of the number of lines by the line speed, since many factors already discussed will reduce the actual throughput.

OBSERVER

Description

OBSERVER is a network monitoring system for PHASE III DECnet networks. It runs as a layered application on the RSX-11M or RSX-11M-PLUS Operating System and does not require any additional hardware or software on the remote nodes to be monitored. OBSERVER uses the Network Information and Control Exchange (NICE) protocol and the Network Management Listener on remote hosts to monitor the Data Link Layer (level 2), Transport Layer (level 3), and Network Services Layer (level 4) of the DECnet software.

OBSERVER consists of software modules which combine to form a comprehensive monitoring system. The central component of OBSERVER is a data acquisition subsystem that periodically polls nodes within the network to obtain traffic, event, and error counters. The network manager has full control over which nodes are polled as well as the polling rate. The data acquisition subsystem reduces the raw data it collects into a manageable and meaningful set of statistics and event data which is then passed on to the OBSERVER data logging subsystem.

The data logging subsystem filters and logs both statistical and event data. Statistical data is periodically logged to a database file at a user selectable rate. Event data is filtered and written to a combination of on-line video displays, hard copy printer, and event database file.

The Command/Display subsystem provides a forms oriented command interface to OBSERVER. It provides on-line, video displays of selected error statistics, traffic statistics, and status information. Various displays are available that allow the user to select the network element, type of information, and level of detail to be presented.

A set of utilities are provided that allow the user to build and manipulate various databases maintained by OBSERVER including the Network Element Reference Data Base. This database contains a description of all nodes and links in the network. This includes such details as system type, type and version of operating system, type and version of network software, system location, name and number of system manager, name and number of customer service contacts, and many other useful details. Easy-to-use display utilities are provided to retrieve this information.

OBSERVER provides report generation programs which access the Event and Statistics Data Base to provide the following reports:

- Node Error Summary
- Link Error Summary
- Node Traffic Level Summary
- Link Traffic Level Summary
- Node Transition Summary

- Link Transition Summary
- Link Exception Summary

The OBSERVER Data Base and log files are fully explained in the OBSERVER User Documentation. These files provide information regarding the operation and performance of the network and can be accessed by user written application programs and DATATRIEVE-11 procedures.

Minimum Hardware Required

Any valid RSX-11M or RSX-11M-PLUS system configuration with:

- PDP-11/23-PLUS, 11/24, 11/44, or 11/70 processor
- At least 512KB main memory dedicated to OBSERVER
- At least 10MB disk storage dedicated to OBSERVER
- At least one supported DECnet Communication Device
- LA120 terminal or equivalent dedicated as the OBSERVER Control and Hard Copy Event Logging Terminal
- Two adjacent VT100 terminals with advance video option or equivalent, dedicated as the OBSERVER Operator Workstation
- 9-track 800 BPI Magtape to support installation and backup

Optional Hardware

Any printer supported by the prerequisite software, for report printing

Prerequisite Software

One of the following:

- RSX-11M Operating System with DECnet-11M
- RSX-11M-PLUS Operating System with DECnet-11M-PLUS

Optional Software

DATATRIEVE

Training Credits

None

Software Installation

Digital Installed

Support Category

Digital Supported

Customer Responsibilities

Before installation of the software the customer must

- Previously have installed all requisite hardware including terminals and communication lines.
- Previously have installed all requisite software
- Obtain, install, and demonstrate as operational to Digital's satisfaction any modems and other equipment and facilities necessary to interface Digital's communications line interfaces and terminals
- Make available for a reasonable period of time, as mutually agreed by Digital and the customer, all hardware, communication facilities, and terminals that are to be used during installation

Delays caused by any failure to meet these responsibilities will be charged at the then prevailing rate for time and materials.

Prerequisite Support

A Network Profile and Customer Support Plan covering all intended network nodes and their support must be prepared jointly by Digital and the customer.

OBSERVER
Ordering Information

OBSERVER is available only on 9-track 800 BPI Magtape (NRZI) distribution media.

Option QSP20-AD is available only after the purchase of one QSP40-AD license.

QSP40-AD	Single-use license, binaries, documentation, support services, plus consulting services including: preinstallation assistance, post installation orientation, and a network performance review session. Specifics on the consulting service will be provided as part of the Customer Support Plan.
QSP20-AD	Single-use license, binaries, documentation, support services
QSP20-DZ	Single-use license-only option, no binaries, no documentation, no support services

Update/Unsupported Options

Users of OBSERVER who specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.

QSP20-HD	Binaries, documentation
QSP20-HZ	Right-to-copy for single-use, no binaries, no documentation

Miscellaneous Option

QSP20-GZ	Documentation-only kit

Message Router for VMS

Description

Message Router for VMS is a store and forward message transport system that optimizes message delivery within a DECnet Phase III or Phase IV network.

This software product runs on a properly configured VAX/VMS Operating System that supports a DECnet Phase III or Phase IV network.

Message Router for VMS supports the existing Standards for Network Protocol, Interface and Formatting being developed for Message Handling Systems by the National Bureau of Standards (NBS).

The National Bureau of Standards supports messages constructed with fields defined by the Specification for the Format of Messages for Computer Based Message Transport Systems. These messages can consist of any information needing transport within the DECnet Phase III or Phase IV network including text, data and arbitrary files.

The Message Router for VMS software logs the progress of messages within the network and informs the sending application if undeliverable.

Message Router for VMS requires application programs, called User Agents or Gateways (UA/G) that will:

- format and display messages
- interact with Message Router for VMS in a "posting protocol" to send messages, or in a "delivery protocol" to receive messages
- convert a received message from Message Router for VMS standard format into the required application format
- convert a sending application format into the Message Router standard format

Message Router for VMS documentation guides users in developing their own User Agents/Gateways. In addition, the VMSMAIL Gateway is included with Message Router for VMS to enable users to access the VMS Personal Mail Utility.

Minimum Hardware Required

Any valid VAX/VMS system configuration that:

- supports a DECnet Phase III or Phase IV network
- has at least 1800 blocks of disk space and 200 pages of memory (Additional requirements are dependent upon user's system application.)

For VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

DECnet-VAX

NOTE: Both the Message Router and DECnet software must be installed on all nodes that will be used to initially send or ultimately receive messages. In addition, it is recommended that Message Router be installed on any node that is part of the routing scheme.

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

Message Router for VMS Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-77/780 & VAX-11/782**
Single-use license, binaries, documentation, support services	QC730-AG	QD730-AG	QE730-AY
Single-use license-only option, no binaries, no documentation, no support services	QC730-DZ	QD730-DZ	QE730-DZ
Update/Unsupported Options Users of Message Router for VMS whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC730-HG	QD730-HG	QE730-HY
Right to copy for single-use, no binaries, no documentation	QC730-HZ	QD730-HZ	QE730-HZ

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Upgrade Options Customers who are currently licensed users of VAX-11 DEC-mail Multinode Option may obtain this new product by purchasing a license to an upgrade kit for use on the same CPU as their previous license.			
Single-use license, binaries, documentation, support services	QC731-AG	QD731-AG	QE731-AY
Single-use license-only option, no binaries, no documentation, no support services	QC731-DZ	QD731-DZ	QE731-DZ
Miscellaneous Options Documentation-only kits	QC730-GZ	QD730-GZ	QE730-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QC730-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

DECdx

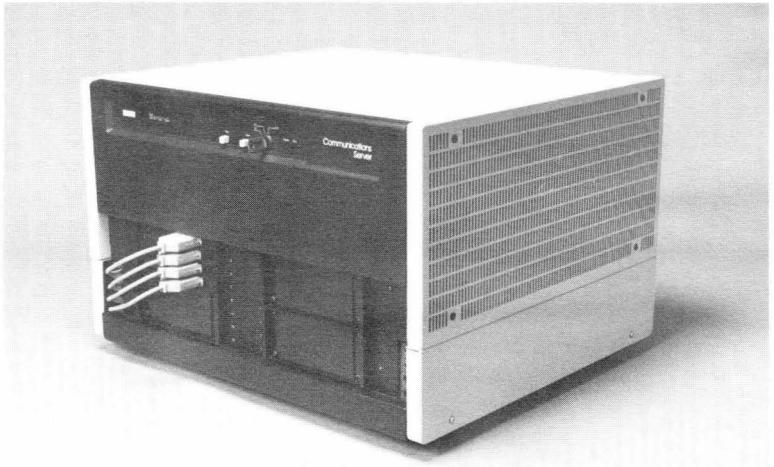
Ordering Information

See your Digital Sales Representative for ordering information.

DECnet Router

DECnet Router Servers are Ethernet Communications Server systems that perform DECnet routing functions between DECnet nodes on an Ethernet and remote DECnet nodes. Additionally, the DECnet Router provides DECnet interconnection between independent Ethernets.

DECnet Routers implement Phase IV DECnet adaptive routing algorithms and network management. Through the use of Phase IV DECnet protocols, DECnet computer networks can contain up to 1023 nodes given proper network planning. DECnet Routers offer a cost-effective means of building such networks while offloading the routing burden from network hosts.



Prerequisite Hardware

The DECnet Router software runs on the following Ethernet Communications Server hardware option:

- DECSA-EA—Ethernet Communications Server hardware, including a one-line synchronous line card (EIA RS-232-C/CCITT V.24, speeds up to 19.2 Kbits per second, full-duplex). Up to seven additional EIA RS-232-C/CCITT V.24 or CCITT V.35 lines can be supported by a DECnet Router Server.

In addition, the following hardware is required:

- All Ethernet physical channel hardware (for example, coaxial cable and terminators).
- An H4000 transceiver or an LNI and transceiver cable.

Prerequisite Software

The DECnet Router Server requires a Phase IV DECnet host to support downline software loading. One or more of the following systems can be used as Ethernet hosts.

VT240 Series Text and Graphics Terminals

The VT240 is a monochromatic text and graphics video display terminal. As the midrange member of the new VT200 family, it incorporates all the features of the VT100 family and the VT220 terminal. You can upgrade the VT240 to include the optional integral modem that supports auto dialing/auto answering functions.

By generating full bit-mapped graphics in Tektronix 4010/4014 emulation, the VT240 supports the industry's graphics standards. The VT240 also supports ReGIS (Remote Graphics Instruction Set), Digital's general purpose graphics command language. It allows you to create pictorial data as easily as you can create ASCII text. By connecting this terminal to a graphics printer, such as Digital's Letterprinter 100, you can reproduce the screen's content.

The VT240 uses the same keyboard that is used with the VT220 terminal, a monitor, and a system box. The system box contains the power supply, controller board, and electrical connectors.

The VT241 terminal, the high-end member of the VT200 family, is a VT240 with a color monitor, instead of the monochrome one. It offers the same capabilities as the VT240, but with the RGB monitor providing color graphics display. The only difference between the VT240 and the VT241 is the monitor.



- VAX/VMS running DECnet-VAX (Phase IV).
- RSX-11M or RSX-11M-PLUS running DECnet-11M (Phase IV) or DECnet-11M-PLUS (Phase IV).

The DECnet Router is designed for easy installation by customers. Since the configuration of the server is bounded, installation of the software requires answering questions about line configurations and operation as is done for communications lines connected to host systems. A copy of this configuration file resides on one or more designated "load hosts" such that the memory-only server can be easily reconfigured.

DECnet Router Specifications	
Operating Environment	
Temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	10%–90% (non-condensing)
Maximum altitude	2.4 km (8,000 ft)
Nonoperating Environment	
Temperature	−40 to +66°C (−40 to +151°F)
Relative humidity	0%–95% (noncondensing)
Maximum altitude	9.1 km (30,000 ft)
Acoustic Noise Emissions	
Sound power	5.8 bels
Sound pressure level	42 dBA (at 1 m distance, 1.5 m height)
Physical Description	
Height	41.9 cm (16.5 in)
Width	64.8 cm (25.5 in)
Depth	55.9 cm (22.0 in)
Weight	39.9 kg (88 lbs) without line cards
Power and Heat Dissipation	
Line voltage tolerance	
Low range	120 VAC nominal 90–128 (rms) single phase three wire
High range	240 VAC nominal 180–256 (rms) single phase three wire
Line current	
120 VAC	7.0 A
240 VAC	3.5 A
Frequency tolerance	47–73 Hz
Max. heat dissipation	1,417 Btu/h
Max. AC power consumption	411 W

DECnet Router
Ordering Information

Server Type	Hardware Model No.	Load Host Software Model No.		
		VAX/VMS	RSX-11M	RSX-11M-PLUS
1-line DECnet Router Server	DECSA-EA	Q x 725	QP725	QP725

The suffix for the software model number denotes, first, the license/support category and, second, the distribution media.

Load Host Software Model No.	License/Support Category	Distribution Media
Q_____-AM	Single use, with support	1600 bpl, 9TR mag tape
Q_____-AH	Single use, with support	RL02 disk
QLA01-DZ	Right-to-copy, no support	—
Q_____-HM	Update: binary kit, no support	1600 bpl, 9TR mag tape
Q_____-HH	Update: binary kit, no support	RL02 disk
Q_____-HZ	Update: right-to-copy, no support	—

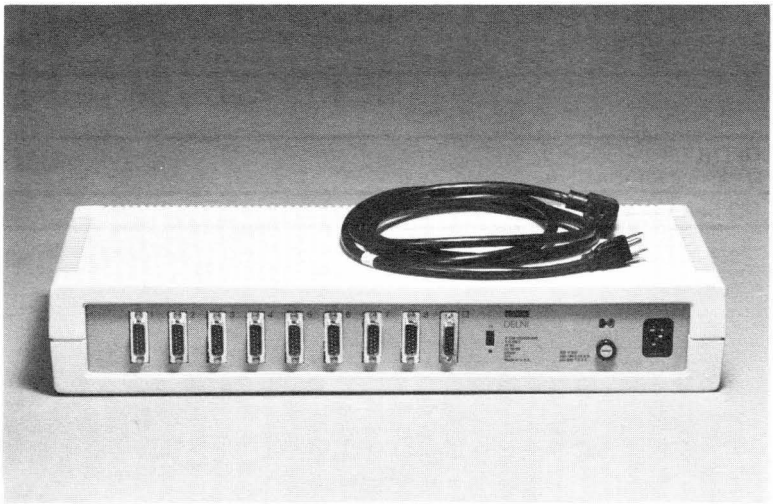
When ordering software for a Server system:

1. The first Server of any type requires a Q_____-AH/AM license: Single Use, With Support.
2. The second (third, fourth, . . .) Server of that *same* type may be a QLA01-DZ license: Right-To-Copy, No Support.
3. When warranty has expired and software updates are available for a particular type of Server system,
   a. order a Q_____-HH/HM license for the first Server of that type, and
   b. order a Q_____-HZ license for the second (third, fourth, . . .) Server of that *same* type.
4. If the load host is a VAX-11/730, designate only RL02(-xH) as the distribution medium.

DELNI (Local Network Interconnect)

The Local Network Interconnect (LNI) allows Ethernet-compatible devices to be grouped together up to 50 meters away from the LNI. It can be configured in three ways: stand-alone, hierarchical stand-alone, and connected. The stand-alone LNI configuration sypports up to eight systems or system-based devices (not terminals) using standard Ethernet transceiver cables up to 50 meters away. The hierarchical stand-alone LNI configuration supports a combination of LNIs and devices using standard Ethernet transceiver cables up to 50 meters away. Hierarchical LNI groupings are not connected to the Ethernet coaxial cable. The connected LNI configuration supports up to eight devices using standard Ethernet transceiver cable up to 50 meters away. These LNI groupings are connected to the Ethernet coaxial cable via H4000 Ethernet transceivers. There are no communication restrictions or performance penalties incurred from using the LNI.

The connected LNI configuration can be expanded to support multiple LNIs as well as other systems—all connected to an Ethernet coaxial cable via H4000 Ethernet transceivers.



DELNI Specifications	
Physical Description	
Length	43.2 cm (17 in.)
Width	17.8 cm (7 in.)
Height	6.4 cm (2.5 in.)
Operating Requirements	
Data rate	10 Mbits per second
Number of lines	8 device ports plus 1 connector for the H4000 transceiver cable.
Electrical Requirements	
Switch-selectable	110 VAC @ 60 Hz and 220 VAC @ 50 Hz
Operating Environment	
Temperature range	5° to 50°C (41° to 122°F)
Relative humidity	10% to 90% (no condensation)
Hardware Requirements	An Ethernet communications controller in each node and a transceiver cable for each device are required. For connected (global) configurations, an H4000 transceiver and transceiver cable are required.

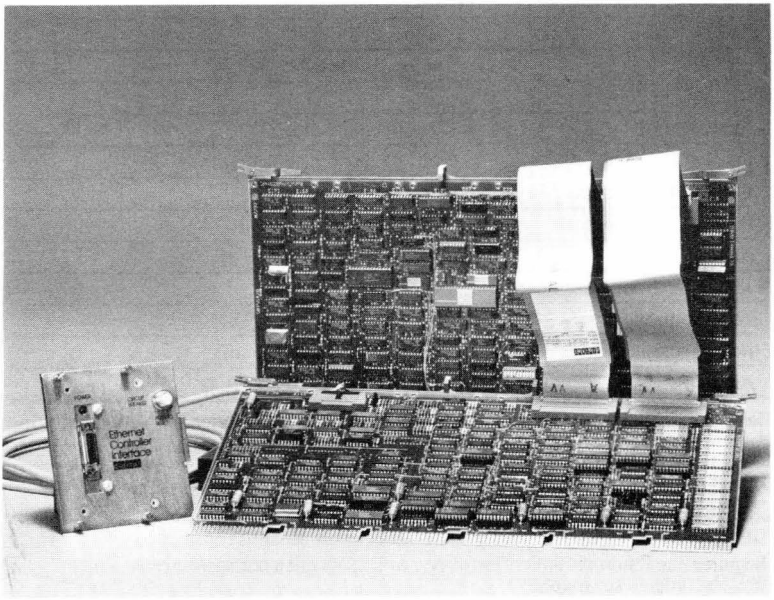
DELNI Ordering Information	
DELNI-AA	Local Network Interconnect-U.S.

DEUNA

The UNIBUS-to-Ethernet communications controller (DEUNA) connects VAX and UNIBUS PDP-11 systems to Ethernet LANS. The controller complies fully with the Ethernet specification. It consists of two hex modules, a distribution panel, and associated cables.

The UNIBUS-to-Ethernet communications controller provides Ethernet data link layer functions and a portion of the physical channel functions. Digital provides documentation and device drivers so users can write their own higher-level protocols (instead of using DNA) for specialized applications and communications in multivendor environments. The UNIBUS-to-Ethernet communications controller allows communication with up to 1,024 addressable devices through the use of the Ethernet coaxial cable. It physically and electrically connects to the Ethernet cable via the Ethernet transceiver (H4000) and the appropriate transceiver cable.

The controller microcode implements data encapsulation and decapsulation, data link management, and all channel access functions to ensure maximum throughput with minimum host processor intervention. It provides significant network maintainability features, including remote loopback of maintenance messages from other nodes, on-board diagnostics for self-test, system identification (status on the network), and downline loading and remote booting of UNIBUS PDP-11 systems from other nodes on the network.



DEUNA Specifications	
Performance	
Operating mode	Simplex (CSMA/CD)
Data format	Ethernet Specification
Data rate	10 Mbits/sec
Network specifications	1024 stations (maximum)
UNIBUS Loading	
Module pair	4 UNIBUS DC loads 2 UNIBUS AC loads
Power Requirements DC power	
Port module	@ + 5V + 5%, 7.0A
Link module	@ + 5V + 5%, 7.0A @ – 15V + 5%, 0.5A (for H4000 transceiver)
Physical Description	
Port and link module	
Height (hex)	21.4 cm (8.4 in.)
Length	39.8 cm (15.7 in.)
Cable interface panel	
Height	10.6 cm (4.0 in.)
Length	10.6 cm (4.0 in.)
Transceiver Cables*	
BNE3A	Low loss PVC jacket
BNE3C	Low loss TEFLON*** jacket
Operating Environment	
Temperature	5° to 50°C (41° to 122°F)
Relative humidity	10 to 90% (no condensation)
Wet bulb temperature	32°C (90°F) max.
Dew point temperature	2°C (36°F) min.
Altitude	sea level to 2.4 km (8,000 ft)
Shipping Environment	
Temperature	– 40° to 60°C (– 40° to 151°F)
Relative humidity	0 to 95% (no condensation)
Altitude	sea level to 9 km (30,000 ft)

*Cables are available in different lengths from DIGITAL's Accessories and Supplies Group.

DEUNA Ordering Information	
DEUNA-AA	DEUNA Unibus-to-Ethernet communications controller

Requires one Ethernet H4000 Transceiver or DELNI and a transceiver cable which must be ordered separately.

DEQNA

The DEQNA is a Q-BUS to Ethernet Communications Controller. It lets you connect Q-BUS systems, such as the LSI-11, to the Ethernet network. The DEQNA provides data link layer and some physical channel functions for connection to Ethernet.

The DEQNA consists of one dual module board plus the appropriate CPU kit that consists of a distribution panel, and internal cabling. The DEQNA controller board fits into an option slot on the Q-BUS backplane and connects to the H4000 Transceiver or DELNI using a transceiver cable.

DEQNA
Specifications

The DEQNA consists of one dual module, a distribution panel, and the associated internal cable. Either the H4000 transceiver or the LNI and a transceiver cable are required and are not supplied with the DEQNA. The DEQNA is not guaranteed with any other transceiver.

The DEQNA is supported on the following host computer systems:

- Micro PDP-11
- PDP-11/23-PLUS

Physical Description (Dual Module)	
Length	21.6 cm (8.5 in.)
Height	13.25 cm (5.22 in.)
Power Requirements	
+12 VDC	−5 VDC
5.0A	3.5A
Environmental Requirements	
Temperature range	10–40°C (50–104°F)
Relative humidity	10%–90% (no condensation)
Transceiver Cables	The transceiver cable may be a maximum of 45 meters in length. Please refer to the latest DECdirect catalog for the appropriate cables and cable lengths.

DEQNA
Ordering Information

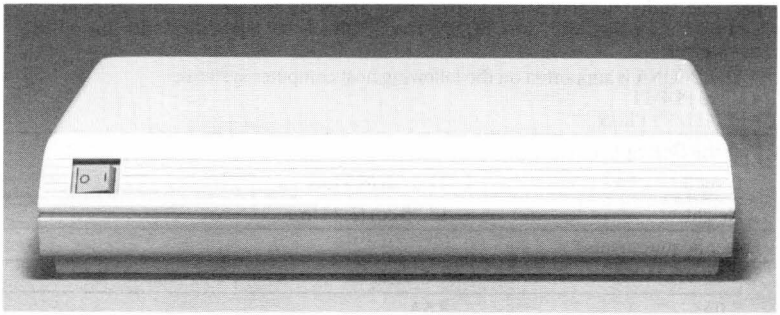
DEQNA-KP	Module for new CPU (DIGITAL integrated at factory)
DEQNA-M	Base module for existing CPU (this field upgrade module requires one of the following CPU cabinet kits for cable, bracket, and distribution panel insert.)
CK-DEQNK-KA	CPU cabinet kit for PDP-11/23
CK-DEQNK-KB	CPU cabinet kit for Micro-11
CK-DEQNK-KC	CPU cabinet kit for PDP-11/23-PLUS

Requires one Ethernet H4000 Transceiver or DELNI and a transceiver cable that you must order separately.

Supports LSI-11 or Q-BUS based CPUs: PDP-11/03, PDP-11/23A, PDP-11/23-PLUS, PDP-11/23S, and Micro PDP-11 with DECnet Phase IV software.

Digital Ethernet Repeater

The Ethernet Repeater (DEREP), a tabletop, stand-alone device with its own power supply, allows connection of multiple segments of Ethernet coaxial cable for extension of the network. The local repeater extends the Ethernet for 500 meters per repeater while the remote repeater extends the Ethernet for an additional 1,000 meters per repeater. (1,024 devices are supported by DECnet Phase IV.) The repeater retimes, amplifies, and repeats all signals it receives from one segment to the other segment. Both the local and the remote repeater are connected to the Ethernet via two H4000 transceivers and two transceiver cables. The remote (fiber-optic) repeater consists of two local repeaters each with a fiber-optic interface board. The fiber-optic link is an option and will be available through the DECdirect Catalog.



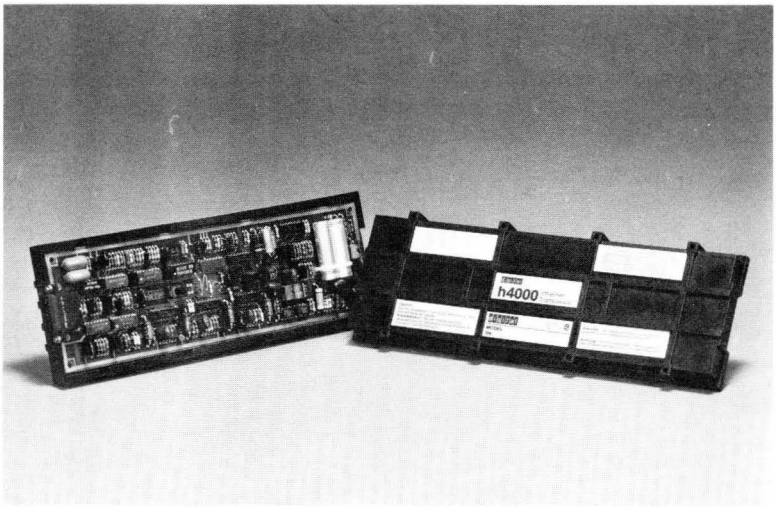
Ethernet Repeater Specifications	
Physical Description	
Length	43.2 cm (17 in.)
Width	30.5 cm (12 in.)
Height	8.9 cm (3.5 in.)
Operating Requirements	
Data rate	10 Mbits per second
Maximum number of repeaters	2 between communicating devices and 100 per 500 meter coaxial cable segment.
Electrical Requirements	
Switch-selectable	110 VAC @ 60 Hz and 220 VAC @ 50 Hz
Power supply board transceiver power	2.5A @ 12 VDC
Environmental Requirements	
Temperature range	5° to 50°C (41° to 122°F)
Relative Humidity	10% to 90% (no condensation)
Hardware Requirements	2 H4000 transceivers and 2 transceiver cables.

Ethernet Repeater Ordering Information	
DEREP-AA	Local Repeater-U.S.

H4000 Digital Ethernet Transceiver

The H4000 DIGITAL Ethernet transceiver is a device which provides the functional interface between the Ethernet coaxial cable and an Ethernet station. The H4000 transmits signals onto the coaxial cable, receives signals from the cable, and detects any message collisions that may occur. It provides electrical isolation and high impedance to the coaxial cable.

The transceiver consists of a small printed circuit board contained in a rugged, compact plastic housing. The plastic housing contains a non-intrusive cable tapping assembly which is used for making the actual physical connection to the Ethernet coaxial cable.



H4000 Specifications	
Performance	
Operating mode	Capable of simultaneous transmission and reception (CSMA/CD)
Data rate	10 Mbits/sec
Network specifications	100 stations per 500 m segment 1024 stations (maximum)
RFI and EMI	The H4000 is U.L. Listed in the Data Processing category and meets FCC 47 CFE, Part 15, Subpart J.
Coaxial Cable Interface	Operationally complies with Ethernet Specification.
Transceiver Cable Interface	
Connector type	164493-1 15-pin D Sub-miniature

Pin Assignment		
	+	−
Transmit pair	3	10
Receive pair	5	12
Collision pair	2	9
Power pair	13	6
Shield	1 plus the connector shell	
Termination impedance (differential)	76.6 ohms (with less than 2% common mode inbalance)	
Termination impedance (common mode)	greater than 100 ohms	
Signal level differential	±630 mV nominal	
Common mode range	±30 V	
Power requirement voltage at transceiver	11.4–15.75 V through 4 ohm maximum	
Current (maximum)	0.5 A	
Typical @ 12 V	0.35 A	
Physical Description		
Length	30.2 cm (11.9 in.)	
Width	9.5 cm (3.74 in.)	
Height	9.0 cm (3.54 in.)	
Operating Environment		
Temperature	5° to 50°C (41° to 122°F)	
Relative humidity	10 to 90% (no condensation)	
Wet bulb temperature	32°C (90°F) max.	
Dew point temperature	2°C (36°F) min.	
Altitude	sea level to 2.4 km (8,000 ft)	
Shipping Environment		
Temperature	−40° to 50°C (−40° to 151°F)	
Relative humidity	0 to 95% (no condensation)	
Altitude	sea level to 9 km (30,000 ft)	
Ethernet Coaxial Cables*	It is recommended that TEFLON coaxial cable be used. BNE2A (or equivalent)	
Transceiver Cables		
BNE3A	Low loss PVC jacket	
BNE3C	Low loss TEFLON jacket	

H4000 Ordering Information	
H4000	H4000 Digital Ethernet Transceiver

Terminal Servers

Terminal Servers are Ethernet Communications Server systems that provide a convenient, host-operating-system-independent method to logically connect Digital terminals to hosts on an Ethernet. Additionally, terminals connected to these servers can logically connect to remote DECnet nodes.

A Terminal Server operating in conjunction with a Phase IV DECnet host provides a fully supported network virtual terminal capability as a standard Phase IV DECnet feature.

Prerequisite Hardware

The Terminal Server software runs on either of the following Ethernet Communications Server hardware options:

- DECSA-CA—Ethernet Communications Server hardware, including eight asynchronous line cards (supports 16 EIA RS-232-C/CCITT V.24 physical terminal connections).
- DECSA-DA—Ethernet Communications Server hardware, including 16 asynchronous line cards (supports 32 EIA RS-232-C/CCITT V.24 physical terminal connections).

In addition, the following hardware is required:

- All Ethernet physical channel hardware (for example, coaxial cable and terminators).
- An H4000 transceiver or an LNI and transceiver cable.

Prerequisite Software

The Terminal Server requires a Phase IV DECnet host to support downline software loading. One or more of the following systems may be used as Ethernet hosts.

- VAX/VMS running DECnet-VAX (Phase IV).
- RSX-11M or RSX-11M-PLUS running DECnet-11M (Phase IV) or DECnet-11M-PLUS (Phase IV).

Phase IV DECnet must include the requisite network virtual terminal support for communication with Terminal Servers.

Terminal Server Specifications	
Operating Environment	
Temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	10%–90% (noncondensing)
Maximum altitude	2.4 km (8,000 ft)
Nonoperating Environment	
Temperature	−40 to +66°C (−40 to +151°F)
Relative humidity	0%–95% (noncondensing)
Maximum altitude	9.1 km (30,000 ft)
Acoustic Noise Emissions	
Sound power	5.8 bels
Sound pressure level	42 dBA (at 1 m distance, 1.5 m height)
Physical Description	
Height	41.9 cm (16.5 in.)
Width	64.8 cm (25.5 in.)
Depth	55.9 cm (22.0 in.)
Weight	16-line Terminal Server— 39.9 kg (88 lbs) without line cards 32-line Terminal Server— 49.9 kg (110 lbs) without line cards
Power and Heat Dissipation	
Line voltage tolerance	
Low range	120 VAC nominal 90–128 (rms) single phase three wire
High range	240 VAC nominal 180–256 (rms) single phase three wire
Line current	
120 VAC	7.0 A
240 VAC	3.5 A
Frequency tolerance	47–63 Hz
For 16-line Terminal Server Max. heat dissipation Max. AC power consumption	 1,417 Btu/h 411 W
For 32-line Terminal Server Max. heat dissipation Max. AC power consumption	 2,245 Btu/h 650 W

Terminal Server Ordering Information

Server Type	Hardware Model No.	Load Host Software Model No. VAX/VMS	RSX-11M	RSX-11M-PLUS
16-line Terminal Server	DECSA-CA	Q x 726	QP726	QP726
32-line Terminal Server	DECSA-DA	Q x 726	QP726	QP726

The suffix for the software model number denotes, first, the license/support category and, second, the distribution media.

Load Host Software Model No.	License/support Category	Distribution Media
Q_____-AM	Single use, with support	1600 bpi, 9TR mag tape
Q_____-AH	Single use, with support	RL02 disk
QLA01-DZ	Right-to-copy, no support	—
Q_____-HM	Update: binary kit, no support	1600 bpi, 9TR mag tape
Q_____-HH	Update: binary kit, no support	RL02 disk
Q_____-HZ	Update: right-to-copy, no support	—

When ordering software for a Server system:

1. The first Server of any type requires a Q_____-AH/AM license: Single Use, With Support.
2. The second (third, fourth, . . .) Server of that *same* type may be a QLA01-DZ license: Right-To-Copy, No Support.
3. When warranty has expired and software updates are available for a particular type of Server system,
   a. order a Q_____-HH/HM license for the first Server of that type, and
   b. order a Q_____-HZ license for the second (third, fourth, . . .) Server of that *same* type.
4. If the load host is a VAX-11/730, designate only RL02 (−xH) as the distribution medium.

VAX BTS, Bisync Terminal Support

Description

VAX BTS enables VAX/VMS systems to host blockmode, synchronous terminals using the Binary Synchronous Communications (BSC) protocol. The specific target terminal used for development is the Teletype Corporation's Dataspeed 4541-1 (the bisync member of the Dataspeed 4540 family) and the Teletype Model 40 printer. Badge readers and light pens are not supported. Other blockmode, synchronous terminals and printers (eg. IBM 3271-2/3277, IBM 3274-XC/3278, IBM 3284, etc) are also supported where their functionality is identical to the Teletype Dataspeed 4541-1 and the Model 40 printer. Based on VMS, it addresses three complimentary environments.

The command mode portion allows a blockmode, synchronous terminal to log onto VMS as a hardcopy device. In this environment, the user can develop applications using VMS, VMS tools and any VMS layered product that can communicate with a hardcopy terminal. The user can also execute these applications on the VAX/VMS system from these terminals.

The Forms Management System (FMS) interface permits these terminals to interact with the FMS Forms Driver (FDV). Forms may be created with the FMS editor (FED) from a VT100 for use on the blockmode, synchronous terminal provided the specific considerations for that terminal are followed. A form may be defined in a Forms Definition Language, translated into binary format description (BFD) and stored in the FMS utility (FUT). Within the unique terminal constraints both VT100's and blockmode, synchronous terminals may mix forms use as desired.

The passthrough facility will allow a blockmode, synchronous terminal to establish a link to an IBM compatible mainframe through VAX 3271 Protocol Emulator (PE). In this mode of operation, the terminal is effectively connected directly to the mainframe system and the VAX/VMS system is transparent to the terminal user and the IBM host CPU.

Architecture

VAX BTS includes six major submodules. The first is the microcode that is loaded into the KMS11-BD, Front End Processor. This microcode supports the Binary Synchronous Communications (BSC) protocol (ANSI Standard X3.28-1971 sub 2.4 and sub B2 plus RV1 and WACK). This microcode allows the KMS11 to address up to 32 devices on each of its eight communications lines (not all concurrently).

The second major submodule is the BTS Port Driver. This driver controls the data link and the port device interface to the KMS11. It processes Input/Output requests to the KMS11 front end processor.

The next major submodule is the BTS Class Driver. This driver controls the bisync terminal and provides Input/Output for the terminal.

The fourth major submodule is the BTS System Manager Utility. It is to be used by the VAX/VMS system manager to control the bisync terminal-to-VAX interface. It has the following functionality:

- Validation of BTS system installation, configuration, and operation
- Configuration of the BTS system
- Starting and stopping VAX-to-Bisync terminal lines
- Monitoring system activity and current configuration

The next major submodule of BTS is the BTS Forms Driver (BTS/FDV). BTS/FDV allows VAX FMS, the Forms Management System, to display forms on the Bisync terminals. BTS/FDV also verifies forms created on other terminals to ensure that they can be displayed on the Bisync terminal.

The sixth major submodule is the BTS Passthrough module, BTSLNK. This module resides on the VAX and is invoked by a Bisync terminal operator. BTSLNK passes data through the VAX between the Bisync terminal and the IBM compatible host. This module interfaces with VAX 3271 PE to complete the connection. The VAX/VMS system is transparent to the terminal user until the special key is used to terminate the passthrough operation. It is the responsibility of the Bisync terminal operator to properly logoff the application on the IBM compatible host.

Operation

While the Bisync terminal is operating as a VAX/VMS terminal, the user can do any operation that any hardcopy device could do on VMS. Any application or VMS layered product which supports a hardcopy device will run on the Bisync terminal without modification. Use of special function keys in the VMS environment is defined in the BTS Users Guide.

While the Bisync terminal is operating in the Passthrough mode, any application on the IBM-compatible host that supports that terminal will run without modification. VAX BTS does not interpret the datastream passing through the VAX except to detect the special key to terminate the passthrough operation.

VAX FMS and 3271 PE are unchanged as far as other VAX terminals (eg VT100) and products are concerned. The full functionality of FMS is available to the system. Capabilities of VAX 3271 PE which permit VAX/VMS applications to interact with IBM-compatible host applications and the terminal emulation functions operate unchanged.

Minimum Hardware Required

Any valid VAX/VMS system configuration with at least one megabyte of memory plus:

- At least one KMS11-BD/BE for communications lines to the Bisync terminal
- Bell 208, 209, or equivalent modems for each terminal and IBM-compatible host communications line
- A DUP11-DA for each IBM-compatible host line

- 2400 blocks of disk space are required for installation of this product
- Approximately 37 Kbytes of non-paged memory are used by this software product which includes 8 Kbytes to store the KMS11 microcode to support powerfail recovery. In addition, 500 bytes are required for each Bisync line and 250 bytes for each Bisync terminal.

VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

- Up to three additional KMS11-BD/BE's on VAX-11/780
- One additional KMS11-BD/BE on VAX-11/750

Prerequisite Software

VAX/VMS Operating System

VAX FMS, Version 2 for forms application

VAX 3271 PE, Version 2 for Passthrough operation

Optional Software

None

Training Credits

None

Support Category

Digital Supported

Software Installation

Customer Installed

Software Product Support

VAX BTS includes standard warranty services.

Customer Responsibilities

Before installation of the software, the customer must

- Previously have installed all requisite hardware including terminals
- Obtain, install, and demonstrate as operational any modems and other equipment and facilities necessary to interface to Digital's communication equipment
- Demonstrate equivalency of operation for modems other than Bell 208, 209 type modems or, in Europe, PTT approved modems
- Make available for a reasonable period of time, as mutually agreed by DIGITAL and the customer, all hardware, communication facilities, and terminals that are to be used during installation. Delays caused by any failure to meet these responsibilities will be charged at the prevailing rate for time and materials.

VAX BTS, Bisync Terminal Support Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
VAX BTS, Single-use license, binaries, documentation, support services.	QC416-AG	QD416-AG	QE416-AY
VAX BTS Single-use license, no binaries, no documentation, no support services.	QC416-DZ	QD416-DZ	QE416-DZ
Right to copy for single-use, no binaries, no documentation	QC416-HZ	QD416-HZ	QE416-HZ
Miscellaneous Options Documentation-only kits	QC416-GZ	QD416-GZ	QE416-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD800-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX PSI, Packetnet System Interface

Description

VAX PSI allows a suitably configured VAX/VMS system to connect to Public Packet Switching Networks (PPSN) conforming to the CCITT recommendation X.25. (June 1980). VAX PSI supports access for VAX/VMS user programs written in VAX MACRO and native mode high-level languages, for example, VAX FORTRAN. Programs executing in PDP-11 compatibility mode cannot use VAX PSI. VAX PSI supports process-to-process and terminal communications via the network.

VAX PSI is a layered product on VAX/VMS. VAX PSI allows the use of DECnet-VAX facilities over X.25 circuits in addition to DECnet's support for private leased lines or switched telephone networks. A DECnet-VAX license is required to communicate with other DECnet nodes over X.25.

Process-to-Process Communication

For process-to-process communication, application programs use VAX/VMS System Services to set up and break connections with the network, to send and receive data, and to issue control and synchronization requests.

Terminal Communications

Using the VAX PSI Packet Assembly/Disassembly (PAD) facility, terminals connected locally to the VAX/VMS system may communicate with remote hosts on the network.

The VAX PSI X.29 Interactive Terminal Interface allows remote asynchronous terminals connected to the network to communicate with the VAX/VMS system as though they were local terminals. (There may be some restrictions imposed by the network itself.)

Virtual Circuits

VAX PSI offers communication over both Permanent and Switched Virtual Circuits (PVC and SVC), and supports up to 255 virtual circuits in total. The maximum number of terminals supported (both local and remote) must not exceed that supported by VAX/VMS; however, note that each remote terminal uses a virtual circuit. VAX PSI allows up to two physical connections to the PPSN; each line has a unique Data Terminal Equipment (DTE) address, but must have the same subscription-time options for maximum and default packet and window sizes, membership of closed user groups and connect-time facilities.

Line Discipline

VAX PSI uses the CCITT recommendation X.25 as the communications discipline. Specifically, the product supports V.24 (EIA—RS232) and V.35 (EIA—RS423) at the hardware level, the symmetric LAPB variant of the X.25 frame level protocol and the X.25 packet level protocol over point-to-point, 4-wire, synchronous, full-duplex lines at transmission rates up to 64 Kbits per second.

User Program Interface

VAX PSI provides an interface which allows application programs to use the X.25 functions, including setting up and breaking connections, transmitting and receiving data, sending and receiving interrupt messages, and resetting virtual circuits. This interface, in addition to CCITT X.25 level 3 functions, provides for splitting and recombination of messages which are longer than the packet size selected for the circuit. However, the interface does not provide national extensions that are not part of the international recommendations; for example, it does not include file transfer, file access or process addressing.

The interface allows an application program to communicate with any other system connected to the network (Digital or non-Digital). Additionally the interface conforms to the Digital Network Architecture specification for X.25 access.

Interactive Terminal Interface

VAX PSI supports terminal communications according to CCITT recommendations X.3, X.28, and X.29. Locally connected terminals, through use of the Host-Based PAD utility program may connect to remote hosts in a manner analogous to that for PADs provided by the network.

VAX PSI supports remote X.29 terminals connected through PADs (either network or host-based); the network PAD performs code conversions between ASCII and the code the terminal uses.

The interface an X.29 terminal uses is compatible with the interface a local terminal uses, except for those facilities where the network does not provide adequate support. For example, the PAD support for data forwarding upon input of an escape sequence is not compatible with that required by Digital standard software. This means that FMS and some of the screen editors may not function as expected unless the PAD is set up in a cost-ineffective way. VAX PSI provides additional facilities which allow a program to manipulate the terminal parameters maintained by the PAD.

Network Management

VAX/VMS provides a Network Control Program for the control of the operation of the X.25 software. This program provides Network Management facilities to load the software, define the lines and network to which the system is connected, specify addressing information for incoming calls, access error counters and perform other maintenance functions. These facilities provide a subset of the Digital Network Architecture specification for Network Management.

Communications

The table below shows the types of communications interface VAX PSI supports. They differ in many respects, particularly in their effect upon CPU utilization.

- The DUP11 is a character interrupt device where CPU cycles are required for X.25 packet and frame level protocol processing and also for each character sent and received.
- The KMS11 products are medium speed DMA devices. The KMS11 communications controller executes character transmission and reception and X.25 frame level protocol (LAPB) processing in microcode. The VAX CPU then processes only the X.25 packet level protocol.

Device	Maximum Type (Kbits/sec)	Maximum Line Speed (Kbits/sec)	Bandwidth
DUP11	Character	9.6	19.2
KMS11-BD/E	DMA	19.2	38.4
KMS11-PX	DMA	19.2	38.4
KMS11-PY	DMA	64.0	128.0

NOTE: This table describes the physical hardware configurations that VAX PSI supports. Note that attaching such devices as A/D converters and timesharing terminals can reduce the maximum number of lines or bandwidth that can be supported. The table shows rated bandwidth for each device type used singly.

Documentation

PPSN specific information is included for the following networks:

DATEX-P

Datanet 1

PSS

Telenet

Transpac

Network specific information on other supported networks is available in the country of origin.

Minimum Hardware Required

Any valid VAX/VMS system configuration with:

- At least 80 Kbytes of nonpaged memory for the VAX PSI software and data storage.
- At least 20 Kbytes of nonpaged memory for the VAX PSI X.29 software and data storage, if required.
- Further nonpaged memory for each virtual circuit, calculated as:

  <windowsize> * <packetsize + 96> *2 + 700 bytes

  which is charged to the quota of the using process

- At least 2000 blocks of system disk space for the use of the VAX PSI software.
- One of the following communications devices supporting one line: DUP11-DA, KMS11-BD, KMS11-BE, KMS11-PX or KMS11-PY (KMS11-BD,-BE not supported on VAX-11/730)

NOTE: Systems using VAX PSI require at least 512 Kbytes of physical memory.

For PTT certification purposes, the combination of KMS11-BD/BE or -PX/PY controller hardware and the X.25 level 2 microcode (supplied as part of the VAX PSI product) is known as the KMX11.

Optional Hardware

One additional supported communications device

Prerequisite Software

VAX/VMS Operating System

Optional Software

DECnet-VAX, Version 3.0

Training Credits

None

Software Installation

Digital Installed

Support Category

Digital Supported

Warranty

None

Customer Responsibilities

Before installation of the software, the customer must

- Previously have installed all requisite hardware including terminals
- Obtain, install, and demonstrate as operational any modems and other equipment and facilities necessary to interface to Digital's communication equipment
- Make available for a reasonable period of time, as mutually agreed by Digital and the customer, all hardware, communication facilities, and terminals that are to be used during installation
- The network verification part of this installation procedure requires that the customer subscribes to the Open User Group and to at least one Switched Virtual Circuit. Systems with exclusively Closed User Group membership, or Permanent Virtual Circuits only, require specially negotiated arrangements for Digital installation of this product.

Delays caused by any failure to meet these responsibilities will be charged at Digital's then prevailing rate for time and materials.

Prerequisite Support

The customer and Digital must jointly prepare a Network Profile and Customer Support Plan covering all the intended network nodes, their usage of PVCs and SVCs and other network facilities, and their support.

VAX PSI, Packetnet System Interface Ordering Information

Options	System		
	VAX-11/730	VAX-11/750	VAX-11/780 & VAX-11/782**
Single-use license, binaries, documentation, support services.	QC071-AG	QD071-AG	QE071-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC071-DZ	QD071-DZ	QE071-DZ
Update/Unsupported Options Users of VAX PSI whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC071-HG	QD071-HG	QE071-HY
Right to copy for single-use, no binaries, no documentation	QC071-HZ	QD071-HZ	QE071-HZ
Miscellaneous Options			
Documentation-only kits	QC071-GZ	QD071-GZ	QE071-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD071-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
Y = RX01 Single Density 8″ Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

The X.25 Communications Protocol

While the Ethernet protocol helps establish flexible and efficient LANs, the X.25 communications protocol, also incorporated into DNA, helps reduce the cost of communications among geographically-distributed systems and networks. X.25, rapidly becoming the standard international low-level communications protocol, was developed by the International Telephone and Telegraph Consultative Committee (CCITT) in the 1970s. X.25 is a series of recommendations for standard communications protocols that could be used by common carriers to provide data communications services. It defines the interface of computers to packet-switched data networks (PSDNs). In the United States, PSDNs are privately owned. In other countries, they are often owned and operated by the national telecommunications authorities.

Digital also offers Packetnet System Interfaces (PSIs) that extend the high-level DECnet functions of DNA to computer systems communicating across PSDNs. The currently available PSI products are VAX PSI, RSX-11 PSI, and the TOPS-20 PSI Gateway. These interfaces allow suitably configured Digital systems running either VAX/VMS, RSX-11, or TOPS-20 to connect to PSDNs that conform to the CCITT recommendation X.25 (June 1980). Countries in which Digital's PSIs are currently supported include the United States, Canada, France, the United Kingdom, Germany, Switzerland, and Holland. Note that all three Digital PSI products are not supported in all seven countries. Digital's PSI products can also be field-configured to support other X.25-compatible networks, for future expansion as well as for private-company network support.

Prerequisite Hardware

The DECnet Router/X.25 Gateway software runs on the following Ethernet Communications Server hardware option: DECSA-EA—Ethernet Communications Server hardware, including a one-line synchronous line card (EIA RS-232-C/CCITT V.24, speeds up to 19.2 Kbits per second, full duplex). Up to seven additional lines (EIA RS-232-C/CCITT V.24 or CCITT V.35) can be supported on the DECnet Router.X.25 Gateway.

The DECnet/SNA Gateway hardware and software are combined under a single option designation: DECSA-AH/AM/DZ—Ethernet Communications Server hardware, including a one-line synchronous line card (EIA RS-232-C/CCITT V.24), and gateway software. One additional EIA RS-232-C/CCITT V.24 line can be supported on the DECnet/SNA Gateway. In addition, the following hardware is required:

- All Ethernet physical channel hardware (for example, coaxial cable and terminators).
- An H4000 transceiver or an LNI and transceiver cable.

Prerequisite Software

The DECnet Router/X.25 Gateway and the DECnet/SNA Gateway require

Phase IV DECnet host support on one or more of the following Ethernet hosts for downline loading the software into the unit.

- VAX/VMS running DECnet-VAX (Phase IV).
- RSX-11M or RSX-11M-PLUS running DECnet-11M (Phase IV) or DECnet-11M-PLUS (Phase IV).

The DECnet Router/X.25 Gateway and the DECnet/SNA Gateway can be easily installed by customers. Since the configuration of each server is bounded, installation of the software requires only answering questions about line configurations and operation, as is done for communications lines connected to host systems. A copy of this configuration file resides on one or more designated "load hosts," so that the memory-only server can be easily reconfigured.

X.25 Gateway Router Specifications	
Operating Environment	
Temperature	+10 to +40°C (+50 to +104°F)
Relative humidity	10%–90% (non-condensing)
Maximum altitude	2.4 km (8,000 ft)
Nonoperating Environment	
Temperature	−40 to +66°C (−40 to +151°F)
Relative humidity	0%–95% (noncondensing)
Maximum altitude	9.1 km (30,000 ft)
Acoustic Noise Emissions	
Sound power	5.8 bels
Sound pressure level	42 dBA (at 1 m distance, 1.5 m height)
Physical Description	
Height	41.9 cm (16.5 in)
Width	64.8 cm (25.5 in)
Depth	55.9 cm (22.0 in)
Weight	39.9 kg (88 lbs) without line cards
Power and Heat Dissipation	
Line voltage tolerance	
Low range	120 VAC nominal 90–128 (rms) single phase three wire
High range	240 VAC nominal 180–256 (rms) single phase three wire
Line current	
120 VAC	7.0 A
240 VAC	3.5 A
Frequency tolerance	47–63 Hz
Max. heat dissipation	1,417 Btu/h
Max. AC power consumption	411 W

X.25 Gateway Ordering Information

The DECnet Router/X.25 Gateway consists of three elements:

- The Server hardware, DECSA-EA, a freestanding unit with one DCSAX-LA synchronous line card (RS232-C/V.24).
- The DECnet Router/X.25 Gateway software, Q*727-A, which is down-line loaded into the Server (Gateway) from a VAX/VMS or RSX-11M/M-PLUS DECnet host on the Ethernet.
- The X.25/X.29 Extension Package, Q*728-A, which contains the host system access routines required to take advantage of the X.25 Gateway in VAX-11 to non-DECnet system (or X.29 terminal) situations.

Server Type	Hardware Model No.	Load Host Software Model No. VAX/VMS	RSX-11M	RSX-11M-PLUS
1-line DECnet Router/X.25 Gateway	DECSA-EA	Q x 727	QP727	QR727

The suffix for the software model number denotes, first, the license/support category and, second, the distribution media.

Load Host Software Model No.	License/support Category	Distribution Media
Q_____-AM	Single use, with support	1600 bpl, 9TR mag tape
Q_____-AH	Single use, with support	RL02 disk
QLA01-DZ	Right-to-copy, no support	—
Q_____-HM	Update: binary kit, no support	1600 bpl, 9TR mag tape
Q_____-HH	Update: binary kit, no support	RL02 disk
Q_____-HZ	Update: right-to-copy, no support	—

When ordering software for a Server system:

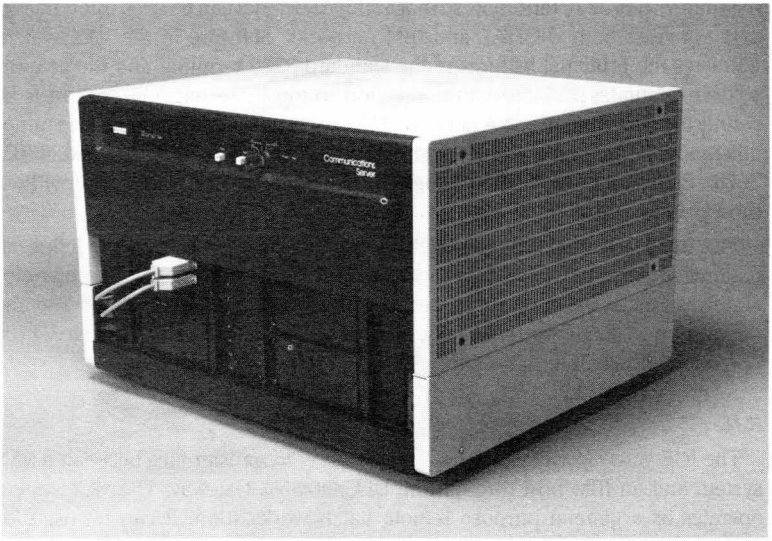
1. The first Server of any type requires a Q_____-AH/AM license: Single Use, With Support.
2. The second (third, fourth, . . .) Server of that *same* type may be a QLA01-DZ license: Right-To-Copy, No Support.
3. When warranty has expired and software updates are available for a particular type of Server system,
   a. order a Q_____-HH/HM license for the first Server of that type, and
   b. order a Q_____-HZ license for the second (third, fourth, . . .) Server of that *same* type.
4. If the load host is a VAX-11/730, designate only RL02(-xH) as the distribution medium.

SNA Gateway

DIGITAL offers a full range of VAX-to-IBM internet products for cross-vendor cooperative computing applications that span centralized and distributed processing environments. Using these products, VAX systems in DECnet networks performing such applications as electronic mail, word processing, and distributed information processing can communicate freely with IBM systems doing centralized data processing and data base-type functions.

Emulation of the 3270 terminal, Remote Job Entry (RJE), and program-to-program communications for both SNA and bisync protocols are all supported. Comprehensive installation, troubleshooting, and network-control facilities help minimize the problems of bringing up and maintaining effective internetwork operations.

There are three principal VAX-to-IBM internet product packages. The first, the DECnet/SNA Gateway, implements SNA protocols and is used with the appropriate VAX gateway-access software to perform 3270 terminal emulation, RJE, and program-to-program communication. The second, the VAX 3271 Protocol Emulator, implements the 3270 bisync protocol for both 3270 terminal emulation and program-to-program communication. Finally, the VAX 2780/3780 product emulates IBM 2780 and 3780 bisync protocols for remote-batch, file-transfer operations. The latter two are described separately.



The DECnet/SNA Gateway

The DECnet/SNA Gateway is a special-purpose, hardware/software communications system designed for remote unattended operation. The gateway consists of a dedicated PDP-11 system packaged with gateway software, a floppy-disk drive for program loading, and a system console. VAX systems use gateway-access software to communicate with the gateway and perform the functions of 3270 terminal emulation, program-to-program data exchange, RJE file transfer, and network management. VAX-to-gateway communication uses standard DECnet; gateway-to-IBM communication uses emulations of the appropriate SNA protocols.

The 3270 terminal emulation and program-to-program facilities of the gateway support communications with IMS or CICS. The gateway RJE facility supports communication with any IBM system running JES2 or JES3 host software. To the IBM host system, the gateway appears as an 8100 Physical Unit Type 2.

The 3270 terminal emulation and RJE functions are operator-driven and require no user programming. The program-to-program facility provides a rich variety of high-level subroutine calls intended for use by applications programmers with a knowledge of SNA interprogram communications features.

3270 Terminal Emulation

The 3270 Terminal Emulator gateway-access software transforms VT100 terminals into virtual 3270 terminals so that a single terminal can be used interchangeably to access both DIGITAL and IBM networks. Software in the VAX system emulates the principal features of the standard 3270 terminal and the gateway software emulates the 3270 communication protocol. The terminal appears to be connected directly to the SNA network. Most users will adapt quickly to the minor differences between the VT100 terminal used as an emulator and an actual IBM 3270. Preexisting application programs will operate in most cases without modification.

The 3270 Terminal Emulator allows the system manager to predefine all parameters required to connect to specified IBM applications. The operator simply supplies an application name when invoking the emulator and the connection is made automatically. Returning the terminal to normal VT100 operation after an internet session requires just a single keystroke.

RJE

The RJE gateway-access software allows users to transfer files between a VAX system and an IBM host through the DECnet/SNA Gateway. The VAX system operates as a general purpose remote batch workstation. It can be used for submitting standard remote batch jobs such as program compilation and for special-purpose functions such as periodic database update.

Multiple input and output data streams can operate concurrently. Files received are stored as successive versions of destination files assigned to each output data

stream. A special feature allows a user to specify particular filenames for output files when required. The software will search for a comment card in the output and rename the file as specified.

Program-to-Program Communication

Gateway-access software for program-to-program communication allows a program in a DECnet/VAX node to operate in close cooperation with an application program in an IBM host running IMS or CICS. This facility is particularly useful in online DB/DC (database/data communications) applications in which the VAX program can be used to perform extensive data preprocessing functions.

The User Application Interface can be called from any VAX/VMS language that conforms to the VAX calling standard. SNA sessions can be initiated by either the VAX or IBM system. Interface functions are very general, allowing almost any feature of the SNA Session Layer to be used by the cooperating programs. The gateway performs such lower-level SNA functions as Path and Data Link control. The VAX application is responsible for such upper-level functions as Logical Unit presentation services, Data Flow, and Transmission Control functions.

Network Management

Gateway-access software for Network Management is required for all VAX systems running other gateway-access modules. The Network Management software provides for the control, monitoring, and troubleshooting of the gateway itself, VAX-to-gateway communications, and gateway-to-IBM communications.

Control functions include bootstrap-loading the gateway and initializing node and circuit counters. Monitoring functions include status reporting and the maintenance of traffic and error counters. There are three powerful troubleshooting utilities: the loopback testing utility, the SNA line trace facility, and the crash dump analyzer. The loopback testing utility can be used for both SDLC and DDCMP lines. The SNA line trace facility allows all gateway/SNA network traffic to be transmitted to a connected VAX node. The crash dump analyzer is used to interpret upline dumps of gateway memory.

SNA Gateway Ordering Information

The DECnet/SNA Gateway includes both hardware and software. The DECnet/SNA software is downline loaded into the Gateway from a VAX/VMS system.

There are three order numbers for this Gateway.

DECSA-AH	Software on RL02 disk media
DECSA-AM	Software on 1600 bits/in., 9 track magnetic tape media
DECSA-DZ	No software, but license to copy current software

The DECnet/SNA Gateway hardware includes one DCSAX-LA EIA synchronous line card, but the software can support up to two line cards. You can add one additional DCSAX-LA synchronous line card.

Cables To connect the Gateway to the SNA Network, order BC17D null modem cables for local connections and BC17C EIA extension cables for remote connections.

SNA Access Routines SNA access routines are software packages that allow VAX system users to perform specific functions on IBM equipment connected to the SNA network. Four access routines are available: Gateway Management, Remote Job Entry (RJE), 3270 Terminal Emulation, and Application Interface.

SNA Access Routines

VAX-11/730	VAX-11/750	VAX-11/780 VAX-11/782	
Gateway Management			
QC452-AG	QD452-AG	QE452-AY	Single-use license, binaries, documentation, support services
QC452-DZ	QD452-DZ	QE452-DZ	Single-use license
QC452-HG	QD452-HG	QE452-HG	Update/unsupported options
QC452-HZ	QD452-HZ	QE452-HZ	Right to copy—single use
QC452-GZ	QD452-GZ	QE452-GZ	Documentation kit
Remote Job Entry			
QC453-AG	QD453-AG	QE453-AY	Single-use license, binaries, documentation, support services
QC453-DZ	QD453-DZ	QE453-DZ	Single-use license
QC453-HG	QD453-HG	QE453-HG	Update/unsupported options
QC453-HZ	QD453-HZ	QE453-HZ	Right to copy—single use
QC453-GZ	QD453-GZ	QE453-GZ	Documentation kit
Application Interface			
QC455-AG	QD455-AG	QE455-AY	Single-use license, binaries, documentation, support services
QC455-DZ	QD455-DZ	QE455-DZ	Single-use license
QC455-HG	QD455-HG	QE455-HG	Update/unsupported options
QC455-HZ	QD455-HZ	QE455-HZ	Right to copy—single use
QC455-GZ	QD455-GZ	QE455-GZ	Documentation kit

VAX 2780/3780 Protocol Emulator

Description

VAX 2780/3780 Protocol Emulator (PE) emulates the synchronous line protocol used by a 2780 or a 3780 Remote Batch Terminal. The emulator provides the VAX/VMS user with a mechanism for transferring data between the VAX/VMS Operating System and another system equipped to handle 2780 or 3780 communications protocols.

The emulator can be invoked interactively or by a command procedure. The emulator's command set is designed to facilitate sharing of a communication line among several users. With the appropriate modem options, the emulator is capable of automatically answering incoming calls.

Sophisticated operations can be performed by a combination of command procedures, allowing for example, unattended operation. This would include the capability of detecting an incoming call, establishing the connection, and then transmitting and receiving files and recovering from transmission failures, all without the intervention of the operator.

Several data formats are supported with the use of a particular format selected via user command. Users can select various forms control translation schemes, variable length records, or card images, ASCII/EBC-DIC translation, and BSC transparency. All file I/O is performed through the VAX/VMS record management facility. Print and punch stream recognition is implemented in such a way that the data manipulation scheme can differ with each stream.

The following IBM remote batch terminal features are supported:

- 2780 Extended and Multiple Record Option
- Variable Horizontal Forms Control
- BSC Transparency
- 3780 Space Compression

The product can concurrently run up to four physical lines, each with a different set of attributes e.g., some can be 2780, the others 3780, at speeds up to 9600 bps per line.

Minimum Hardware Required

Any valid VAX-11/730, VAX-11/750, or VAX-11/780 system configuration with a DUP-11.

VAX-11/730 Systems

An R80/RL02 configuration is required for VAX-11/730 systems.

Optional Hardware

- Up to three additional DUP-11s for VAX-11/780
- One additional DUP-11 for VAX-11/750

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Software Installation

Digital Installed

Support Category

Digital Supported

Customer Responsibilities

Before installation of the software, the customer must

- Previously have installed all requisite hardware including terminals
- Obtain, install, and demonstrate as operational any modems and other equipment and facilities necessary to interface to Digital's communication equipment
- Demonstrate equivalency of operation for modems other than Bell 201, 208, and 209, or in Europe, PTT approved modems
- Provide a relevant file or job that can be submitted to the remote system to facilitate installation verification of the software
- Make available for a reasonable period of time, as mutually agreed by Digital and the customer, all hardware, communication facilities, and terminals that are to be used during installation
- Customer accepts responsibility for proper operation of equipment or software not provided by Digital and conformance of such equipment and software to the IBM specifications cited below.

Warranty Limitations

Digital has designed this software according to the specifications for IBM 2780 and 3780 data transmission terminals as defined in IBM documents GA27-3005 and GA27-3063, respectively.

This software is primarily meant to function with IBM OS/VS2 JES2. While this software may function correctly with other equipment and software, Digital cannot offer its standard warranty for this software unless it has been tested with such equipment and software configuration and found acceptable to Digital.

Since the introduction of this product, other configurations may have been tested. Please contact your local Digital office for more information.

VAX 2780/3780 Protocol Emulator Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780**
Single-use license, binaries, documentation, support services.	QC111-AG	QD111-AG	QE111-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC111-DZ	QD111-DZ	QE111-DZ
Sources license, sources, no support services	QC111-EH	QD111-EM	QE111-EM
Sources license, listings, no support services	QC111-FR	QD111-FR	QE111-FR
Update/Unsupported Options Users of VAX 2780/3780 PE whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a binary, single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC111-HG	QD111-HG	QE111-HY
Right to copy for single-use, no binaries, no documentation	QC111-HZ	QD111-HZ	QE111-HZ
Sources/Listings Update Options The following options are available to licensed users as updates to sources and/or listings options. The update is distributed in source form on the appropriate medium and includes no installation or other services unless specifically stated.	QC111-NH	QD111-NM	QE111-NM
Miscellaneous Options Documentation-only kits	QC111-GZ	QD111-GZ	QE111-GZ

The following key (G, H, M, R, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD111-AG = binaries on TU58 DECtape II Cartridge.*

G = TU58 DECtape II Cartridge*
H = RL02 Disk Cartridge
M = 9-track 1600 BPI Magtape (PE)
R = Microfiche
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

VAX 3271 Protocol Emulator

Description

VAX 3271 Protocol Emulator (PE) enables VAX VT100 terminals and application programs to interact with IBM system application programs and system services.

The Terminal Emulator utility allows the VT100 user on a VAX system to access an IBM system. This feature is useful for users who are implementing distributed processing with VAX systems. Users who are moving applications from centralized mainframes to VAX distributed processors will find this capability an efficient migration tool during the transition phase; users who occasionally access applications that remain on mainframes can access those applications through their local VAX systems.

The application program interface provides a base for distributed applications where one component of the application runs in an IBM system and the other component in a VAX. This type of application is useful in situations such as on-line access and update of a mainframe database in response to an event in the VAX, or where it is inappropriate to present a 3270 style formatted screen to a user who is accustomed to VAX style screens.

Terminal Emulation

The 3270 Emulation utility causes a screen display transmitted from the IBM system to be displayed on the VT100 in a fashion similar to the display on a 3270, and maps the VT100 keyboard to simulate the 3270 keyboard. Most existing host application programs operate without modification. Those host programs that use 3270 features not included in this product (for example, 480 character screens) must be modified.

The 3270 Terminal Emulator utility supports the following features of the 3277 Model 2 terminal:

- 1920 character screen
- Upper/lower case, numeric and special symbol characters
- Field attribute characters, protected and unprotected fields
- Tab stop
- Overstrike and insert mode
- Display, reverse video, intensified display, or non-display characters

NOTE: Intensified and reverse video features require the Advanced Video Option.

The following terminal features are among those not supported:

- Selector pen, security lock, and operator identification card reader
- Printer
- 480 character screen
- 3279 Display Station (color)

- 132 column screen
- 25th line on 3277/3278 display station. The 3277/3278 display station reserves the 25th line for a variety of terminal/system status indicators. On the VT100 in Terminal Emulation mode, a combination of LED and function keys furnish much the same features.

Refer to product documentation for a complete list of supported and unsupported features.

Application Program Support

The application program support interface makes on-line access to a mainframe database possible. Applications on the IBM system can be coded using procedures normally used to support 3270 terminals; the VAX application communicates with the IBM application by issuing calls to this package that are consistent with other VAX input/output services. VAX 3271 PE manages the modems and line protocols, and provides an easy-to-use interface so that the application programmer need not be knowledgeable about communications.

Up to 32 separate logical connections can be made simultaneously on a single communications line, the connections can be from the same program or several programs on either the VAX or the IBM systems.

Command Sequence

The emulator will execute the WRITE, GENERAL POLL, and SPECIFIC POLL command sequences. The 3271 PE does support explicit READ MODIFIED commands but may process them in a different manner than an IBM system. READ BUFFER, SENSE, and COPY commands are not supported.

Network Management

The VAX 3271 Protocol Emulator allows the system manager to control and monitor the activity of the PE. The generation procedure can be verified with the Installation Certification Procedure supplied with the product. Utilities are provided which load the PE software and which start and shut down the PE controlled lines. The system manager can test communications components using the loopback test program as an aid in determining failed components. The features which provide counts of the occurrence of specific types of data transmissions and transmission failures, the error logging and statistical routines, may be used to assist in tuning the system.

Line Discipline

The communications discipline used by the VAX 3271 Protocol Emulator is the 3271 subset of IBM's Binary Synchronous Communications (BSC) protocol using EBCDIC code. Specifically, this subset of BSC supports operation of full- and half-duplex leased lines in either point-to-point or multipoint configurations, at transmission speeds up to 9600 bits per second. VAX 3271 PE does not support switched facilities, contention line control, or transparent BSC capability, but it can share a multipoint line with control units functioning in transparent or non-transparent mode.

Minimum Hardware Required

Any valid VAX/VMS system configuration plus a DUP11 synchronous line interface.

600 blocks of system disk space is required for installation of the product.

Approximately 8 Kbytes of non-paged memory are used by this software product for the first DUP11 unit. Each subsequent unit requires approximately 200 bytes of pool. Each terminal requires a further 200 bytes of non-paged memory. When the emulator is running, further non-paged memory is allocated sufficient to accommodate the number and size of the buffers requested by the user.

Terminal Emulation Performance depends on system and line load, application, and on the rate of data entry. Refer to product release notes or your local DIGITAL office for further information.

VAX-11/730 Systems

An R80/RL02 configuraton is required for VAX-11/730 systems.

Optional Hardware

- Up to three additional DUP11's on VAX-11/780
- One additional DUP11 on VAX-11/750
- One DUP11 on a VAX-11/730
- Up to four VT100 Terminals with Advanced Video Option (the number supported will depend on application and system loading)

Prerequisite Software

VAX/VMS Operating System

Optional Software

None

Training Credits

None

Support Category

Digital Supported

Software Installation

Digital Installed

Software Product Support

VAX 3271 Protocol Emulator includes standard warranty services.

Prerequisite Support

A Network Profile must be prepared jointly by Digital and the customer. This plan includes descriptions of the Digital and IBM systems, the physical communications link(s), the application, the expected traffic, and the anticipated level of support required.

Customer Responsibilities

Before installation of the software the customer must

- Previously have installed all requisite hardware including terminals
- Obtain, install, and demonstrate as operational any modems and other equipment and facilities necessary to interface to Digital communications equipment
- Demonstrate equivalency of operation for modems other than Bell System 201C, 208A or 209A type modems or, in Europe, PTT approved modems
- Have generated any necessary IBM host software that will be communicating with the 3271 Protocol Emulator to Digital's satisfaction
- Make available for a reasonable period of time, as mutually agreed by Digital and the customer, all hardware, communications facilities, and terminals that are to be used during installation

To use the VAX 3271 Protocol Emulator Application Program Interface effectively, the customer must be prepared to work at the system programming level as well as the more traditional applications program level in both Digital and IBM systems.

Successful use of this product requires that

- The customer design the application with full knowledge of what has to be done at the system programming level on the host IBM system to accomplish the desired function
- The customer should be capable of generating both the IBM and Digital systems to achieve the desired CPU-to-CPU logical communications links

Delays caused by any failure to meet these responsibilities will be charged at the prevailing rate for time and materials.

VAX 3271 Protocol Emulator
Ordering Information

Options	System		
	VAX-11/730	**VAX-11/750**	**VAX-11/780 & VAX-11/782****
Single-use license, binaries, documentation, support services.	QC112-AG	QD112-AG	QE112-AY
Single-use license-only option, no binaries, no documentation, no support services.	QC112-DZ	QD112-DZ	QE112-DZ
Sources license, sources, no support services	QC112-EM	QD112-EM	QE112-EM
Sources license, listings, no support services	QC112-FR	QD112-FR	QE112-FR
Update/Unsupported Options Users of VAX 3271 PE whose specified Support Category warranty has expired may order under license the following software option as an update to an earlier version. The option may also be purchased for use on a second or subsequent CPU, in conjunction with a single-use, license-only option. Options are distributed in binary form on the appropriate medium and include no installation or other services unless specifically stated.	QC112-HG	QD112-HG	QE112-HY
Right to copy for single-use, no binaries, no documentation	QC112-HZ	QD112-HZ	QE112-HZ
Miscellaneous Options Documentation-only kits	QC112-GZ	QD112-GZ	QE112-GZ

**The VAX-11/782 is a multiprocessor that is considered a single CPU for binary licensing purposes.

The following key (G, M, R, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QD112-AG = binaries on TU58 DECtape II Cartridge.

G = TU58 DECtape II Cartridge*
M = 9-track 1600 BPI Magtape (PE)
R = Microfiche
Y = RX01 Floppy Diskette
Z = No hardware dependency

*The TU58 is to be used in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

External Document Exchange

Description

External Document Exchange is a software package that converts a VAX file in WANG OIS EBCDIC format into a second VAX file in Digital word processing format. When used in conjunction with the VAX 2780/3780 Protocol Emulator, ALL-IN-1 Office Menu, and a WANG OIS system, the package provides 2-way document exchange capability between WANG OIS and Digital VAX. External Document Exchange operates on the Digital VAX through a menu selection from the ALL-IN-1 main menu and a simple user friendly form, completed by the user. From a WANG OIS the operator transfers documents in the normal way using the IBM 3780 emulator. The WANG operator may optionally stipulate the document name and the destination.

The External Document Exchange software is made up of the following:

- A conversion program to read a VAX file in EBCDIC character codes and produce ASCII character codes in the record format required by DECdx/VMS.
- A conversion program to read a VAX file in ASCII character codes and DECdx/VMS record format and produce EBCDIC character codes.
- Menus for the ALL-IN-1 Office Menu system to control each of the above conversion programs.
- Menus for the ALL-IN-1 Office Menu system to control the VAX 2780/3780 emulator program.

System operation requires the connection of the WANG OIS system to the VAX through a DUP-11. Usually there are compatible modems at either end of the connection. If the two systems are located within x distance of each other then a modem eliminator may be used.

The WANG OIS system must include either a TC terminal communication option, or a communications controller. The system also requires IBM 3780 emulator software. Transmission from WANG to VMS is through the use of the 3780 software on the WANG (in transparent mode) and the 3780 BSC transparency mode on the VAX. Once in the VAX file system, the conversion software formats the file.

Transmission from VMS to WANG is as follows. A DECdx/VMS file is converted to EBCDIC and then transmitted to the WANG OIS using the 3780 protocol emulator. The user interface, when operated from the Digital side is a simple ALL-IN-1 form selected from the menu.

All codes the VAX receives from the WANG OIS convert to parallel codes in DECdx/VMS format. The WANG OIS system allows most formatting codes to be captured and sent intact to the Digital VAX. The following list shows WANG formatting codes transmitted as a single code:

- double underline
- overstrike, and
- bold.

Digital provides documentation for upgrading the WANG OIS so that more unique formatting codes are transmitted. The upgrade must be done by the customer or by WANG.

Minimum Hardware Required

Any valid VAX/VMS system configuration.

Optional Hardware

None

Prerequisite Software

VAX/VMS Operating System

VAX 2780/3780 Protocol Emulator, Version 1.4

ALL-IN-1 Office Menu, Version 1.2

DECdx/VMS, Version 1.0

Optional Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

Ordering Information

See your Digital Sales Representative for ordering information.

DMF32 Multifunction Communications Controller

DMF32 is an intelligent, high performance communications controller which enables a combination of modems and terminals to communicate with VAX systems. The Upgrade Option contains three basic elements:

1. An eight-line asynchronous interface for operation with modems and terminals. The eight lines have speeds to 19.2 kbits/s each, full duplex. Two lines have full modem control and split speed capability; the other six are for local terminal connection only. Supports both SILO and DMA *transmit* modes; character or 32-word SILO *receive* modes.

2. A single-line synchronous interface for connection to a network communication facility. Reaches speeds to 19.2 kbits/s with double-buffered DMA, modem control and support for both bit- and byte-oriented protocols.

3. A parallel interface for either a lineprinter (in DMA mode) or a user-developed device. In the case of operating a user-developed device, operation is permitted word by word, in 64-word SILO mode, or in a DMA mode.

The DMF32 uses the Direct Memory Access (DMA) mode and SILO (first-in, first-out) buffers in the controller to permit fast data transfers and reduce CPU interrupt overhead. It is supported by VAX VMS and DECnet VAX.

DMF32 Specifications	
Performance Characteristics	
Asynchronous Line Multiplexer	
Operating modes	Full- or half-duplex
Signal compatibility	RS-232-C and RS-423-A, CCITT V.28/V.24
Line baud rates	50 b/s to 19,200 b/s (Lines 0 and 1 are split speed)
Lines 0 and 1 signals	TX DATA RX DATA or SEC RX DATA RTS, CTS, DSR, CAR SEC CAR, SEC RTS DTR, RI, DSRS USER TX (pin 18) USER RX (pin 25)
Lines 2-7	TX DATA RX DATA
Synchronous Line	
Operating mode	Full- or half-duplex
Signal compatibility	EIA RS-232C and RS-423-A CCITT V.24 and V.28
Line baud rates	19,200 b/s (max.)

Synchronous line signals	TX DATA, RX DATA RTS, CTS, DSR, CAR, DTR, RI, DSRS, TX CLK (DCE source) RX CLK (DCE source) TX CLK (DTE source) USER TX (pin 18) USER RX (pin 25)
External Modems	Bell 208, 209, 2048, 2096
Lineprinter Options	
Printers available	LP32-AA, -BA (285/200 line/min) LP32-EA, -EB (600/445 line/min) LP32-GA, -GB (1220/905 line/min)
UNIBUS Loading	
Microcontroller	1 dc load
Module (M8396)	5.5 ac loads
Power Requirements	
Microcontroller	5V ±5%, 8A
Module (M8396)	15V ±5%, 0.4A −15V ±5%, 0.4A
Physical Description	
Microcontroller Module (M8396)	Height (hex): 39.7 cm (15.7 in.), Length (standard): 30.2 cm (11.9 in.)
Distribution Panel	Height: 10.1 cm (4.0 in.) Length: 21.6 cm (8.5 in.)
Panel Mounting Frame	Height: 13.3 cm (5.25 in.) Length: 48.2 cm (19.0 in.)
Device Cables*	
Asynchronous lines (FCC qualified)	BC22E-10, 25 (16-conductor) BC22D-10, -25, (26-conductor null modem)
Synchronous line	BC22F-10, -25 (25-conductor)
Lineprinter interface	BC27A-30 included with LP32-AA, -BA, -EA, -EB BC27B-30 included with LP32-GA, -GB
Parallel interface	Not supplied
Environment	
Operating temperature	10° to 40°C (50° to 104°F)
Relative humidity	10 to 90% (no condensation)
Wet bulb temperature	28°C (82°F) max.
Dew point temperature	2°C (36°F) min.
Heat dissipation	167 Btu/h (total)
Altitude	Sea level to 2.4 km (7,920 ft)
Shipping†	
Temperature	−40° to 66°C (−40 to 151°F)
Relative humidity	0 to 95% (no condensation)

Altitude	Sea level to 9 km (29,700 ft)

*Digital cable types or equivalent type.
†Unit packaged for shipping.

DMF32 Ordering Information	
DMF32-LP	System option. External cables for terminals not included, for connection to modems one BC22E-xx is recommended per line
DMF32-M	Upgrade option. Includes base module only. For system installation, select the appropriate external cables and one of the following cabinet kits
CK-DMF32-LD	DMF32 Cabinet Kit for use with shielded cabinets
CK-DMF32-L1	DMF32 Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter bracket included.

DMR11 Synchronous Line Controller

The DMR11 is designed to provide high performance interconnection of DECsystem-10, DECsystem-20, PDP-11 and VAX family computers in network applications. For computers located in the same facility, DMR11's can be utilized for high speed communication (up to 1,000,000 bps) over inexpensive coaxial and triaxial cables with all necessary modems built-in. Where computers are located remotely and connected via common carrier facilities, DMR11's can be used to interface to synchronous modems such as Bell Models 208 and 209 or other modems conforming to the EIA RS 232C, RS449, RS423, RS422 or CCITT V.24 standards.

DMR11 Specifications	
Performance Characteristics	
Operating mode	Full or half-duplex, point to point
Data format	8-bit bytes, DDCMP
Data rates	
DMR11 line unit module (local)	1,000,000 b/s 500,000 b/s 250,000 b/s 56,000 b/s
DMR11 remote options (clocked by modem)	
DMR11-AA	19,200 b/s (max.)
DMR11-AB	250,000 b/s (max.)
DMR11-AE	1,000,000 b/s (max.)
Maximum distance	3,000 m. at 1,000,000 b/s 3,700 m. at 500,000 b/s 5,000 m. at 250,000 b/s 6,000 m. at 56,000 b/s
UNIBUS loading	One UNIBUS DC load Five UNIBUS AC loads
Power Requirements	
DC power	
Microprocessor module	+5V ± 5%, 7.0A
Line unit module	+5V ± 5%, 5.0A +15V ± 5%, .150A −15 ± 5%, .180A
Other Characteristics	
Standard interface	
DMR11-AA	CCITT V.24/EIA RS-232-C/EIA RS-449 compatible
DMR11-AB	CCITT V.35 or DDS Compatible
DMR11-AE	EIA RS-449/RS-422

Modems	
DMR11-AA	Bell 208, 209 or equivalent
DMR11-AB	Bell 500A LI/5 or GTE Lenkurt L500 A-5 or equivalent
DMR11-AE	Bell 2049 or 2096 Dataphone II or equivalent
Cable type (not supplied)	
Local line unit	BC55N twinaxial (for use at 56 kb/s) BC55M triaxial (for use at 250 to 1,000 kb/s)
Remote options	BC05D recommended
Environment	
Operating	
Temperature	5° to 50°C (41° to 122°F)
Relative humidity	10 to 90% (no condensation) wet bulb temperature 32°C (90°F) max. dew point temperature 2°C (36°F) min.
Altitude	sea level to 2.4 km (8 kft)
Shipping	
Temperature	−40° to 66°C (−40 to 151°F)
Relative humidity	0 to 95% (no condensation)
Altitude	sea level to 9 km (30 kft)

DMR11 Ordering Information	
DMR11-AP	System Option. Interfaces to EIA RS232/CCITT synchronous modems (Bell series 200 compatible) at speeds up to 19.2K b/s. Includes data set control. External cable not included; order BC22E-xx cable.
DMR11-FP	System option. Interfaces to EIA RS423/RS429 V.24 synchronous modems at speeds up to 56K b/s. Includes data set control. External cable not included; order BC55D-xx cable.
DMR11-BP	System option. Interfaces to CCITT V.35/DDS synchronous modems (Bell 500A L1/5 or equivalent) at speeds up to 1M b/s. Includes data set control. Includes BC05Z-25 cable for modem connection.
DMR11-CP	System Option. Includes integral modem, for local interconnection. Supports switch-selectable speeds over the following distances: 6000 ft (1830 m) at 1 Mb/s 7000 ft (2135 m) at 500 kb/s 8000 ft (2440 m) at 250 kb/s 46,000 ft (14,030 m) at 56 kb/s External cables not included; Requires BC55S or BC55T external cable. Note: Earlier versions of this option used a plastic cable connector. To connect the BC55S or BC55T to the earlier BC55N and BC55M cables. BC56A/B/D/E adapter cables are available. The BC56A is the male to male cable for adapting BC55S to BC55M, and the BC56B is the male to female cable for adapting BC55S to BC55M. BC56D is the male to male cable for adapting BC55T to a BC55N, and BC56E is the cable for adapting BC55T to BC55N.
DMR11-EP	System option. Interfaces to EIA RS422/RS429 V.24 synchronous modems, supports speeds up to 1 Mb/s (FDX). Includes data set control for switched network operation. External cable not included; cable not available through Digital.
DMR11-M	Upgrade option. Includes base module only. For system installation select the appropriate external cable and one of the following cabinet kits.
CK-DMR11-AD	EIA RS232 Cabinet Kit for use with shielded cabinets
CK-DMR11-A1	EIA RS232 Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter bracket included.
CK-DMR11-BD	V.35 Cabinet Kit for use with shielded cabinets.

DMP11 Synchronous Line Controller

The DMP11 Synchronous Communications Line Controller is an efficient communications device that enables high-speed data transfers between network nodes, which can be PDP-11s or VAX systems.

The controller allows both multipoint or point-to-point operations over common carrier or private lines, or through shielded cables. The unit can be configured for half-duplex operation at transfer rates of up to one Mbit per second or for full-duplex operation at transfer rates of up to 500 kbits per second.

The controller microcode implements the Digital Data Communications Message Protocol (DDCMP) to ensure maximum throughput with minimum processor intervention. In multipoint operation the control computer can downline load and start programs at the tributary computers.

For computers located within the same facility, the controller contains an integral modem for connection to shielded cables. For remote applications requiring connections to common carrier lines, the DMP11 unit conforms to synchronous modems connecting to Electronic Industries Association Standards (EIA) or to the International Consultative Committee on Telephone and Telegraph (CCITT) standards.

The DMP11 operation is supported by DECnet running with RT-11, RSTS/E, RSX-11M, RSX-11M-PLUS and VAX/VMS operating systems.

DMP11 Specifications	
Performance Characteristics	
Operating mode	Full- or half-duplex
Data format	Synchronous DDCMP
Data rates	
DMP11-AA	
EIA RS-232-C	19.2 kbits/s (max.)
EIA RS-423-A/	56 kbits/s (max.)
RS-449	19.2 kbits/s (max.)
CCITT V.24/V.28	
DMP11-AB	
CCITT V.35 DDS/ISO	
FDX	500 kbits/s (max.)
HDX	1 Mbit/s
DMP11-AC	
FDX	500 kbits/s (max.)
HDX	1 Mbit/s (max.)
DMP11-AE	
EIA RS-422-A/RS-449	

FDX	500 kbits/s (max.)
HDX	1 Mbit/s (max.)
Tributaries supported	32 (max.)
Compatible with	
Multipoint	DMP11 controllers DMV11 controllers
Point-to-Point	DMR11 controllers DMC11 controllers
UNIBUS Loading	
Microprocessor module	1 UNIBUS dc load 5 UNIBUS ac loads
Line Unit Module	no UNIBUS loads
Power Requirements	
dc power	
Microprocessor module	5V ± 5%, 12.0A 15V ± 5%, .1A −15V ± 5%, .2A 5V ± 5%, 7.0A
Line Unit Module	5V ± 5%, 5.0A 15V ± 5%, 0.1A −15V ± 5%, 0.2A
Heat dissipation	160 btu/h (total)
Physical Size	
Microprocessor and line unit module	
Height (hex)	39.8 cm (15.7 in.)
Length (standard)	21.38 cm (8.42 in.)
Cable interface panel	height 12.7 cm (5.0 in.) length 16.66 cm (6.56 in.)
Integral modem panel	height 10.16 cm (4.0 in.) length 10.4 cm (4.1 in.)
Modem cables available	
BC05D	EIA RS-232-C
BC55N-98	Twinaxial (56 kbits/s require two cables for full duplex.)
BC55M-98	Triaxial (250 kbits/s and greater require two cables for full duplex.)
Environment	
Operating	
Temperature	5° to 50°C (41° to 122°F)
Relative humidity	10 to 90% (no condensation)
Wet bulb temperature	32°C (90°F) max.
Dew point temperature	2°C (36°F) min.
Altitude	sea level to 2.4 km (7,920 ft.)

Shipping* temperature	−40° to 66°C (−40 to 151°F)
Relative humidity	0 to 95% (no condensation)
Altitude	sea level to 9 km (29,700 ft.)

*Cables available in different lengths from Digital Accessories and Supplies group.
†Packaged for shipment

DMP11
Ordering Information

DMP11-AP	System Option. Interfaces to EIA RS232/CCITT synchronous modems (Bell series 200 compatible) at speeds up to 19.2K b/s. Includes data set control. External cable not included; order BC22E-xx cable.
DMP11-FP	System option. Interfaces to EIA RS423/RS449 V.24 synchronous modems at speeds up to 56K b/s. Includes data set control. External cable not included; order BC55D-xx cable.
DMP11-BP	System Option. Interfaces to CCITT V.35/DDS synchronous modems (Bell 500A L1/5 or equivalent) at speeds up to 56K b/s. Includes data set control. Includes BC05Z-25 cable for modem connection
DMP11-CP	System option. Includes integral modem, for local interconnection. Supports switch selectable speeds; at the following distances, maximum speeds supported are: 6000 ft at 1 Mb/s (HDX) 7000 ft 500 kb/s (FDX) External cables not included; Requires BC55S or BC55T external cable. Note: Earler versions of this option used a plastic cable connector. To connect the BC55S or BC55T to the earlier BC55N and BC55M cables, BC56A/B/D/E adapter cables are available. The BC56A is the male to male cable for adapting BC55S to BC55M, and the BC56B is the male to female cable for adapting BC55S to BC55M. BC56D is the male to male cable for adapting BC55T to a BC56E is the cable for adapting BC55T to BC55N.
DMP11-EP	System option. Interfaces to EIA RS422/RS449 V.24 synchronous modems, supports speeds up to 1M b/s (HDX) or 500 kb/s (FDX). Includes data set control for switched network operation. External cable not included; cable not available through DIGITAL.
DMP11-M	Upgrade option. Includes base module only. For system installation one of the following cabinet kits and the appropriate external cable.
CK-DMP11-AD	EIA RS232 Cabinet Kit for use with shielded cabinets
CK-DMP11-A1	EIA RS232 Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter bracket included.
CK-DMP11-BD	V.35 Cabinet Kit for use with shielded cabinets
CK-DMP11-B1	V.35 Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter brakcet included.
CK-DMP11-CD	Integral modem Cabinet Kit for use with shielded cabinets
CK-DMP11-C1	Integral modem Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter bracket included.
CK-DMP11-ED	RS422/RS449 Cabinet Kit for use with shielded cabinets
CK-DMP11-E1	RS422/RS449 Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter bracket included.
CK-DMP11-FD	RS423/RS449 Cabinet Kit for use with shielded cabinets
CK-DMP11-F1	RS423/RS449 Cabinet Kit for use with cabinets without I/O Connection Panels. Adapter bracket included.

Dual-Speed DF03 Modem Family

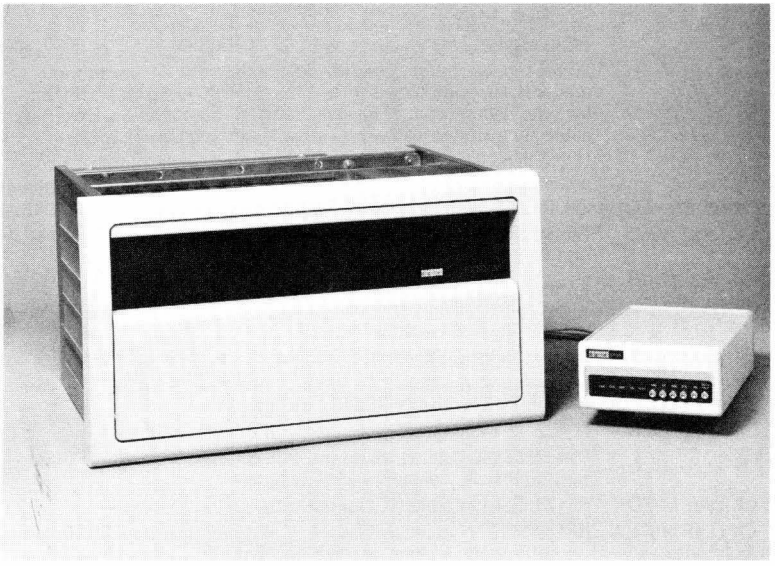
Digital's family of DF03 modems and modem enclosures was designed to meet the need for low- to medium-speed data communications between computer systems and remote terminals.

When data communication applications require only a small number of modems at one location, the DF03 freestanding unit provides the solution by means of a lightweight, compact modem that can be easily positioned on a desk or table close to the computer or terminal.

When the data communication requirements are for many modem devices at the same location, up to 12 DF03 modem modules can be placed into the DF100 multiple modem enclosure and conveniently installed in a rack or cabinet. This enclosure effectively reduces the cost of each modem and provides a significant savings in space.

The DF03 modems are compatible with the Bell System 103J- and 212A-type modems and operate at data rates between zero and 300 bits per second or 1,200 bits per second. They also provide full-duplex transfer with synchronous or asynchronous data formats. The modems are available in either a manual originate version or an automatic originate (autocall) version. These capabilities enable the modems to be used in attended and unattended configurations.

The DF03 family of modems has been approved by the Federal Communications Commission (FCC) for direct connection to the Public Switched Telephone Network (PSTN), and also conforms to the FCC regulations on EMI/RFI emanations.



DF100 Multiple-Modem Enclosure

The DF100-RM multiple-modem enclosure is a cost-effective solution when more than five centrally located remote connections are required. Easily installed into a 48.26 cm (19.0 in.) cabinet or rack, this space-saving enclosure permits the use of up to 12 DF03 single-card modem modules. The enclosure occupies only 26.7 cm (10.5 in.) of vertical mounting space within the cabinet.

The DF100-RM unit contains a standard power supply with additional space for mounting a redundant power-regulator option. The power-regulator option automatically assumes the powerload if the standard regulator becomes defective.

The multiple-modem enclosure supports the DF03-RA module and DF03-RC (autocall) module and has been designed to support future Digital modem products. Modems within the enclosure can be functionally intermixed and connected to public and private lines and can operate at different data rates. The enclosure also allows the user to expand and upgrade the system at a minimum cost.

The user can install additional DF03 modules into the enclosure while modules already present are operational. The front cover of the DF100-RM enclosure is removable to allow easy access to the modules. The status lights on the modules are visible through the window on the front cover of the enclosure.

The multiple modem enclosure and second optional regulator are available as follows:

DF100-RM Rack-mountable modem enclosure with 120 Vac power supply
DF100-PR Redundant power-regulator option for the DF100-RM

DF03 Specifications

General	DF03-AA/AC	DF03-RA/RC
Application	Serial, Binary Synchronous or Asynchronous Data	Serial, Binary Synchronous or Asynchronous Data
Operating Mode	Full-Duplex, Two-Wire	Full-Duplex, Two-Wire
Data Rate	Low-Speed: 0 to 300 b/s (Async) High-Speed: 1,200 bps (Async) 1,200 bps (Sync) 1,200 bps	Low-Speed: 0 to 300 b/s (Async) High-Speed: 1,200 bps (Async) 1,200 bps (Sync) 1,200 bps
Telephone Line Requirement	Voice Grade PSTN Line with RJ11C Termination	Voice Grade PSTN Line with RJ21X Termination (Multiline)
Certified for FCC Part 68 (Direct Connection)	Yes	Yes

FCC Part 15	Verified for Category B (Home and Computer Environment)	Certified for Category A (Computer Environment)
Terminal Interface	EIA RS232-C/ CCITT V.24 & V.28 25-Pin Cinch Connector	EIA RS232-C/ CCITT V.24 & V.28 and EIA RS423-A (up to 200 feet) 25-Pin Cinch Connector
Operating Environment		
Temperature	5°C to 50°C (41°F to 122°F)	5°C to 50°C (41°F to 122°F)
Relative humidity	0% to 95% Noncondensing, Noncaustic	0% to 95% Noncondensing, Noncaustic
Power requirement (nominal)	13.7 VA at 120V, 60HZ	84 VA at 1120V, 60HZ
Voltage protection	¼-Amp Fuse	2.5-Amp Breaker
Physical Characteristics		
Height	69 mm (2.5 in.)	203 mm (8 in.)
Width	143 mm (5.5 in.)	21.6 mm (.85 in.)
Depth	277 mm (10.9 in.)	264 mm (10.4 in.)
Weight	2.7 Kg (6 lb. approx.)	.7–.9 Kg (1.5–2.0 lb. approx.)
Test Features		
	ANL—Analog Loop Back ST—Self Test RDL—Remote Digital Loop Back DTL—Digital Loop Back	LL—Local Loop (Analog Loop Back) ST—Self Test RL—Remote Loop (Remote Digital Loop Back) DL—Digital Loop Back RJ11C Telephone Line Test Jack
Operating Features		
	Data/Talk—Data/Talk Selection HS—High/Low Speed Selection	Data/Talk—Data/Talk Selection HS—High/Low Speed Selection
Status Indicators		
	Carrier, Data Terminal Ready, Data Set Ready High Speed, Test Mode	Send Data, Receive Data Carrier, Data Terminal Ready, Data Set Ready (Modem Ready), Off Hook, High Speed, Test Mode

Modem Requirements	DF03-AA/AC	DF03-RA/RC
Low-speed modulation	Frequency-Shift Keying (FSK)	Frequency-Shift Keying (FSK)
High-speed modulation	Quaternary Differential Phase-Shift Keying (QDPSK)	Quaternary Differential Phase-Shift Keying (QDPSK)
Selectable modem options	Loss of Carrier Disconnect —Send Space Disconnect —Long Space Disconnect —Async or Sync Operation	Loss of Carrier Disconnect —Send Space Disconnect —Long Space Disconnect —Async or Sync Operation
Autoanswer	—Autoanswer Mode —Interface Speed Indication/Selection —CAR, DSR, CTS Force On/Normal —Interface Control Mode Test—ANL	—Autoanswer Mode —Interface Speed Indication/Selection —CAR, DST, CTS Force On/Normal —Interface Control Mode Test—ANL
Auto dial	—Serial, Asynchronous Data Format —110, 300, or 1,200 bps (Fixed) —ASCII Character Set	—Serial, Asynchronous Data Format —110, 300 or 1,200 bps (Follows Modem Speed) —ASCII Character Set

DF100-RM Multiple Modem Enclosure Specifications	
Capacity	12 Individual Modem Modules
Telephone Line Requirement	Ability to connect to 12 telephone lines using any mixture of PSTN lines with RJ21X service or private/leased lines with four-position connector.
Operating Environment	
Temperature	5°C to 50°C (41°F to 122°F)
Relative humidity	0% to 95% noncondensing, noncaustic
Power requirement	84 VA at 120V, 60HZ
Voltage protection	2.5-Amp Breaker
Mounting Requirement	Standard 19″ Computer Cabinet or Rack
Physical Characteristics	
Height	267 mm (10.5 in.)
Width	483 mm (19.0 in.)
Depth	343 mm (13.5 in.)
Weight	12.25 kg (27 lb. without modules)

DF03 and DF100 Ordering Information	
DF03-AA/JK	Modem—300/1200 bps, direct connect
DF03-AC/JK	DF03-AA, plus automatic originate (Auto-call)
DF03-RA/JK	1200 bps, Rack Mountable modem
DF03-RC/JK	DF03-RA, plus automatic originate (Auto-call)
DF100-RM/JK	Rack Mount Modem enclosure
DF100-PR/JK	Redundant Power Regulator Option

VAX-11/780 Computer System

The VAX-11/780 computer system is the high-end member of the VAX family of computers. Like the VAX-11/750 computer system, it implements the full VAX 32-bit architecture. In addition to sharing the identical set of system software with the VAX-11/750 system, it also offers compatibility with the peripheral set via the UNIBUS and optional MASSBUS adapters. The processor uses a 32-bit architecture with addressing space for very large programs, an extensive instruction set with numerous data types, and 32-bit bus structure for high throughput.

The VAX-11/780 system hardware is complemented by the VAX/VMS (Virtual Memory System) operating system. This general purpose, multiprogramming operating system simultaneously handles multiuser, realtime, and multistream batch applications, plus on-line program development.

Highlights

- 32-bit architecture with 4 gigabytes of virtual address space allowing for large programs without overlays
- Full VAX Instruction Set, including over 240 basic operations, 9 addressing modes, 6 data types, and Compatibility Mode PDP-11 Instructions
- Sixteen 32-bit general purpose registers that can be used for temporary storage and as accumulators, index registers, and base registers
- A multiuser, multifunction virtual memory operating system that supports a wide variety of languages and program development tools
- Dependability through extensive reliability, availability and maintainability features including automatic error checking, remote diagnosis, VAX/VMS operating system on-line diagnostics, and automatic restart
- Expansion to 8 Mbytes of ECC MOS memory (plus 4 Mbytes Multiport Memory)
- MA780 Multiport Memory option that can be shared by up to four VAX-11/780 systems for high-throughput, enhanced-availability applications
- Up to four MASSBUS adapters for connection of high-throughput disk and tape devices
- Up to four UNIBUS adapters for connection of Digital and user-designed peripherals

Description

The VAX-11/780 computer system is a high-performance system that implements VAX Family architecture, thus making it software compatible with other VAX family systems. Programs written for one VAX system can run without modification on any other VAX system. Data and software compatibility with PDP-11 computer systems is provided by utilization of the same disk or tape file formatting and through compatibility mode PDP-11 system instructions.

A variety of complete VAX-11/780 systems is available. Each system is based on the VAX-11/780 processor, the VAX/VMS operating system, a choice of mass

storage subsystems, an LA120 console terminal, an 8-line communication multiplexer, and a minimum of 512 Kbytes of memory.

Central Processor

The Central Processing Unit (CPU) of the VAX-11/780 system is a microprogrammed computer that executes a large set of variable-length instructions in VAX native mode, and nonprivileged PDP-11 system instructions in compatibility mode.

VAX Native Mode

The native mode instruction set is highly versatile and bit-efficient, resulting in concise, fast-running programs. Each native mode instruction can use any of nine different addressing modes. This yields smaller programs and less complicated assembly language for programming.

The processor has built-in floating point instructions that handle single and double precision (32- and 64-bit) computation. An optional floating point accelerator substantially increases the already fast floating point performance and is transparent to applications programs. Full decimal arithmetic and text string instructions equip the VAX-11/780 processor for commercial and character-oriented data processing applications. The native mode instruction set also includes program control and special instructions that improve both the performance and the memory utilization of system and application software. Instructions are variable in length and can start on any byte boundary.

System and bus error logging and improved diagnostic aids help field technicians locate and identify error conditions quickly. The system's remote diagnosis capability lets users call in the help of highly skilled troubleshooters at Digital's central diagnosis center.

Console Subsystem

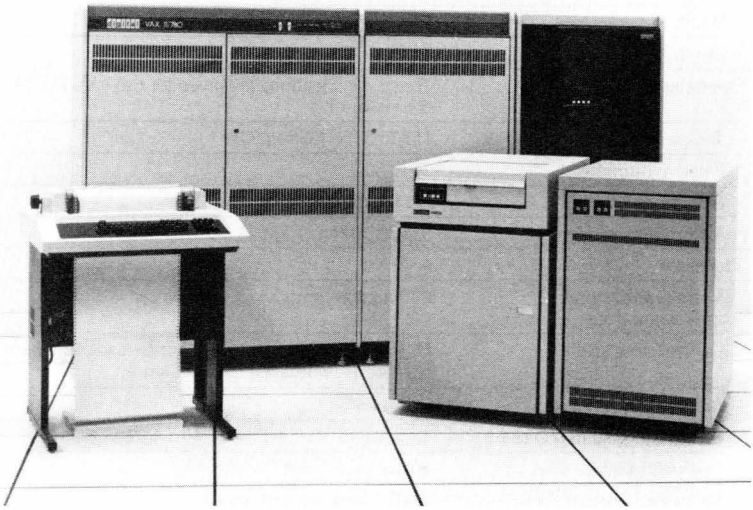
The VAX-11/780 console subsystem is designed to allow the user to give commands interactively to the processor using a console command language. Three elements combine to give the user access to the system's capabilities: a set of machine status switches on the processor's front panel, an LA120 console terminal, and an integral floppy disk drive. Simple console commands entered through the console terminal, replace the traditional toggle switches and provide operational control (i.e., bootstrapping, initialization, self-testing, examining/depositing data in memory, etc.). When the console terminal is not being used to communicate console command language instructions to the processor, it can function as a VAX system terminal.

The remote diagnosis module is an option available to customers with a full, Digital maintenance contract. It provides the customer with dial-in diagnosis (24 hours a day, 7 days a week, with a 15 minute response time), including detection of failures down to the board and chip level, and diagnostic capability even on an inoperative CPU.

Supported Software

VAX systems are complemented by the high-performance VAX/VMS operating system. This operating system can support many user environments, including realtime processing, interactive program development, and batch processing, running independently, concurrently, or in any combination. It includes a highly efficient scheduling algorithm, extensive record and file management capabilities, and virtual memory features achieved by an extremely efficient paging algorithm. The VAX/VMS operating system offers a large choice of languages and utilities.

The VAX/VMS operating system also provides program development and maintenance utilities including an interactive and a batch editor, a linker with cross-reference ability, and a symbolic debugger.



VAX-11/780 Specifications	
I/O UNIBUS Adapter	
Maximum UNIBUS I/O rate	1.5 MB/s through buffered data paths
Buffered data paths	15 total, 8-byte total in each
Processor Power Requirements	These specifications are given for the VAX-11/780 processor only
AC line voltage	120/280 V
Frequency tolerance	59-61 Hz
Phases	3
Also available	220/380 V 50 Hz 240/415 V 50 Hz
Maximum AC power consumption	6225 W
Physical Characteristics	These specifications are given for the VAX-11/780 processor only
Weight	498 kg (1100 lbs)
Height	153.7 cm (60.5 in)
Width	118.1 cm (46.5 in)
Depth	76.2 cm (30 in)
Operating Environment	These specifications are given for the VAX-11/780 processor only
Temperature	15° to 32°C (59° to 90°F)
Relative humidity	20 to 80%
Maximum altitude	2.4 km (8000 ft)
Maximum heat dissipation	5350 kcal/h (21,230 Btu/h)
Processor	
Microcontrol store instruction time	200 nanoseconds
Control store size	5K words (99-bit words), 4K words read only memory and 1K words user control store
Internal data path	32 bits
Maximum system I/O rate	13.3 MB/s
Instruction buffer size	8-byte lookahead
Memory cache	8 KB, 2-way set associative
VAX Instruction Set	
16 32-bit registers 248 basic operations	32 priority interrupt levels 9 addressing modes
Data types: Integer, floating point, packed decimal, character string, variable bit fields, and numeric strings	

Main Memory	
Virtual address space	4 gigabytes
Physical expansion	8 megabytes in 256 KB increments (plus 4 megabytes multiport memory)
Parity	8-bit error correcting code per 64-bit quadword
Cycle times	800 nanoseconds per 64-bit read (1300 nanoseconds with single-bit errors) 1400 nanoseconds per 64-bit write

ALL-IN-1 VAX 11/780 Starter Packages (2)
Ordering Information

1. RA60 Distribution = E78VS-CA

1	MS780-FA (2 Mbyte)
1	QE902-AJ (RA60 DIST)
1	QE001-HJ (RA60 DIST)
1	QE001-AZ I&W
1	QE400-AJ VAX DECmail
1	QE708-AY DXT/VMS

ALL-IN-1 VAX 11/780 Starter Packages
Ordering Information

2. 9 Track Magtape Distribution = E78VS-DA

1	MS780-CA (2 Mbyte)
1	QE902-AM (9TRK DIST)
1	QE001-HM (16MT9)
1	QE001-AZ I&W
1	QE400-AM VAX DECmail
1	QE708-AY DXT/VMS

VAX-11/782 Attached Processor Computer System

The VAX-11/782 Attached Processor Computer System is a high-end member of the VAX family of computers. The VAX-11/782 is a tightly coupled asymmetrical multiprocessor system based on the MA780 shared memory subsystem. It is comprised of two VAX-11/780 CPUs and supports up to 8 MB of MA780 shared memory. The VAX-11/782 is available as either a complete packaged system or as an upgrade to a single VAX-11/780. Like all family members, it implements the VAX 32-bit architecture and is a fully supported product.

The VAX-11/782 system offers a performance improvement of 60 to 80 percent over a single VAX-11/780—at a small incremental investment. Applications can be transferred from a single to an attached processor configuration without having to perform additional development or debugging efforts.

The interplay of the two processors is transparent to support personnel and users. A system manager only needs to maintain one copy of the VAX/VMS operating system because the two processors share the same operating system code and data structures. Users who currently own a VAX-11/780 can easily upgrade to a VAX-11/782 for a significant increase in performance.

Highlights

- Performance improvement of 60 to 80 percent over a single VAX-11/780
- Ease of use, and transparent to the user
- A multiuser, multifunction virtual memory operating system that supports a wide variety of languages and program development tools
- Upgrade from a standalone VAX-11/780
- Dependability through extensive reliability, availability and maintainability features
- Supports up to 8 MB of shared memory

Description

The VAX-11/782 Attached Processor System is available in three complete packaged systems. Each packaged system includes two CPUs each with an LA120 console terminal, the VAX/VMS operating system, various memory sizes, a choice of mass storage subsystems, and an 8-line communication multiplexer.

The VAX-11/782 Attached Processor is also available as an upgrade option to a single processor VAX-11/780 system. Components of the attached processor system upgrade include the CPU, an LA120 console terminal, 1 MB of MA780 shared memory (maximum of 8 MB) with battery backup, and the cache invalidate option. The attached processor does not support I/O peripherals. All

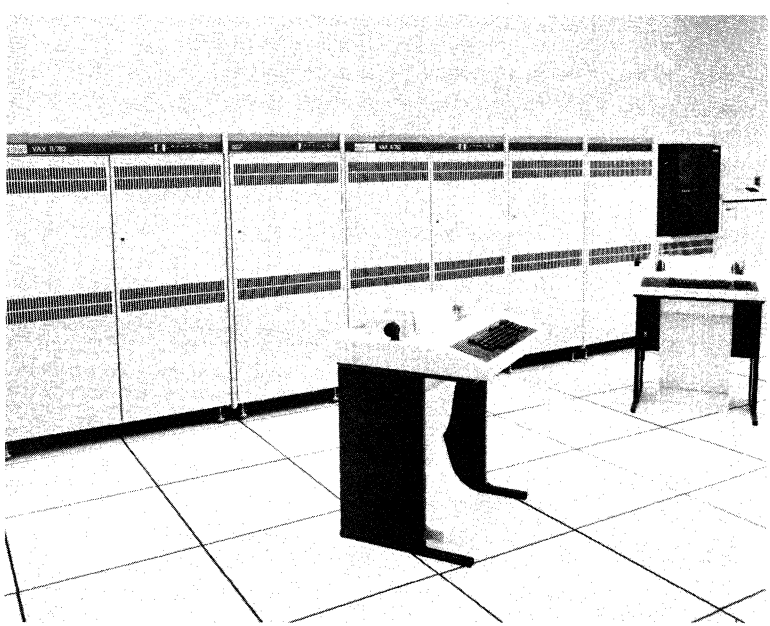
I/O devices and peripherals are connected to the primary processor. Both processors must be at the same revision level and the same version of microcode. Neither the Writable Control Store (WCS) option nor the 2.2 MB/sec RP07 drive are supported.

Shared Memory Subsystem

The attached processor upgrade is delivered with 1 MB of shared memory which can expand to a total of 8 MB. The packaged systems are available with a choice of shared memory sizes and are also expandable to a total of 8 MB. The MA780 shared memory is MOS memory with Error Correcting Code (ECC). Each CPU cabinet contains local memory for diagnostics.

Dependability

VAX-11/782 Attached Processor Systems, designed for careful cooperation between hardware and software, perform continual checking, detecting, and correcting of error conditions. The result is a fault-tolerant environment where errors are corrected before they impede system operation. VAX maintenance operations, which are aided in part by the system's remote diagnosis capability, proceed quickly and easily when a failure does occur. Components are tested and repaired in minimal time, often without disturbing users or bringing the system down.



Console Subsystem

The VAX-11/782 console subsystem is designed to allow the user to give commands interactively to the processor using a console command language. Three elements combine to give the user access to the system's capabilities: a set of machine status switches on the processor's front panel, an LA120 console terminal, and an integral floppy disk drive. Simple console commands entered through the console terminal, replace the traditional toggle switches and provide operational control (i.e., bootstrapping, initialization, self-testing, examining/depositing data in memory, etc.). When the console terminal is not being used to communicate console command language instructions to the processor, it can function as a VAX system terminal.

The remote diagnosis module is an option available to customers with a full, DIGITAL maintenance contract. It provides the customer with dial-in diagnosis (24 hours a day, 7 days a week, with a 15 minute response time), including detection of failures down to the board and chip level, and diagnostic capability even on an inoperative CPU.

Supported Software

VAX systems are complemented by the high-performance VAX/VMS operating system. This operating system can support many user environments, including realtime processing, interactive program development, and batch processing, running independently, concurrently, or in any combination. It includes a highly efficient scheduling algorithm, extensive record and file management capabilities, and virtual memory features achieved by an extremely efficient paging algorithm. The VAX/VMS operating system offers a large choice of languages and utilities.

The VAX/VMS operating system also provides program development and maintenance utilities including an interactive and a batch editor, a linker with cross-reference ability, and a symbolic debugger.

VAX-11/782 Specifications	
Processor	
Microcontrol store instruction time	200 nanoseconds
Control store size	5 Kwords (99-bit words), 4 Kwords read only memory and 1 Kwords user control store
Internal data path	32 bits
Maximum system I/O rate	13.3 MB/s
Instruction buffer size	8-byte lookahead
Memory cache	8 KB, 2-way set associative
VAX Instruction Set	
16 32-bit registers	32 priority interrupt levels
248 basic operations	9 addressing modes

Data types: Integer, floating point, packed decimal, character string, variable bit fields, and numeric strings	
Memory	
Physical expansion	8 MB shared memory
Parity	8-bit error correcting code per 64-bit quadword
Cycle times	800 nanoseconds per 64-bit read (1300 nanoseconds with single-bit errors) 1400 nanoseconds per 64-bit write
Primary Processor I/O UNIBUS Adapter	
Maximum UNIBUS I/O rate	1.5 MB/s through buffered data paths
Buffered data paths	15 total, 8-byte total in each
Processor Power Requirements	These specifications are given for a single VAX-11/780 processor only
AC line voltage	120/280 V
Frequency tolerance	59-61 Hz
Phases	3
Also available	220/380 V 50 Hz, 240/415 V 50 Hz
Maximum AC power consumption	6225 W
Physical Characteristics	These specifications are given for a single VAX-11/780 processor only
Weight	498 kg (1100 lbs)
Height	153.7 cm (60.5 in)
Width	118.1 cm (46.5 in)
Depth	76.2 cm (30 in)
Operating Environment	These specifications are given for a single VAX-11/780 processor only
Temperature	15° to 32°C (59° to 90°F)
Relative humidity	20 to 80%
Maximum altitude	2.4 km (8000 ft)
Maximum heat dissipation	5350 kcal/h (21,230 Btu/h)

VAX-11/782
Ordering Information

782XA-AE(AJ)	VAX-11/782 Dual CPU 4 MB ECC MOS Shared Memory H9652 UNIBUS Expansion Cabinet with BA11-K and DD11-K VAX/VMS License only

In addition, you must order a Mass Storage device, a Communications device and a Console Terminal. A Software Selection is optional.

VAX-11/750 Computer System

The VAX-11/750 computer system is the mid-range member of the VAX family of computers. Like the VAX-11/780 computer system, it implements the full 32-bit VAX architecture. yet at a lower price. In addition to sharing the same set of system software with the VAX-11/780 system, it also offers compatibility with the peripheral set via the UNIBUS and optional MASSBUS adapters. The processor uses a 32-bit architecture with addressing space for very large programs, an extensive instruction set with numerous data types, and 32-bit bus structure for high throughput.

The VAX-11/750 system hardware is complemented by the VAX/VMS (Virtual Memory System) operating system. This general purpose, multiprogramming operating system simultaneously handles multiuser, realtime, and multistream batch applications, plus on-line program development.

Highlights

- 32-bit architecture with 4 gigabytes of virtual address space allowing for large programs without overlays
- Full VAX Instruction Set, including over 240 basic operations, 9 addressing modes, 6 data types, and compatibility mode PDP-11 instructions
- Sixteen 32-bit general purpose registers that can be used for temporary storage and as accumulators, index registers, and base registers
- A multiuser, multifunction virtual memory operating system that supports a wide variety of languages and program development tools
- Dependability through extensive reliability, availability and maintainability features including automatic error checking, remote diagnosis, VAX/VMS operating system on-line diagnostics, and automatic restart
- Advanced semiconductor technology implementation that reduces the physical size and power requirements, and increases reliability
- Expansion to 2 Mbytes of ECC MOS Memory
- Direct memory access I/O for the UNIBUS or up to three MASSBUS (optional) adapters
- Hardware Bootstrap Load for up to 4 different devices

Description

The VAX-11/750 computer system is the mid-range, high-performance system that implements VAX Family architecture, thus making it software compatible with other VAX Family systems. User programs written for one VAX system can run without modification on any other VAX system. Data and software compatibility with PDP-11 computer systems is provided by utilization of the same disk or tape file formatting and through compatibility mode PDP-11 system instructions.

A variety of complete VAX-11/750 systems is available. Each system is based on the VAX-11/750 processor, the VAX/VMS operating system, a choice of mass storage subsystems, a console terminal, an 8-line communication multiplexer, and a minimum of 512 Kbytes of memory.

Central Processor

The Central Processing Unit (CPU) of the VAX-11/750 system is a microprogrammed computer that executes a large set of variable-length instructions in VAX native mode, and nonprivileged PDP-11 system instructions in compatibility mode.

VAX Native Mode

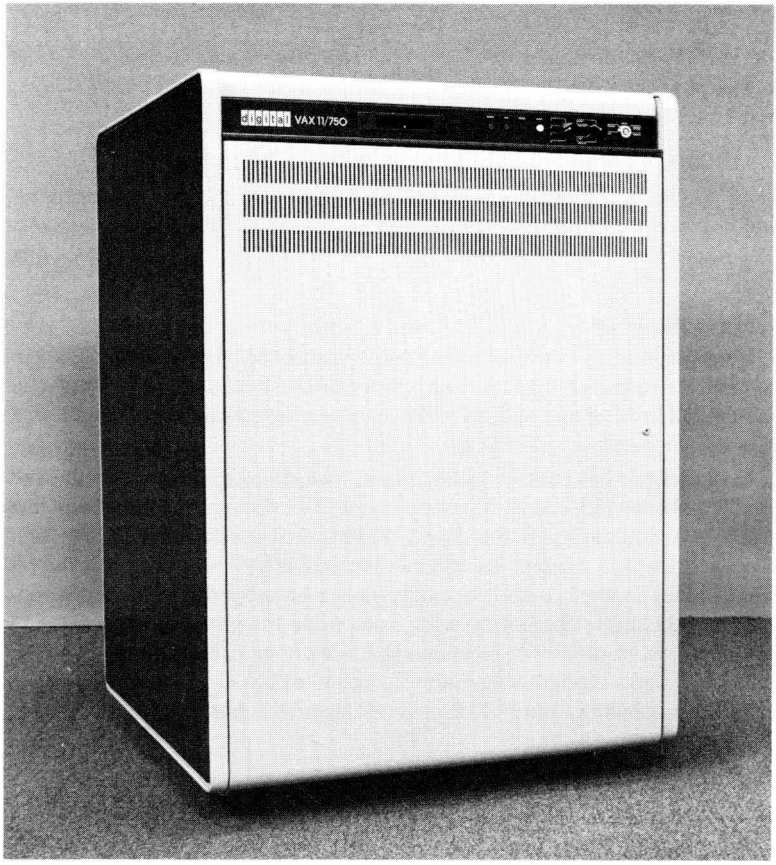
The native mode instruction set is highly versatile and bit-efficient, resulting in concise, fast-running programs. Each native mode instruction can use any of nine different addressing modes. This yields smaller programs and less complicated assembly language programming.

The processor has built-in floating point instructions that handle single and double precision (32- and 64-bit) computation. Full decimal arithmetic and text string instructions equip the VAX-11/750 processor for commercial and character-oriented data processing applications. The native mode instruction set also includes program control operating system can support many user environments, including realtime processing, interactive program development, and batch processing, running independently, concurrently, or in any combination. It includes a highly efficient scheduling algorithm, extensive record and file management capabilities, and virtual memory features achieved by an extremely efficient paging algorithm.

Supported Software

VAX systems are complemented by the high-performance VAX/VMS operating system. This operating system can support many user environments, including realtime processing, interactive program development, and batch processing, running independently, concurrently, or in any combination. It includes a highly efficient scheduling algorithm, extensive record and file management capabilities, and virtual memory features achieved by an extremely efficient paging algorithm. The VAX/VMS operating system offers a large choice of languages and utilities.

The VAX/VMS operating system also provides program development and maintenance utilities including an interactive and a batch editor, a linker with cross-reference ability, and a symbolic debugger.



VAX-11/750 Specifications	
Processor	
Micro-control store instruction time	320 nanoseconds
Control store size	6 Kwords (80-bit words, read only memory)
Internal data path	32 bits
Maximum system I/O rate	5 MB/s
Instruction buffer size	8-byte lookahead
Memory cache	4 KB direct mapped
VAX Instruction Set	
16 32-bit registers	
248 basic operations	

56 optional instructions	
32 priority interrupt levels	
9 addressing modes	
Data types: Integer, floating point, packed decimal, character string, variable bit fields, numeric strings	
Main Memory	
Virtual address space	4 gigabytes
Physical expansion	2 megabytes in 256 Kbyte increments
Parity	7-bit error correcting code per 32-bit longword
Cycle times	800 nanoseconds per 32-bit read 640 nanoseconds per 32-bit write
I/O UNIBUS Adapter	
Maximum UNIBUS I/O rate	1.5 MB/s through buffered data paths
Buffered data paths	3 total, 4-byte buffer in each
Power Requirements	These specifications are given for the VAX-11/750 processor only
Maximum AC line voltage tolerance	90-128 or 180-256 V
Frequency tolerance	47-63 Hz
Phases	1
Surge current	100 A
Maximum AC power consumption	1700 W
Physical Characteristics	These specifications are given for the VAX-11/750 processor only
Weight	182 kg (400 lbs) maximum
Height	106.2 cm (41.8 in)
Width	73.7 cm (29.0 in)
Depth	76.3 cm (30.0 in)
Operating Environment	These specifications are given for the VAX-11/750 processor only
Temperature	10° to 40°C (50° to 104°F)
Relative humidity	10 to 90%
Maximum altitude	2.4 km (8000 ft)
Heat dissipation	1460 kcal/h (5800 BTU/h)

ALL-IN-1 VAX 11/750 Starter Packages (2)
Ordering Information

1. RA60 Distribution = E75VS-CA

1	MS750-CA (1 Mbyte)
1	QD001-HJ
1	QD001-AZ
1	QD902-AJ OFFICE MENU
1	QD400-AJ VAX DECmail
1	QD708-AG DXT/VMS

ALL-IN-1 VAX 11/750 Starter Packages
Ordering Information

2. 9 Track Magtape Distribution = E75VS-CA

1	MS750-CA (1 Mbyte)
1	QD001-HM
1	QD001-AZ
1	QD902-AM OFFICE MENU
1	QD400-AM DECmail
1	QD708-AG DXT/VMS

(Note: no RL02 distribution)

VAXcluster Systems

A VAXcluster is composed of one or more VAX-11/750, VAX-11/780 or VAX-11/782 processors running on VAX/VMS connected by a high-speed bus, one or more mass storage servers, and communication links to the user community. Each cluster element connected to the high-speed bus is referred to as a cluster node. The maximum distance between the SC008 star coupler and any node is 45 meters.

The VAX-11/782 and VAX-11/780 Cluster Systems are presented on the next few pages. VAX-11/750-based VAXcluster systems are configured by starting with a standard system and adding a C1750 Computer Interconnect. As always, additional options, mass storage etc., can be added to the VAXcluster system when all basic requirements are met. There are two types of VAXclustering. The first type is a basic system element, which consists of a VAX-11/780 CPU with 2 MB of (64K chip) ECC MOS memory or a VAX-11/782 CPU with 4 MB of (16K chip) ECC MOS memory, C1780 computer interconnect, HSC50 intelligent controller, and (1) one each disk and tape interface (each with four ports), plus a VAX/VMS operating system license. To complete a system the following must be added:

- A load device, such as the RA60 205 MB removable disk drive or the TEU78 magnetic tape subsystem
- A system device, such as an RA60 205 MB removable disk drive or RA81 456 MB fixed disk drive or RA80 121 MB fixed disk drive
- A LA120 console terminal
- A communications I/O adapter such as a DZ11 eight-line asynchronous serial communications interface, a DZ32 eight-line asynchronous multiplexer, or a DMF32 communications interface which consists of an eight-line asynchronous interface, a single-line synchronous interface, and a parallel interface for a lineprinter or a user-developed device
- VAX/VMS operating system software (the first purchase of VAX/VMS must be fully supported before a license-only version may be purchased)

The second type of Cluster is an upgrade to an existing VAXcluster. The upgrade consists of a VAX-11/780 CPU with 2 MB of (64K chip) ECC MOS memory or a VAX-11/782 CPU with 4 MB of (16K chip) ECC MOS memory, C1780 computer interconnect, and a VAX/VMS operating system license. To this must be added an LA120 console terminal, and an optional system disk such as the RA60, RA80 or RA81 disk drives.

The system disk for the VAXcluster Upgrade is optional. VAX/VMS requires a system disk to be allocated to each processor connected to the cluster. If the customer site has an existing disk that will be allocated to the upgrade building block, then the system disk is optional.

CI750 Adapter

The CI750 adapter is available as an option for the VAX-11/750 and VAX-11/751 computer systems. It is a microprocessor controlled, fully buffered, high-speed interface between the Computer Memory Interconnect bus (CMI) of the CPU and the dual path CI. The capability to reliably communicate over the CI in the event of failure of one of the data paths is insured with the dual CI paths.

The CI unit is mounted in a 101.6 cm (40.6 in) high cabinet. One CI750 adapter can be configured with each VAX-11/750 processor. The CI750 consists of three extended-length, hex-height modules, a backplane, and a power supply, all contained within a mounting enclosure 26.67 cm (10.5 in.) in height. A CI interface module is included and installs in an I/O Adapter slot of the CPU backplane. The interface module is connected to the CI adapter through a set of flat cables. Space is available within the CI750 cabinet for mounting an additional CI750 adapter. Although mounted in the same cabinet as the first CI750, the additional CI750 adapter is used to connect a second, separate VAX-11/750 or VAX-11/751 processor to the CI bus.

The CI components consist of the CI750 adapter, the interconnecting coaxial cables and the SC008 Star Coupler unit. Signals between the adapter and Star Coupler are transferred through four coaxial cables. The maximum length of each cable is 45 m (147.6 ft).

The CI750 cabinet attaches to the left side (preferred) or right side of VAX-11/750 CPU cabinets that comply with the latest Federal Communications Commission's (FCC) rulings.

For non-FCC-compliant systems, the CI750 unit must be mounted on the right side of the VAX-11/750 CPU cabinet. If a UNIBUS expansion cabinet is present in the existing VAX-11/750 system, the CI750 cabinet must be mounted between the CPU and UNIBUS cabinets. This configuration requires that longer UNIBUS cables be ordered because of the new position of the UNIBUS cabinet.

A minimum of 2 Mbytes of main memory is required in the VAX-11/750 CPU to support the installation and operation of the CI750 adapter.

CI780 Adapter

The CI780 adapter is available as an option for the VAX-11/780 and VAX-11/782 systems. It is a microprocessor controlled, fully buffered, high-speed interface that connects the Synchronous Backplane Interconnect (SBI) of the CPU to the dual path CI bus. The capability to reliably communicate over the CI bus in the event of failure of one of the data paths, is insured with the dual CI paths.

The CI780 consists of a backplane assembly that contains four hex-height, extended-length modules, a cable set and connector panel, and a power supply. The adapter can be mounted in any option panel space available within the CPU cabinet or the CPU expansion cabinet. Coaxial cables from the CI780 adapter are terminated at coaxial connector panels that are installed into the slots of the I/O connector panel at the rear of the CPU or expansion cabinets.

The CI components consist of the CI780 adapter, the interconnecting coaxial cables, and the SC008 Star Coupler unit.

A minimum of 2 Mbytes of main memory is required in the VAX-11/780 CPU to support the installation and operation of the CI780 adapter.

Signals to and from the CI780 adapter and Star Coupler are transferred through four coaxial cables. The maximum length of each cable is 45 m (147.6 ft).

CI750/CI780 Adapters Specifications

Data Format	Manchester-encoded serial data packets
Data Transfer Rate	70 Mbits per second maximum
Data Throughput	CI750—up to 2.4 Mbytes per second sustained CI780—up to 3.0 Mbytes per second systained
Modes	Uninitialized Uninitialized/Maintenance Disabled Disabled/Maintenance Enabled Enabled/Maintenance
Priority Levels	
CI750	ARB 1,2,3 (CMI) BR4
CI780	TR14 (SBI) BR4
CI Cluster Cabling	Dual-path, Half-duplex BNCIA double shielded coaxial cables, 45 meters (147.6 feet) maximum
Power Requirements	
CI750-BA	ac Power—120V, 60 Hz (nominal) Line Voltage—90-128 Vrms Frequency—47-63 Hz Phases—single Steady-state current—7.5A at 120 VAC Plug type—L5-30P Cable length—3m (9.84 ft)

CI750-BB	ac Power—240V, 50 Hz (nominal) Line voltage—180-256 Vrms Frequency—47-63Hz Phases—single Steady-state current—4.2A at 240Vac Plug type—(varies by country) Cable length—3m (9.84 ft)
CI750 (CCI) Module	5 Vdc at 11.0A
CI780-AA	ac Power—120V, 60 Hz (nominal) Line voltage—90-128 Vrms Frequency—47-63 Hz Phases—single
CI780-AB	ac Power—240V, 50 Hz (nominal) Line voltage)180-256 Vrms Frequency—47-63 Hz Phases—single
Operating Environment	
Temperature	10°C to 40°C (50°F to 104°F) with a temperature gradient of 20° C/hour (36°F/hour)
Relative Humidity	10% to 90% with a wet bulb temperature of 28°C (82°F) and a minimum dew point of 2°C (36°F)
Altitude	Sea level to 2400 meters (8000 ft) Derate the maximum allowable operating temperature by 1.8 C/1000 meters (1°F/1000 feet) for operation above sea level

VAX-11/782 VAXcluster Ordering Information

782CA-AE(AJ) Components
- VAX-11/782 Dual CPU
- 4 MB (16K Chip) shared ECC MOS memory
- C1780-AA(AB) (120V/240V) Computer interconnect
- SC008-AC Star Coupler
- Two BNCIA-20 20 m (60 ft) CI cables (total of eight cables)
- HSC50-AA(AB) Intelligent disk/tape server
- HSC5X-BA Interface to four SDI disks
- HSC5X-CA Interface to four STI tapes
- QE001-DZ VAX/VMS operating system software license
- H9652-MA(MB) 60 in (106 cm) high UNIBUS Expansion Cabinet with BA11-K expander box and DD11-DK backplane

In addition, you must order a Load Device, a System Device, a Console Terminal, a Communications I/O adapter, and a VMS Software package.

VAX-11/782 VAXcluster Upgrade Ordering Information

782CA-AP(AT) Components
- VAX-11/782 Dual CPU
- 4 MB (16K Chip) shared ECC MOS memory
- H9652-MA(MB) cabinet
- CI780-AA(AB) computer interconnect
- Two BNCIA-20 20 m (60 ft) CI cables (total of eight cables)
- QE001-DZ VAX/VMS operating system license

In addition, you must order a Communications I/O adapter and a Console Terminal; a System Device is optional.

VAX-11/780 VAXcluster Ordering Information

780CA(AE)(AJ) Components
- VAX-11/780-EA(ED)
- 2 MB (64K Chip) ECC MOS memory
- CI780-AA(AB) (120V/240V) computer interconnect
- SC008-AC Star Coupler
- Two BNCIA-20 20 m (60 ft) CI cables (total of eight cables)
- HSC50-AA(AB) intelligent disk-tape controller
- HSC5X-BA Interface to four SDI disks
- HSC5X-CA Interface to four STI tapes
- QE001-DZ VAX/VMS operating system license
- H9652-MA(MB) 60 in (106 cm) high UNIBUS expansion cabinet with BA11-K expander box and DD11-DK backplane.

In addition, you must order a Load Device, a System Device, a Console Terminal, a Communications I/O adapter, and a VMS Software package.

VAX-11/780 VAXcluster Upgrade Ordering Information

780CA-AP(AT) Components
- VAX-11/780-EA(ED)
- 2 MB (64K chip) ECC MOS memory
- H9652 UNIBUS expansion cabinet
- CI780-AA(AB) computer interconnect
- Two BNCIA-20 20 m (60 ft) CI cables (total of eight cables)
- QE001-DZ VAX/VMS operating system license

In addition, you must order a Communications I/O adapter and a Console Terminal; a System Device is optional.

CI780/CI750 Ordering Information	
C1780-AA,-AB	C1780 adapter option including an H7100 power supply. The C1780-AA operates with 120 Vac input power operation and the C1780-AB operates with 240 Vac input power
C1780-SA,-SB	Dual node starter kit consisting of two C1780-AA,-AB adapters, one SC008-AC Star Coupler, and two BNCIA-10 coaxial cables
C1750-BA,-BB	C1750 adapter mounted in a 101.6 cm (40 in) height cabinet. The C1750-BA operates with 120 Vac input power and the C1750-BB operates with 240 Vac input power.
C1750-AA,-AB	An expansion C1750 adapter for mounting into the cabinet supplied with the C1750-BA,-BB option or into a customer supplied FCC-compliant cabinet for use with the VAX-11/751 CPU. The C1750-AA operates with 120 Vac input power and the C1750-AB operates with 240 Vac input power.
C1750-SA,-SB	Dual node starter kit contains two C1750-BA,-BB adapters, an SC008-AC star coupler unit, and two BNCIA-10 cables.

SC008 Star Coupler

The SC008 Star Coupler serves as the common, central connecting point for all elements of the CI. The Star Coupler is an RF-transformer-coupled, dual-path, passive device that connects up to 16 CI nodes. The unit distributes the signals and provides signal isolation between paths and noise rejection.

The Star Coupler occupies a 101.6 cm (40.0 in) high, free-standing cabinet that has mounting space for up to four star-coupler connector panels. Each panel contains eight transmit and eight receive coaxial connectors, and six modularity coaxial connectors. The modularity connectors are used to connect the panels together for node expansion. The Star Coupler is supplied in an eight node, dual-path configuration (SC008-AC) with two connector panels. A Star Coupler expander option (SC008-AD) is available and consists of two additional panels for mounting within the cabinet. This option increases the capability to 16 nodes.

The transmit and receive cables enter the cabinet at the rear and are routed through the cable guides to the connector panels. Provisions are made for the cables to enter at either the top rear or bottom rear of the cabinet. A rear door and cable shield protect the installed cables.

C008 Star Coupler Unit Specifications	
Electrical Characteristics	
I/O Connectors	Female TNC coaxial
Impedance	50 ohms
Bandwidth	1 to 100 Mhz
Isolation between I/O ports	30 db
Insertion loss (input to output)	20 db (input to output)
Nodes	
SC008-AC	Eight nodes, dual-path
SC008-AD	Provides eight additional nodes, dual-path, for SC008-AC
Physical Characteristics	
Cabinet size	
Height	40.0 in (101.6 cm)
Width	21.25 in (54 cm)
Depth	30.0 in (76.2 cm)
Connector panel size	
Height	8.75 in (22.2 cm)
Width	16 in (40.64 cm)
Depth	4.0 in (10.2 cm)
Weight	9.6 lbs (4.3 kg)
Environmental (MIL STD 202E)	
Operating and storage temperature	−55° to 100°C (−67°F to 212°F)
Operating humidity	95% relative

SC008 Ordering Information	
SC008-AC	One A panel and one B panel. Eight node Star Coupler option with a dual-path connector panel in a 101.6 cm (40.0 in) high cabinet
SC008-AD	Eight to 16 node dual-path expansion kit for mounting in the SC008-AC unit.
SC008-AC and SC008-AD (combined)	Two A panels and two B panels for up to 16 node dual-paths.

VAX-11/730 Computer System

The VAX-11/730 computer system is the entry-level member of the VAX family of computers. Like the VAX-11/780 and the VAX-11/750 computer systems, it implements the full 32-bit VAX architecture and runs the same set of system software. With the VAX-11/730, however, VAX functionality is available at a much lower price, providing the ability to move VAX power down to the project or section level.

The processor uses a 32-bit architecture, an extensive instruction set with numerous data types, and a 32-bit bus structure for high throughput. Connection to mass storage devices and other peripherals is provided through a UNIBUS adapter.

VAX-11/730 system hardware is complemented by the VAX/VMS operating system.

Highlights

- 32-bit architecture with 4 gigabytes of virtual address space
- Full VAX Instruction Set, including 304 basic operations
- A multiuser, multifunction virtual memory operating system that supports a wide variety of languages and program development tools
- Dependability through extensive reliability, availability and maintainability features including automatic error checking, customer runnable diagnostics, and VAX/VMS operating system on-line diagnostics
- Bit-slice and Programmed Array Logic (PAL) technology that increase logic density and reduce size and price
- 32-bit VAX processor in rack-mountable 10.5 inch high box
- Compact, 8-user, packaged system in a single 42 inch high cabinet
- Expansion to 5 MB of 64 K chip ECC MOS Memory
- Direct memory access I/O for the UNIBUS
- An integrated disk controller that interfaces up to four rack-mounted disks
- DMF32 multifunction communications controller (standard on systems) featuring programmed silo and DMA transmit modes
- Optional Floating Point Accelerator (FP730) to decrease instruction execution times of floating point arithmetic and some integer arithmetic operations

Description

The VAX-11/730 computer system, the entry-level VAX system, implements the full 32-bit VAX architecture. Because the VAX-11/730 is software compatible with the other VAX family systems, user programs written for one VAX system can run without modification on any other VAX system. Data and software compatibility with PDP-11 computer systems is provided by utilization of the same disk or tape file formatting and through compatibility mode PDP-11 system instructions.

Two complete VAX-11/730 systems are available. Each system is based on the VAX-11/730 processor, the VAX/VMS operating system, a minimum of 1 MB of memory, a console terminal, a multiline DMF32 multifunction communications controller, and two mass storage devices. Both VAX-11/730 packaged systems, the Dual RL02 and the RL02/R80, comply with the Class A FCC test parameters of Chapter 15, Subchapter J.

The two packaged systems are designed for different performance environments. A Digital Software Service Specialist can help determine which one best suits application needs.

Central Processor

The central processing unit (CPU) of the VAX-11/730 system is a microprogrammed computer that executes the large set of variable-length instructions in VAX native mode, and nonprivileged PDP-11 system instructions in compatibility mode.

Supported Software

VAX systems are complemented by the high-performance VAX/VMS operating system. This operating system can support many user environments, including realtime processing, interactive program development, and batch processing, running independently, concurrently, or in any combination. It includes a highly efficient scheduling algorithm, extensive record and file management capabilities, and virtual memory features achieved by an extremely efficient paging algorithm. The VAX/VMS operating system offers a large choice of languages and utilities.

The VAX/VMS operating system also provides program development and maintenance utilities including an interactive and a batch editor, a linker with cross-reference ability, and a symbolic debugger.

VAX-11/730 Specifications	
Processor	
Micro-control store instruction time	270 nanoseconds
Control store size	16 K words (24-bit words) 17 K words with the IDC
Internal data path	32 bits
Instruction buffer size	4-byte lookahead
VAX Instruction Set	
16 32-bit registers	
304 basic operations	
90 instructions accelerated by the FP730 option	

32 priority interrupt levels	
13 addressing modes	
Data types: Integer, floating point, packed decimal, character string, variable bit fields, numeric strings	
Main Memory	
Virtual address space	4 GB
Physical expansion	Up to 5 MB in 1 MB increments
Parity	7-bit error correcting code per 32-bit longword
Memory cycle time	810 nanoseconds Read/Write
I/O UNIBUS Adapter	
Maximum UNIBUS I/O rate	1.5 MB/s
Power Requirements	These specifications are given for the VAX-11/730 processor only

Specifications for 60 Hz systems are listed first; 50 Hz systems are in parenthesis

Maximum	**Dual RL02 System**	**RL02/R80 System**
AC line voltage tolerance	90–128 V (180–256 V)	90–128 V (180–256 V)
Frequency tolerance	47–63 Hz (47–63 Hz)	60 Hz ± 1 Hz (50 Hz ± 1 Hz)
Phases	1 (1)	1 (1)

	Box	**Dual RL02 System**	**RL02/R80 System**
Surge current	15 amps (90 V RMS) 7.5 amps (180 V RMS)	20 amps (90 V RMS) 10 amps (180 V RMS)	32 amps (90 V RMS) 12 amps (180 V RMS)
Maximum AC power consumption	470 watts	790 watts	1205 watts

Mechanical

	Box	**Dual RL02**	**RL02/R80**
Weight (max.)	45.4 kg (100 lbs)	227.0 kg (500 lbs)	249.7 kg (550 lbs)
Height	26.6 cm (10.5 in)	106.2 cm (41.8 in)	106.2 cm (41.8 in)
Width	47.0 cm (18.5 in)	54.1 cm (21.3 in)	54.1 cm (21.3 in)
Depth	66 cm (26.6 in)	80.0 cm (31.5 in)	80.0 cm (31.5 in)

Operating Environment	These specifications are given for the VAX-11/730 processor only
Temperature	10° to 40°C (50° to 104°F)
Relative humidity	10 to 90%
Maximum altitude	2.4 km (8000 ft.)

	Box	**Dual RL02 System**	**RL02/R80 System**
Heat dissipation	403.2 Kcal/hr (1603 Btu/hr)	756.0 Kcal/hr (2694 Btu/hr)	1260.0 Kcal/hr (4109 Btu/hr)

ALL-IN-1 VAX 11/730 Starter Packages (2)
Ordering Information

1. RA60 Distribution = E73VS-CA

1	MS730-CA (2 Mbyte)
1	QC902-AJ OFFICE MENU
1	QC001-HJ VMS PACK & DOC
1	QC001-AZ
1	QC400-AJ VAX DECmail
1	QC708-AG DXT/VMS

ALL-IN-1 VAX 11/730 Starter Packages
Ordering Information

2. 9 Track Magtape Distribution = E73VS-DA

1	MSR730-CA (1 Mbyte)
1	QC902-AM OFFICE MENU
1	QC001-HM VMS PACK & DOC
1	QC001-AZ
1	QC400-AM VAX DECmail
1	QC708-AG DXT/VMS

VAX-11/725 Systems

The VAX-11/725 is Digital's smallest, most affordably-priced, UNIBUS VAX/VMS system. This compact, quiet system was designed specifically for the open-office environment and also contains the new RC25 disk subsystem. The VAX-11/725 appeals both as the CPU for a single-user workstation and as a low-priced, multi-user system.

The RC25 disk provides the reliability and performance of Winchester technology with the flexibility of removable media.

The RC25 contains an intelligent controller and onboard microdiagnostics. Of the 52 Mbyte of storage, 50 are customer-usable. The first 26 Mbyte are on a fixed platter, while the remaining 26 Mbyte are stored on an 8 inch removable cartridge. This allows the copying of disks to be accomplished with a 1:1 backup ratio.

Standard Components

Standard components for the VAX-11/725 are listed in this section. The three systems are described in the Ordering Information section.

- VAX-11/730 CPU
- 1 MB MS730-CA (64K chip) ECC MOS memory
- Two TU58 tape cartridge drives
- RC25 52 Mbyte (26 Mbyte fixed, 26 Mbyte removable) 8 inch Winchester disk with KLESI controller
- Pedestal Cabinet: 17.5 in (44.45 cm) W x 24.5 in (62.23 cm) H x 28.5 in (72.39 cm) D
- QC001-DZ VMS operating system license*
- Power controller and power supply
- 25 ft (7.6 m) console cable

*Support is required for the first VAX/VMS operating system purchased.

VAX 11/725 Specifications*	
Power required	20 amp dedicated power
Height	24.5 in. (62.23 cm)
Width	17.5 in. (44.45 cm)
Depth	28.5 in. (72.39 cm)

*See VAX-11/730 for CPU specifications.

VAX-11/725 Ordering Information	
SV-CXNZA-EA(ED)	VAX/VMS QC001-A4. Dedicated backplane slot for FP730, data path, memory controller, worktable control store, 1 MB ECC MOS memory, slot dedicated for a second MB ECC MOS memory, 4 Hex slots for Unibus options
SV-CXNZA-EK(EN)	VAX/VMS license QC001-DZ
SV-CXNZB-EA/ED	Same as above, except: 2 MB ECC MOS memory, 3 Hex slots for Unibus options, and a dedicated slot for DMF32 multi-function controller.
SV-CXNZB-EK(EN)	VAX/VMS license QC001-DZ
SV-CXNZC-EA(ED)	Same as above except: an FP730 floating point accelerator, 2 MB ECC MOS memory, 1 Hex slot for Unibus option, two DEUNA modules, and a DMF-32 multi-function controller.
SV-CXNZC-EK(EN)	VAX/VMS license QC001-DZ

In addition, you must purchase either a VT100, VT125, LA100 or LA120 console device.

MicroVAX 1

The MicroVAX 1 is the first microcomputer member of the 32-bit VAX family of computer systems, and is the first VAX configuration to use the extended Q-bus.

Engineered to perform a wide range of applications such as dedicated realtime applications, office automation, and general purpose programming, the MicroVAX 1 microcomputer gives you software compatibility with larger VAX systems. Any non-privileged, native-mode program which runs on a VAX/VMS system will execute unmodified on a MicroVAX 1 microcomputer.

The MicroVAX 1 system can operate in any normal office environment. No special air conditioning is required. It is also available in three versions—a rack-mount version that fits in a standard 19-inch cabinet, a tabletop version that conveniently sits on top of a desk, or a floor stand model which fits easily under a desk or table. No special computer room is required. And the MicroVAX 1 system runs on standard 15 amp electrical lines. No special wiring is required.

The MicroVAX 1 microcomputer is customer-installable and easy-to-operate. It has a rear I/O distribution panel that provides simple plug-in connectors for terminals, network interfaces, and other cables.

The MicroVAX 1 system can be networked by utilizing an Ethernet Q-bus interface. Networking applications can consist of other MicroVAX 1 systems such as in an applications development environment, or consisting of departmental systems or VAXclusters which may be used for managerial applications, data collection, etc.

Hardware

The MicroVAX 1 CPU is implemented as two quad-height modules that can be inserted into the Q/CD slots of the extended Q-bus backplane. They occupy adjacent slots and are connected together over the top with a special cable. The first board is the CPU module which provides the 32-bit data path, microsequencer, and control store. The second board is a memory management and cache memory module which provides the logic to interface the extended Q-bus to the internal 32-bit VAX architecture.

The MicroVAX 1 microcomputer system features:

- MicroVAX 1 native-mode instruction set
- 256-Kbyte or 512-Kbyte parity MOS memory increments
- 10- or 28-Mbyte fixed Winchester disk subsystem
- 2 x 400-Kbyte diskette subsystem
- Disk controller for both Winchester disk and diskette subsystems
- Single and double precision (G) floating point datatypes in firmware
- 8-slot extended Q-bus backplane
- Ethernet Q-bus interface
- 8-Kbyte I/O space

- Extended block mode transfer support
- 8-Kbyte direct-mapped cache
- 512-entry (longword) translation buffer
- 10-microsecond interval timer
- Console serial line
- 8-Kbyte boot ROM
- VAX ASCII console and TTY emulation
- Microverify self-test diagnostics
- Mass storage control protocol
- 230-watt switching power supply
- I/O distribution panel with inserts for expansion

Software

A realtime programming toolkit and two VAX-compatible virtual memory operating systems provide a range of VAX solutions for 32-bit microcomputer users.

- VAXElan—A fully modular software system that lets programmers build dedicated, realtime applications on VAX/VMS development systems. The VAXElan toolkit uses the Pascal language and is layered on the VMS operating system as a development tool. After development, VAXElan applications run standalone on VAX or MicroVAX 1 target systems via the kernel executive.
- MicroVMS—A fully compatible modular version of the VMS operating system. The MicroVMS operating system can be used in both the general purpose multifunction and multiuser environments.
- MicroVAX ULTRIX—A standalone operating system based on the UNIX (Berkley Version 4.2) operating system for the multiuser development environment.

Note: The MicroVMS and MicroVAX ULTRIX operating systems will be supported in the near future.

Specifications	
Power Supply	
Rack-mountable system	
Height	13.3 cm (5.25 in)
Width	48.3 cm (19.0 in)
Depth	63.5 cm (25.0 in)
Weight	24.0 kg (53.0 lb)
Watts	230
Receptacles required	NEMA #5-15R (120VAC/60 Hz) NEMA #6-15R (240VAC/50 Hz) 36 amps at +5 VDC 7 amps at +12 VDC 230 watts overall
Floor Stand System	
Height	62.3 cm (24.5 in)
Width	25.4 cm (10.0 in)
Depth	68.5 cm (27.0 in)
Weight	31.7 kg (70.0 lb)
Watts	230
Receptacles required	NEMA #5-15R (120VAC/60 Hz) NEMA #6-15R (240VAC/50 Hz)
Tabletop System	
Height	15.2 cm (6.0 in)
Width	54.6 cm (21.5 in)
Depth	68.5 cm (27.0 in)
Weight	29.4 kg (65.0 lb)
Watts	230
Receptacles required	NEMA #5-15R (120VAC/60 Hz) NEMA #6-15R (240VAC/50 Hz)

MicroVAX 1 Ordering Information	
610QA-DE	Rack-mountable MicroVAX 1 CPU with 512 Kbyte memory and VAXElan license
610QA-XZ	Same as above without license
610QH-DE	Floor stand/tabletop MicroVAX 1 with 512 Kbyte memory and VAXElan license.
610QH-XZ	Same as above without license.
610QB-DE	Rack-mountable MicroVAX 1 CPU with 512 Kbyte memory, 800 Kbyte diskette, 10 Mbyte disk and VAXElan license
610QB-XZ	Without license
610QJ-DE	Same as above in floor stand/table top model
610QJ-XZ	Without license
610QC-DE	Rack-mountable MicroVAX CPU with 1 Mbyte memory, 800 Kbyte diskette, 28 Mbyte disk and VAXElan license
610QC-XZ	Without license
610QK-DE	Same as above in floor stand/tabletop model
610QK-XZ	Without license

MicroVAX 1 Options Ordering Information	
MicroVAX 1 system options:	
MSV11-PK	256-Kbyte parity MOS memory.
MSV11-PL	512-Kbyte parity MOS memory.
DZV11-DP	Four-line asynchronous program-controlled multiplexer with modern control. It is a quad-size option for use on Q-bus processors.
DEQNA-KP	Ethernet communications controller. It is used to connect a Q-bus processor to an Ethernet location network.
MicroVAX 1 upgrade options:	
DLVJ1-LP	Four-line asynchronous interface without modem control. It is a dual-size, double buffered module used to support up to four asynchronous devices on Q-bus processors.
RX50-AA	2 x 400-Kbyte diskette subsystem.
RD51-A	10-Mbyte fixed Winchester disk subsystem.
RD52	28-Mbyte fixed Winchester disk subsystem.
RQDX1	Disk controller.
DEQNA-M	Ethernet communications controller module and documentation.
CK-DEQNA-KB	12-inch cable and panel insert with 25-pin EIA connector for the DEQNA-M communications controller.

MICRO/PDP-11

The MICRO/PDP-11 family of small, multiuser computers consists of both floppy-disk and fixed-plus-floppy systems. They are packaged to fit easily under a desk or worktable, on a tabletop, or as a rack mountable box enclosure, and can be expanded to support up to 10 users.

The 5.25 inch RD51 Winchester disk drive, included in some MICRO/PDP-11 models, has a formatted capacity of 10 MB. The RX50 floppy diskette subsystem, included in all models, accepts two single-sided 5.25 in diskettes, each with a capacity of 400 KB. (These are the same diskettes used by Digital's Professional series of personal computers.) The RQDX1 controller handles both the RD51 and the RX50 and performs Direct Memory Access (DMA) block-mode transfers for maximum system efficiency.

MICRO/PDP-11 Specifications	
Size	
Rack-mount MICRO/PDP-11	13.1 cm high x 47.5 cm wide x 62.5 cm deep 5.25 inches high x 19 inches wide x 25 inches deep
Floor-stand MICRO/PDP-11	61.25 cm high x 25.4 cm wide x 68.6 cm deep 24.5 inches high x 10 inches wide x 27 inches deep
Tabletop MICRO/PDP-11	15 cm high x 53.8 cm wide x 68.6 cm deep 6 inches high x 21.5 inches wide x 27 inches deep
Power Requirement	
120 Vac nominal	90–128 Vac, 47–63 Hz 4.4 A typical, 6.0 A maximum
240 Vac nominal	180–256 Vac, 47–63 Hz 2.2 A typical, 4.0 A maximum
320 W at rated power supply output	
7 A fuse	
Environment	
15°–32° Celsius (59°–90° Farenheit), operating –40°–60° Celsius (–40°–151° Farenheit), nonoperating	
20%–80% relative humidity, operating 10%–95% relative humidity, nonoperating	
260 W typical, 320 W maximum heat dissipation Meets FCC EMI/RFI requirements for a Class A computing device	
RX50 Diskette Drive	
Total capacity 819.2KB formatted	
Dual diskettes, single spindle	
164 ms average seek	
100 ms average latency	
250K bits/sec (31.25 Kbytes/sec) average transfer rate	
Single-sided 96 tracks/inch preformatted diskettes (RX50K-XX)	

RD51 Fixed Disk
Capacity 9.93MB formatted
Four surfaces, single spindle
5M bits/sec (625 Kbytes/sec) average transfer rate
8.33 ms average latency
85 ms average access time (includes setting)
Power Supply
4.5–36 A @ +5 Vdc 0–7 A @ +12 Vdc
Total power output: 230 W maximum
Overvoltage, overcurrent protection
Thermal Shutdown
DIGITAL standard ac OK and dc OK signals, and remote controller signal

MICRO/PDP-11
Ordering Information

11A23-F	MICRO/PDP-11 Floor/Table System Base (floppy only). Includes CPU, 256 KB parity MOS memory, RX50 dual diskette subsystem.
11A23-R	Same as 11A23-F, but includes rackmount hardware instead of plastic covers and floor stand.
11C23-F	MICRO/PDP-11 Floor/Table System Base. Includes CPU, 256 KB parity memory, RX50 dual diskette subsystem, RD51 Winchester disk subsystem.
11C23-R	Same as 11C23-F, but includes rackmount hardware instead of floor-stand and plastic covers.
SX-RA500-EX	MICRO/PDP-11 Floor/Table Packaged System. Includes the 11C23 features plus a PDP-11 Operating System General License and a DZV11 multiplexer for a total of six terminal ports.

VT200 Family of Video Terminals

Digital's newest family of video terminals, the VT220, the VT240, and the VT241, advance the standard set by Digital's VT100 family of terminals. The VT200 family includes all the universal features of the VT100 family and expands these further by letting you control more of the terminal's operations. So that you can tailor the VT200 family to your application, Digital has developed a series of user-friendly set-up menus. These menus contain parameters that you can select and change easily. Just enter Set-Up mode, move the cursor to the field of the characteristic you want to change, and press the ENTER key. It's that simple.

VT220 and VT240 series terminals can be used with any of Digital's processors. These video terminals can also work with other vendors' systems. And just like the VT100 family, the VT200 family is fully compatible with Digital's printers.

VT220 Video Terminal

The VT220 video display terminal is the low-end member of Digital's new VT200 family of video terminals. This monochromatic text terminal not only includes all the capabilities of Digital's VT100 family, but gives you more control of the terminal's operations.

Since the VT220 video terminal provides so much functionality, the unit is totally self-contained. If you connect your VT220 terminal to a printer, such as Digital's LA50 Personal Printer, you can print the text you've created.

The VT220 terminal consists of a monitor and keyboard. The monitor contains a monochrome cathode ray tube and a terminal controller circuit board. Also cointained in the monitor are: power supply and monitor board, host serial communications port, and printer port.



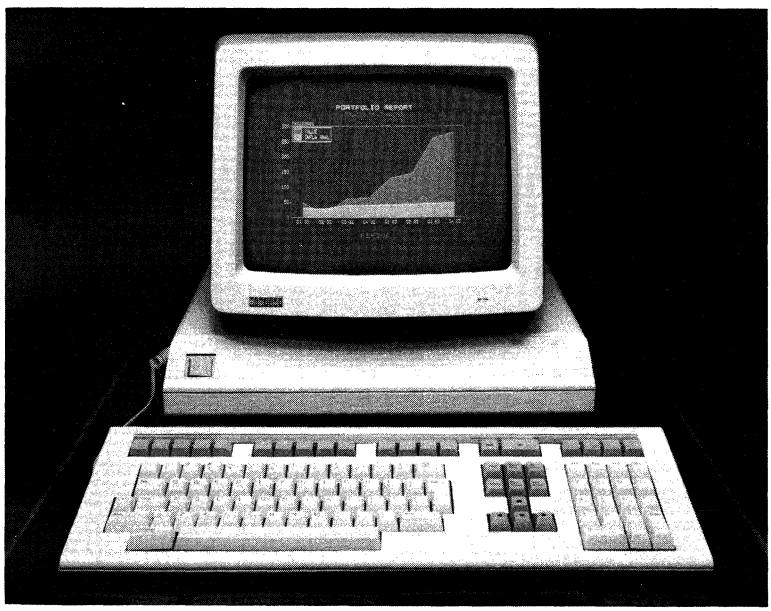
VT240 Series Text and Graphics Terminals

The VT240 is a monochromatic text and graphics video display terminal. As the midrange member of the new VT200 family, it incorporates all the features of the VT100 family and the VT220 terminal. You can upgrade the VT240 to include the optional integral modem that supports auto dialing/auto answering functions.

By generating full bit-mapped graphics in Tektronix 4010/4014 emulation, the VT240 supports the industry's graphics standards. The VT240 also supports ReGIS (Remote Graphics Instruction Set), Digital's general purpose graphics command language. It allows you to create pictorial data as easily as you can create ASCII text. By connecting this terminal to a graphics printer, such as Digital's Letterprinter 100, you can reproduce the screen's content.

The VT240 uses the same keyboard that is used with the VT220 terminal, a monitor, and a system box. The system box contains the power supply, controller board, and electrical connectors.

The VT241 terminal, the high-end member of the VT200 family, is a VT240 with a color monitor, instead of the monochrome one. It offers the same capabilities as the VT240, but with the RGB monitor providing color graphics display. The only difference between the VT240 and the VT241 is the monitor.



VT200 Family of Video Terminals Specifications	
Display	
VT220 CRT	30.5 cm (12 in.) diagonal measure; white, green, or amber phosphor; monochrome composite
VT240 CRT	30.5 cm (12 in.) diagonal measure; white, green, or amber phosphor; monochrome composite
VT241 CRT	33 cm (13 in.) diagonal measure, P4 phosphate, RGB color composite
Text format	24 lines x 80 characters or 132 characters (keyboard- or host-selectable)
VT240 series graphics format	800 horizontal x 240 vertical addressable points, two bits per point 800 x 480 logical address range for 2:1 picture aspect ratio
Character	VT220: 7 x 9 dot-matrix with 2-dot descenders VT240 Series: 8 x 9 dot-matrix with 2-dot descenders
Character size	3.35 mm x 2.0 mm (0.132 in. x 0.078 in.) in 80-column mode 3.35 mm x 1.3 mm (0.132 in. x 0.051 in.) in 132-column mode
Character set	ASCII, U.K. National, Digital Special Graphics, and Digital Supplemental Character Sets (each 94 printing characters). The ASCII and Digital supplemental character sets make up Digital's multinational character set.
Cursor type	Keyboard-selectable, blinking block character or blinking underline (text) Blinking diamond, visible when graphics mode is active (graphics) Crosshair, visible when graphics input mode is active
Keyboard	
General	105-key detachable unit with a 1.9 m (6 ft) coiled cord attached with a 4-pin telephone-type modular connector. Word processing versions and data processing versions are available in multiple languages and country kits.
Key layout	51-key arrangement and sculpturing similar to standard typewriter keyboard with an 18-key auxiliary keypad
Numeric keypad	18-key numeric keypad with period, comma, minus, enter, and 4 general purpose function keys
Function keys	36 keys, firmware and software driven
Height	5.0 cm (2.0 in.)
Width	53.3 cm (21 in.)
Depth	17.1 cm (6.8 in.)
Weight	2.0 kg (4.5 lbs)

Communications	
Type	Full-duplex, asynchronous (all models)
Interface	EIA RS-232-C and 20 mA, both standard
Speeds	75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19,200 b/s, keyboard selectable
Parity	7- and 8-bit: Even, odd, mark, space or none, keyboard selectable 8-bit only: Mark and space
Character size	7- or 8-bit, keyboard selectable
Buffer prevention overflow/ Synchronization	Automatic generation of XON and XOFF control codes, selectable in Set-Up mode
Echo	Local echo selectable in Set-Up mode
Power Requirements	
Line voltage	90–128 Vax RMS single phase, 3 wire; 180–268 Vac RMS single phase, 3 wire (switch-selectable)
Line frequency	47–63 Hz
Current (VT220)	0.48 A RMS at 120 Vac RMS 0.24 A RMS at 240 Vac RMS
Current (VT240 Series)	2.2 A RMS at 90 Vac RMS 1.1 A RMS at 180 Vac RMS
Power consumption (VT220)	60 W, maximum
Power consumption (VT240 Series)	107 W, maximum
Operating Environment	
Temperature	10° to 40°C (50° to 104°F)
Relative humidity	10% to 90% noncondensing
Maximum wet bulb	28°C (82°F)
Altitude	2.4 km (8,000 ft)
Physical Characteristics	
VT220 Monitor	
Height	28.3 cm (11.1 in.)
Width	33.3 cm (13.1 in.)
Depth	38.7 cm (15.3 in.)
Weight	11.8 kg (26 lbs)
VT240 Monitor	
Height	29.2 cm (11.5 in.)
Width	34.9 cm (13.8 in.)
Depth	31.1 cm (12.3 in.)
Weight	6.4 kg (14 lbs)

VT241 Monitor	
Height	32.4 cm (12.8 in.)
Width	38 cm (15 in.)
Depth	42.1 cm (17 in.)
Weight	16.6 kg (36.6 lbs)
VT240 Series System Box	
Height	8.8 cm (3.5 in.)
Width	45 cm (18 in.)
Depth	30 cm (12 in.)
Weight	2.0 kg (4.5 lbs)

VT200 Series Ordering Information	
VT220-A	VT220 Terminal
VT22K-BA	VT220 Keyboard
VT240-A	VT240 Terminal
VT24K-BA	VT240 Keyboard
VT241-A	VT241 Terminal
VT24K-BA	VT241 Keyboard

DECmate II

The DECmate II contains a complete 12-bit minicomputer designed by Digital. Its 6120 processor—a new fast descendant of Digital's powerful PDP-8 minicomputer—comes with 64 Kwords of 12-bit main memory—the equivalent of 96 Kbytes. This combination of a powerful processor, extensive main memory, and Digital's software makes the DECmate II exceptionally easy to use. And computer-based instruction (CBI) is available for the system that can reduce word processing and system learning time even further. When the DECmate II is equipped with the CP/M option module, both the Z80 and the 6120 processors run in parallel. The Z80 executes the CP/M instructions, and the 6120 handles all of the other system functions. This allows CP/M applications running on the DECmate II to be remarkably fast and efficient.

DECmate II System Summary Specifications	
Standard System	System unit, keyboard, display screen, and operating system.
System Unit	Small Box.
CPU	6120 (PDP-8) microprocessor.
Memory	64 Kwords (96 Kbyte equivalent)
Printer Port	Serial, RS232.
Communications Port	Asynch/synch, up to 9,600 baud with modem control
Storage	Dual diskette drive (2 x 400 Kbytes).
Video Output	Monochrome, RS170-compatible.
Operating System	WPS-8 word processing and COS-310 office automation software, CP/M-80.
System Expansion	Three dedicated slots for option boards. User-installable

DECmate II System Unit and Power Supply Specifications	
Physical Description	
Height	6.5 in. (16.5 cm)
Length	19 in. (48.3 cm)
Width	14.3 in. (36.3 cm)
Maximum Weight	30 lbs. (13.6 kg)
Power Supply Type	Transistor, Switch-Type AC to DC Converter
AC Input	Switch-Selectable
115 nominal	Single-phase, 3-wire 90–128V rms 47–63 Hz Line Frequency

230V nominal	Single-phase, 3-wire 174–256V rms 47–63 Hz Line Frequency
Line Current	3A @ 115Vac 1.5A @ 230 Vac
AC Power Consumption	218 Watts
Regulated Voltages	+5V, +12V, & −12V DC
Circuit Protection	Circuit Breaker, Externally Accessible

DECmate II Diskette Subsystem Specifications	
Performance	
Capacity/Drive	819 Kbytes
Diskettes Per Drive	2
Number of Recorded Surfaces	2
Per Track	5,120
Per Sector	512 bytes
Sectors Per Track	10
Transfer Rate	250 Kbytes/s
Average Access Time	290 msec
Functional Specifications	
Rotational Speed Densitites	300 r/min 96 tracks per inch
Physical Description	
Height	3.3 inches (8.4 cm)
Width	5.8 inches (14.7 cm)
Depth	8.5 inches (21.6 cm)
Weight	3.8 pounds (1.7 kb)

DECmate II Hard Disk Subsystem Specifications		
Performance		
Formatted Capacity		
Per Drive	5 Mbytes	10 Mbytes
Per Surface	1.25 Mbytes	2.5 Mbytes
Per Track	8,192 bytes	8,192 bytes
Per Sector	512 bytes	512 bytes
Sectors Per Track	16	16
Transfer Rate	5 Mb/s	5 Mb/s
Average Access Time	170 msec	85 msec

Functional Specifications		
Rotational speed	3600 r/min	3600 r/min
Densities	254 tracks per inch	345 tracks per inch
Physical Description		
Height	3.3 in. (8.3 cm)	3.3 in. (8.3 cm)
Width	5.8 in. (14.6 cm)	5.8 in. (14.6 cm)
Depth	8.5 in. (20.4 cm)	8.5 in. (20.4 cm)
Weight	4.5 lb. (2.3 kg)	4.5 lb. (2.3 kg)

DECmate II Keyboard Specifications	
Electronics	8-bit microprocessor 4 Kbytes of ROM 256 bytes of RAM 4 LEDs Speakers
Cord	6-foot (1.9 m), coiled 4-pin telephone-type modular connectors Plugs into display monitor
Physical Description	Low profile, detachable
Height	2.0 inches (5 cm) at highest point
Length	21 inches (53.3 cm)
Width	6.75 inches (17.1 cm)
Weight	4.5 pounds (2 Kg)
Keypad	Sculptured key array
Home Row Key Height	30 mm above desktop
Keys	105 matte textured-finished keys Concave surface
Size	0.50 inches (1.27 cmm) square
Spacing	0.75 inches (1.9 cm) center-to-center (single-width keys)
Wobble	Less than .020 inches (0.5 mm)
Numeric Keypad	18 keys
Function Keys	36 keys; firmware- and software-driven 20 function keys horizontally positioned beneath label strip
Diagnostics	Powerup self-test Generates identification code upon passing test

DECmate II Video Monitor Specifications	
Characters	
DECmate II	7 x 9 dot matrix Includes 2-dot descenders
Format	24 Lines x 80/132 Characters
Physical Description	
Height	11.5 in (29.2 cm)
Width	13.75 in (34.9 cm)
Depth	12.25 in (31.1 cm)
Weight	14 lb (6.4 kg)
Cord	6-foot (1.9 m)
Adjustable Tilt	+5 to −25 Degrees
Video Format	Monochrome Composite

Hardware Options

- Second dual diskette drive (2 x 400 Kbytes)
- RX02 8-inch dickette drive interface
- Z80 CP/M softcard with 64 Kbytes of memory
- Choice of LA50 Personal Printer, Letterprinter 100, or LQP02 Letter Quality Printer
- Hard disk drive
- System unit standard for vertical floor mounting

DECmate II Ordering Information

The system unit contains the procesor, main memory, option boards, diskette drives, communication ports, and power supply.

PC278-A	DECmate II System Unit
PCXXF-BA	Optional floorstand for system unit
VR201-A	DECmate II Video Display
PC2K1-AA	U.S. Keyboard
PC27X-AA	CP/M-80 Option Board

DECmate II CP/M 2.2 Operating System Control Program for Microcomputers

Digital distributes this Software Product under license from Digital Research, Inc.

Description

DECmate II CP/M 2.2 is an implementation of CP/M, Version 2.2, (Control Program for Microcomputers), developed by Digital Research, Inc. DECmate II CP/M 2.2 is a single-user operating system specifically tailored for the DECmate II personal computer with the optional Z80 Auxiliary Processing Unit. Using a floppy disk storage system, CP/M provides for program construction, storage and editing, along with assembly and program debugging facilities. CP/M includes a text editor, Z80-microprocessor-compatible assembler, debugger, and file utility programs.

The CP/M monitor provides access to programs through a file management package. The file subsystem supports a named file structure allowing dynamic allocation of file space as well as sequential and random file access. Programs can be stored in both source and machine executable form. DECmate II CP/M 2.2 supports CP/M files on RX50 5¼-inch diskettes and RX01-format 8-inch diskettes when an RX01 or RX02 drive is attached to the DECmate and reads VT180-format 5¼-inch diskettes.

Features

Basic I/O System (BIOS), (DECmate II specific)—Operations necessary to access the diskette drives and to interface standard peripherals.

Basic Disk Operating System (BDOS)—Disk management by controlling one or more diskette drives that contain independent file directories. The BDOS implements disk allocation strategies that provide fully dynamic file construction, while minimizing head movement across the diskette during access. Files can contain any number of records, not exceeding the size of any single disk. In a DECmate CP/M system each RX50 diskette can contain up to 128 files.

Console Command Processor (CCP)—Symbolic interface between the user's console and the remainder of the CP/M system. The CCP reads the console device and processes commands to:

- List the file directory
- Erase files
- Rename files
- Print the contents of files
- Control the operation of transient programs, such as assemblers, editors, and debuggers

Transient Program Area (TPA)—Programs loaded from the diskette, under command of the CCP, are held in the TPA. During the program editing, for example, the TPA holds the CP/M text editor machine code and data areas. Programs created under CP/M can be checked out by loading and executing these programs in the TPA.

Utilities

DECmate II CP/M 2.2 includes the standard CP/M, Version 2.2, utilities, plus

DISKINIT—Utility for initializing RX50 or RX01 formatted diskettes for use by CP/M on DECmate II. DISKINIT allows the user to specify the drive containing the disk and how it should be initialized: "system" or "data" disk.

DISKCOPY—Utility for duplicating diskettes. DISKCOPY can copy a diskette, compare the contents of two diskettes, and verify the readability of a diskette.

Minimum Hardware Required

1PC2K1-A	Country kit, including language-specific documentation and keyboard
VR201-A	Black and white monitor
PC278-A	System unit with 6120 Single Board Computer and one dual RX50 drive
PC27X-AA	Z80 Auxiliary Processing Unit with 64 KB of user memory

Optional Hardware

RX50-AA	Dual RX50 add-on
PC27X-BA	RX01/RX02 Interface Module, used with RX01 or RX02 disk drive

LA50, LA100, LQP02, LQPSE, and LA120 printers

Prerequisite Software

None

Training Credits

None

Software Installation

Customer Installed

Support Category

Digital Supported

DECmate II CP/M 2.2
Ordering Information

This product is available only as the software component of the Z80 Auxiliary Processing Unit and is distributed on RX50 5¼" floppy diskette distribution media.

PC27X-AA	Z80 APU, single-use license, binaries, documentation, support service.

DECmate II Office Workstation

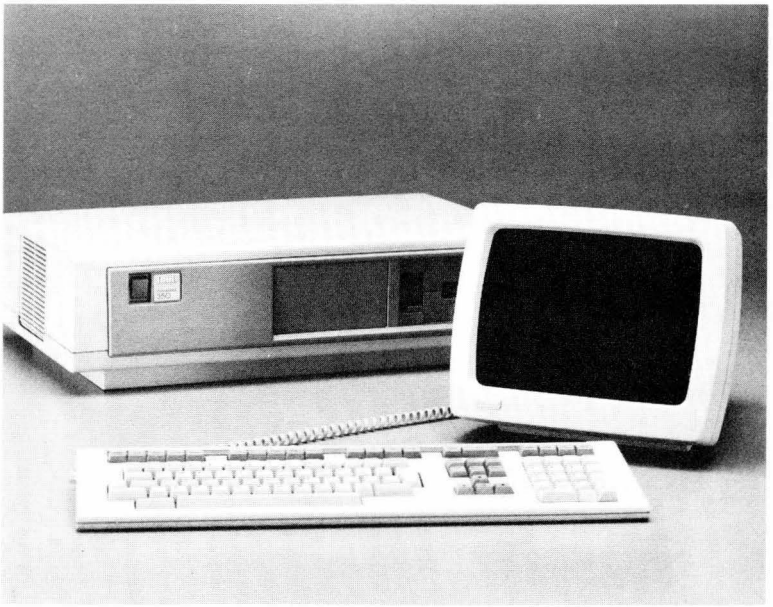
The DECmate II can be easily converted to an office workstation through the addition of the Office Workstation software. This includes DECmate WPS version 2, with Easycom, and the CP/M 2.2 Operating System. For customer ordering convenience the Office Workstation software can be purchased as one unit at a cost lower than the sum of the individual pieces.

Office Workstation Ordering Information	
PC27X-AC	DECmate WPS with Easycom and CP/M2.2 Operating System

The Professional 325 and the Professional 350

The Professional 325 and Professional 350 were designed for a new generation of personal computer software. Digital has developed a new operating system for the Professionals that gives them the ability to execute many different computing tasks simultaneously. The operating system also contains a sophisticated file-managing ability—compatible with larger Digital minicomputers—as well as a multiple communications capability. This computing power used to be found only on larger minicomputers, but it is now available on a personal computer. The Professionals are able to work interactively at the same time that they are printing, communicating with another computer, or performing other tasks.

Both the Professional 325 and 350 contain a 16-bit PDP-11 minicomputer, a system clock, a printer port, a communications port, and 512 Kbytes of main memory. The Professional 325 and 350 also include a floating point processor as a standard feature. This allows for high-speed calculation of large numbers and is especially useful in scientific and technical applications. Each system includes a diskette drive with 800 Kbytes of storage capacity on two 5¼-inch diskettes.



Professional 325 and 350 System Summary

Specifications	
Standard System	System unit, keyboard, display screen, and operating system.
System Unit	Large Box.
CPU	F11 (PDP-11/23) microprocessor with standard floating point processor
Memory	512 Kbytes, expandable in 256 Kbyte increments
Clock	Nonvolatile RAM with rechargeable NiCD battery
Printer port	Serial, RS232.
Communications port	Asynch/synch, up to 9,600 baud with modem control
Storage	Dual diskette drive (2 x 400 Kbytes).
Video Output	Monochrome, RS170-Compatible.
Operating System	Professional Operating System (P/OS), multitasking software Optional CP/M-80 operating system
System Expansion	1 option slot (Professional 325) 3 option slots (Professional 350) User-installable

System Unit and Power Supply for Professional 325 and 350

Specifications	
Physical Description	
Height	6.5 in. (16.5 cm)
Length	22 in. (55.8 cm)
Width	14.3 in. (36.3 cm)
Maximum weight	35 lbs. (15.9 kg)
Power Supply Type	Transistor, switch-type AC to DC converter
AC Input	Switch-selectable
115V nominal	Single-phase, 3-wire 90–128V rms 47–63 Hz line frequency
230V nominal	Single-phase, 3-wire 174–256V rms 47–63 Hz line frequency
Line Current	6A @ 115Vac 4A @ 230Vac
AC Power Consumption	320 Watts
Regulated Voltages	+5V, +12V, & −12V DC
Circuit Protection	Circuit breaker, externally accessible

Professional 325 and 350 Diskette Subsystem

Specifications	
Performance	
Capacity/drive	819 Kbytes
Diskettes per drive	2
Number of recorded surfaces	2
Per track	5,120
Per sector	512 bytes
Sectors per track	10
Transfer rate	250 Kbytes/s
Average access time	290 msec
Functional Specifications	
Rotational speed	300 r/min
Densities	96 tracks per inch
Physical Description	
Height	3.3 inches (8.4 cm)
Width	5.8 inches (14.7 cm)
Depth	8.5 inches (21.6 cm)
Weight	3.8 pounds (1.7 kb)

Professional 325 and 350 Hard Disk Subsystem

Specifications	325	350
Performance		
Formatted Capacity		
Per drive	5 Mbytes	10 Mbytes
Per surface	1.25 Mbytes	2.5 Mbytes
Per track	8,192 bytes	8,192 bytes
Per sector	512 bytes	512 bytes
Sectors per track	16	16
Transfer rate	5 Mb/s	5 Mb/s
Average access time	170 msec	85 msec
Functional Specifications		
Rotational speed	3600 r/min	3600 r/min
Densities	254 tracks per inch	345 tracks per inch
Physical Description		
Height	3.3 in. (8.3 cm)	3.3 in. (8.3 cm)
Width	5.8 in. (14.6 cm)	5.8 in. (14.6 cm)
Depth	8.5 in. (20.4 cm)	8.5 in. (20.4 cm)
Weight	4.5 lb. (2.3 kg)	4.5 lb. (2.3 kg)

Professional 325 and 350 Keyboard

Specifications	
Electronics	8-bit microprocessor 4 Kbytes of ROM 256 bytes of RAM 4 LEDs Speakers
Cord	6-foot (1.9 m), coiled 4-pin telephone-type modular connectors Plugs into display monitor
Physical Description	Low profile, detachable
Height	2.0 inches (5 cm) at highest point
Length	21 inches (53.3 cm)
Width	6.75 inches (17.1 cm)
Weight	4.5 pounds (2 kg)
Keypad	Sculptured key array
Home Row Key Height	30 mm above desktop
Keys	105 matte textured-finished keys Concave surface
Size	0.50 inches (1.27 cm) square
Spacing	0.75 inches (1.9 cm) center-to-center (single-width keys)
Wobble	Less than .020 inches (0.5 mm)
Numeric Keypad	18 keys
Function Keys	36 keys; firmware- and software-driven 20 function keys horizontally positioned beneath label strip
Diagnostics	Powerup self-test Generates identification code upon passing test

Professional 325 and 350 Video Monitor

Specifications	
Characters	7 x 10 dot matrix Includes 2-dot descenders
Format	24 Lines x 80/132 Characters
Physical Description	
Height	11.5 in (29.2 cm)
Width	13.75 in (34.9 cm)
Depth	12.25 in (31.1 cm)
Weight	14 lb (6.4 kg)
Cord	6-foot (1.9 m)
Adjustable Tilt	+5 to −25 Degrees
Video Format	Monochrome Composite

Hardware Options

- Integral 5 or 10 Mbyte hard disk drive and controller
- Z80 CP/M softcard with 64 Kbytes of memory
- 256 Kbyte memory option for increased memory
- Upgrade kit for converting a Professional 325 to a Professional 350
- Extended bit-map graphics option
- Telephone Management System with dual-port modem capability
- Voice unit for TMS (does not require an option slot)
- Realtime Interface module
- Choice of LA50 Personal Printer, Letterprinter 100, or LQP02 Letter-Quality Printer
- 13-inch color monitor (requires the Extended bit-map graphics option)
- System Unit stand for vertical floor mounting.

Ordering Information	
PC325D	Professional 325 System Unit
PC350D	Professional 350 System Unit
PC3K1-A	Keyboard
VR201-A	Monochrome Video Monitor (white)
VR201-A	Monochrome Video Monitor (green)
VR201-A	Monochrome Video Monitor (amber)
VR241-AA	Color Monitor

Rainbow

The Rainbow base system is a complete solution to your personal computer needs. Whichever model you choose—the Rainbow 100 or the Rainbow 100+ system—you get Digital's highly-acclaimed keyboard; a high-resolution monitor, either monochrome or color; high performance from 8-bit *and* 16-bit microprocessors; large-capacity system storage space; and enough memory to get real work done from the start. The communications and printer ports are also standard. The modular packaging makes installation a snap. Advanced features like memory-mapped video and 132-column displays let you see more information at one time and see it faster. With the terminal emulation capability, you get a personal computer and a terminal rolled into one.

Rainbow 100

The Rainbow 100 personal computer is a cost-effective investment in computing power for your business, personal, and entertainment needs. It comes with 64 Kbytes of memory and 800 Kbytes of diskette storage space. There are three dedicated option slots for system expansion in the system unit, so you can add more memory (up to 256 Kbytes), bit-mapped graphics, and extended communications capability to your Rainbow 100.

You can also add an additional floppy drive to your system, so you can insert four diskettes simultaneously for a total of 1.6 Mbytes of storage space. If that's not enough, a special upgrade kit allows you to add a hard-disk option.

Rainbow 100+

The Rainbow 100+ personal computer is a direct extension of the entry-level Rainbow 100. It comes with 128 Kbytes of memory, 800 Kbytes of floppy-diskette storage space, and a 10 Mbyte internal hard disk. Two dedicated option slots in the Rainbow 100+ system unit provide space for the addition of the bit-mapped graphics option and incremental memory upgrades to a total of 896 Kbytes.

Rainbow 100 System Specifications
System Unit
Two microprocessors—Zilog 8-bit Z80A and Intel 16-bit 8088
Main memory—64 Kbytes parity RAM, expandable up to 256 Kbytes
Dual-diskette drive—800 Kbytes removable floppy storage, expandable to 1.6 Mbytes
Serial RS232/423 printer port
Async/sync RS232/423 communications port
Memory-mapped video
Terminal emulation

Keyboard	
Low-profile, detached	
N-key rollover	
Scuptured key array	
105 matte-textured, non-slip keys	
Separate editing keys and numeric keypad	
Adjustable keyclick and bell tone	
Video Monitors	
80 or 132 column width display	
High resolution, 7 x 9 dot matrix	
Bit-mapped graphics capability	
60 image-per-second refresh rate	
High-efficiency, anti-glare filter	
Monochrome	Monochrome composite, choice of white, amber, or green display on black
	12-inch (diagonal) screen
Color	RBG Color
	13-inch (diagonal) screen
Diagnostics	
Power-up self-test	
Menu-selectable self-test	
Diagnostic diskette	
System Expansion & Options	
Three option module slots, all options user-installable	
Memory expansion option—64 Kbytes or 192 Kbytes additional RAM	
Graphics option	
Extended communications option or third-party module	
Additional dual-diskette drive fits in system unit for a system total of 1.6 Mbytes	

Rainbow 100+ System Specifications
System Unit
Two microprocessors—Zilog 8-bit Z80A and Intel 16-bit 8088
Main memory—128 Kbytes parity RAM, expandable up to 896 Kbytes
Winchester hard-disk drive—10 Mbytes internal storage
Dual-diskette drive—800 Kbytes removable storage
Serial RS232/423 printer port
Async/sync RS232/423 communications port
Memory-mapped video
Terminal emulation

Keyboard	
Low-profile, detached	
N-key rollover	
Scuptured key array	
105 matte-textured, non-slip keys	
Separate editing keys and numeric keypad	
Adjustable keyclick and bell tone	
Video Monitors	
80 or 132 columnn width display	
High resolution, 7 x 9 dot matrix	
Bit-mapped graphics capability	
60 image-per-second refresh rate	
High-efficiency, anti-glare filter	
Monochrome	Monochrome composite, choice of white, amber, or green display on black
	12-inch (diagonal) screen
Color	RBG Color
	13-inch (diagonal) screen
Diagnostics	
Power-up self-test	
Menu-selectable self-test	
Diagnostic diskette	
System Expansion & Options	
Two option module slots, all options user-installable	
Memory expansion options—8 upgrades available, to a system total of 896 Kbytes	
Graphics option	

System Unit and Power Supply for Rainbow 100 and Rainbow 100+ Specifications

Physical description	
Height	6.5 in. (16.5 cm)
Length	19 in. (48.3 cm)
Width	14.3 in. (36.3 cm)
Maximum weight	30 lbs. (13.6 kg)
Power supply type	Transistor, Switch-type AC to DC converter
AC Input	Switch-selectable
115V nominal	Single-phase, 3-wire 90–128V rms 47–63 Hz line frequency
230V nominal	Single-phase, 3-wire 174–256V rms 47–63 Hz line frequency

Line current	3A @ 115Vac 1.5A @ 230Vac
AC Power consumption	237 Watts
Regulated voltages	+5V, +12V, & =12V DC
Circuit protection	Circuit breaker, externally accessible

Rainbow 100+ Internal Hard-Disk Drive Specifications	
Height	3.3 inches (8.3 cm)
Width	5.8 inches (14.6 cm)
Depth	8.5 inches (20.4 cm)
Weight	4.5 lbs (2.3 kg)
Formatted capacity	10 Mbytes
Performance	
Peak transfer rate	5M bits per second
Rotational latency	8.33 milliseconds
Average access time	85 milliseconds
Media Characteristics	
Density	345 tracks per inch, 9074 bits per inch
Recording method	MFM
Start time	15 seconds
Stop time	20 seconds
Rotational speed	3600 rpm
Number of data platters	2
Number of data surfaces	4
Number of heads per surface	1

Rainbow Dual Diskette Drive Specifications	
Performance	
Capacity/drive	819 Kbytes
Diskettes per drive	2
Number of recorded surfaces	2
Per track	5,120
Per sector	512 bytes
Sectors per track	10
Transfer rate	250 Kbytes/s
Average access time	290 msec

Functional Specifications	
Rotational speed	300 r/min
Densities	96 tracks per inch
Physical Description	
Height	3.3 inches (8.4 cm)
Width	5.8 inches (14.7 cm)
Depth	8.5 inches (21.6 cm)
Weight	3.8 pounds (1.7 kb)

Rainbow Keyboard Specifications	
Electronics	8-bit microprocessor 4 Kbytes of ROM 256 bytes of RAM 4 LEDs Speakers
Cord	6-foot (1.9 m), coiled 4-pin telephone-type modular connectors Plugs into display monitor
Physical Description	Low profile, detachable
Height	2.0 inches (5 cm) at highest point
Length	21 inches (53.3 cm)
Width	6.75 inches (17.1 cm)
Weight	4.5 pounds (2 Kg)
Keypad	Scuptured key array
Home row key height	30 mm above desktop
Keys	105 matte textured-finished keys Concave surface
Size	0.50 inches (1.27 cmm) square
Spacing	0.75 inches (1.9 cm) center to center (single-width keys)
Wobble	Less than .020 inches (0.5 mm)
Numeric keypad	18 keys
Function keys	36 keys; firmware- and software-driven 20 function keys horizontally positioned beneath label strip
Diagnostics	Powerup self-test Generates identification code upon passing test

Rainbow Video Monitor Specifications	
Physical Description	
Height	11.5 inches (29.2 cm)
Width	13.75 inches (34.9 cm)
Depth	12.25 inches (31.1 cm)
Weight	14 lbs (6.4 kg)
Adjustable tilt	+5 to −25 degrees
Standard video output	RS170 compatible, monochrome character cell video
Video Screen	
12 inches (diagonal)	
Anti-glare filtering to reduce eye fatigue	
Video Display	
High-resolution monochrome with bold, underline, blink, and reverse-video	
Split-screen capability	
60-image-per-second refresh rate reduces screen flicker	
Keyboard	
Characters	7 x 9 dot matrix, includes 2-dot descenders
Format	80 or 132 columns wide, selectable, by 24 lines for a total in excess of 3000 characters
Graphics *(With Graphics Option)*	800 x 240 pixels
Set-UP Parameters	Smooth or jump scroll, scroll rate, light or dark screen, block or underline cursor, auto wrap, auto screen blank, menu-selectable

Rainbow Color Monitor Specifications	
Physical Description	
Height	12.8 inches (31.9 cm)
Width	14.5 inches (36.3 cm)
Depth	17.0 inches (43.2 cm)
Weight	36.6 lbs (16.6 kg)
Video Screen	
13 inches (diagonal)	
High-resolution color	
High-efficiency, anti-glare filter	
Color Graphics *(With Graphics Option)*	
High-resolution Mode	800 x 240 pixels, 4 selectable colors
Medium-resolution Mode	384 x 240 pixels, 16 selectable colors
Palette	1024 colors for the Rainbow 100* 4096 colors for the Rainbow 100+

Text *(Under Video Control of System Unit)*	
Format	80 or 132 columns wide, selectable, by 24 lines 7 x 9 dot matrix, includes 2-dot descenders
Video Display	Bold, underline, blink, and reverse-video, and split-screen capability
Active Raster Size	240 mm (W) x 150 mm (H)
Dot Pitch	.31 mm resolution (shadowmask)
Deguassing	Built-in, automatic
Interface	Standard RS170 RGB (red-green-blue) cable connector with built-in line termination and selectable external synch
Power Supply	Universal, switch-Selectable 90–120 Vac, 47–63 Hz or 185–256 Vac, 47–63 Hz
Hardware Prerequisite	Graphics Option (PC1XX-BA)

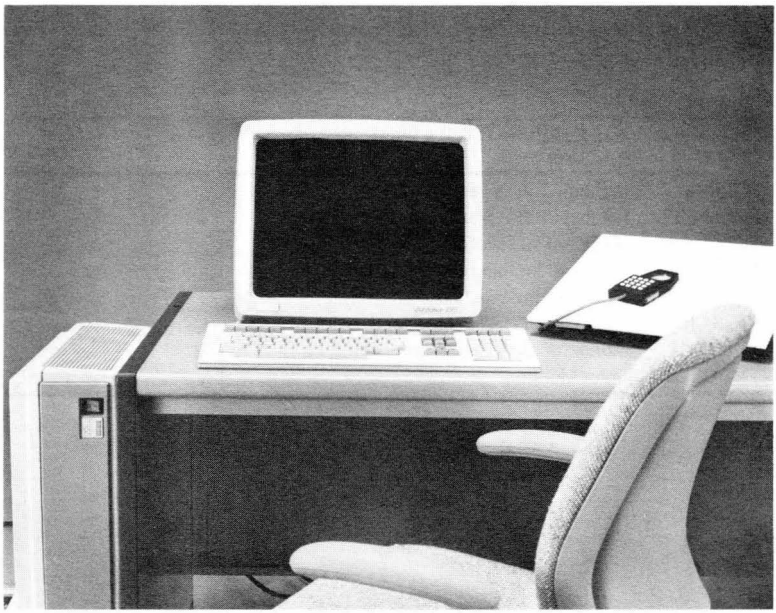
*Note: The palette for the Rainbow 100 is 4096 if separate monitors for text and graphics are used.

Rainbow 100 and Rainbow 100+ Ordering Information	
PC100-A	Rainbow 100 System Unit
PC100-P2	Rainbow 100+ System Unit
PC1K1-AA	Keyboard for Rainbow 100
PC1K1-BA	Keyboard for Rainbow 100+
VR201-A	Monochrome Video Monitor (White)
VR201-B	Monochrome Video Monitor (Green)
VR201-C	Monochrome Video Monitor (Amber)
VR241-AA	Color Monitor

VAXstation 100

The VAXstation 100 is a high performance, high resolution graphics workstation which can be connected to any VAX system via the UNIBUS. The VAXstation 100 consists of a 19 in. (48 cm) landscape monitor, a modified LK201 keyboard, a 3-button mouse, a graphics processor, and a UNIBUS interface. The graphics processor and power supply are housed in a multibox that can be located up to 10 ft (3m) from the monitor. Optionally available is an 11 x 11 in. high resolution graphics tablet with a 5-button cursor.

The VAXstation 100 provides text writing speeds of up to 30,000 characters/sec; pixel writing rate of 1 microsecond/pixel; vector drawing rate of 2 microseconds/pixel; full screen clear or write from local memory in 0.1 second, and full screen write from the VAX memory in 1 second.



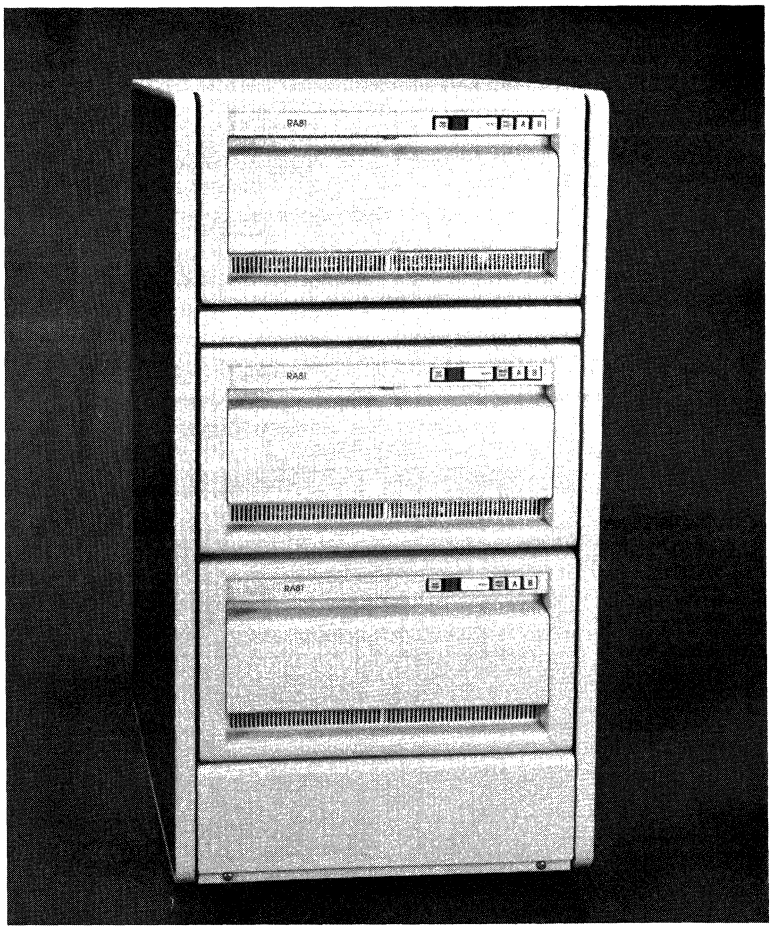
Specifications	
UNIBUS Window Module	
Mounting	1 Hex slot
Power drawn	@ 5V 3.5 @ – 15V .20 @ + 15V .15
Bus loads drawn	1
Monitor	
Size	19 inch (diagonal)
Orientation	Landscape (horizontal)
Format	1088 horizontal by 864 vertical by 1 pixels on a square grid
Resolution	78 pixels per inch
Picture size	28.19 cm by 35.4 cm (11.1 in. by 13.95 in.)
Refresh	60 Hz non-interlaced
Phospher	P4 low persistence monochrome
Ergonomics	Tilt swivel base, anti-glare screen
Controls	Brightness, contrast
Power	70 watts
Weight	20.2 kg (45 lbs)
Detached Keyboard	
105 sculptured keys	
Typewriter main array	
Editing keypad	
Numeric keypad	
12 Programmable function keys	
Profile	30 mm (1.2 in.) (from palm rest to home row)
Cord length	3.6 m (12 ft.)
Weight	2 kg (4.5 lbs)
Mouse	
Output	200 pulses per inch (X and Y relative displacement)
Cable length	3.6 m (12 ft.)
Function buttons	3
Graphics Tablet	
Area	27.9 cm by 27.9 cm (11 in. by 11 in.)
Resolution	1000 points per inch
Accuracy	.010 inch
Repeatability	.001 inch
Pointer	5 button puck
Cable length	3.6 m (12 ft.)

Fiber Optic Link	
Bandwidth	10 Mbit per sec
Length	Up to 300 meters (990 feet)
Bend radius	3 inches
Graphics Processor	
Motorola 68000 microprocessor	
128 Kbytes local 68000 program memory	
16 Kbytes bootstrap and diagnostics ROM	
512 Kbytes frame buffer	
2901-based graphics accelerator	
Power Supply	
210 watts	
120/220V, 60/50 Hz	
3 wire	
Performance	
Text writing	30,000 characters per second
Pixel writing	1 microsecond per pixel
Vector drawing	2 microseconds per pixel
Full screen clear or write from local memory	0.1 second
Full screen write from VAX memory	1.0 second

Ordering Information	
VS100-AA	VR100-AA (Monochrome 19 in. (48 cm) Monitor 1088H x 864V resolution, 60 Hz, 10ft. (3 m) cable). Includes UNIBUS interface, multibox with Graphics Processor and 120/220V 60/50 Hz power supply, and the DS11-FA VAX UNIBUS-Window/Fibre-Optic-Transceiver Card.
LK201-CA	1 Keyboard with 12 ft. Cord (U.S./Canada)
VS10X-BA	1 VS10X-DA (11 in. x 11 in. Graphics Tablet) 1 VS10X-CA (5-button Puck)
VS10X-EA	3-button Mouse with 12 ft. cable
BN25B-15	15 Meter Optical Cable with terminators
BN25B-30	30 Meter Optical Cable with terminators
BN25B-60	60 Meter Optical Cable with terminators
QC432-AG	VS100 I/O Driver Binary for VAX-11/730
QD432-AG	VS100 I/O Driver Binary for VAX-11/750
QE432-AY	VS100 I/O Driver Binary for VAX-11/780
QC434-AG	VAXstation Display Services (including VS100 I/O Driver). Binary for VAX-11/730
QD434-AG	VAXstation Display Services (including VS100 I/O Driver). Binary for VAX-11/750
QE434-AY	VAXstation Display Services (including VS100 I/O Driver). Binary for VAX-11/780
QC434-GZ	VAXstation Display Services Documentation for VAX-11/730
QD434-GZ	VAXstation Display Services Documentation for VAX-11/750
QE434-GZ	VAXstation Display Services Documentation for VAX-11/780
QC432-DZ	VS100 I/O Driver License for VAX-11/730
QD432-DZ	VS100 I/O Driver License for VAX-11/750
QE432-DZ	VS100 I/O Driver License for VAX-11/780
QC434-DZ	VAXstation Display Services (including VS100 I/O Driver) License for VAX-11/730
QD434-DZ	VAXstation Display Services (including VS100 I/O Driver) License for VAX-11/750
QE434-DZ	VAXstation Display Services (including VS100 I/O Driver) License for VAX-11/780

RA81 Disk Subsystem

The RA81 rack- and cabinet-mountable disk system features Winchester fixed-disk technology and the UDA50 controller. Fixed-disk technology improves data integrity because the media is almost never exposed to contaminating elements. It provides large-capacity storage (456 Mbytes) for VAX-11 systems. The RA81 system's large capacity is achieved through the innovative read/write and positioner control systems. The read/write system employs an encoding/decoding scheme that yields a third more storage capacity than drives using conventional MFM encoding. Positioning information on a dedicated (servo) surface enables high speed seeking. Additional positioning information is embedded between sectors on every track for high precision positioning.



Because more data is contained on each disk pack, maintaining data integrity is extremely important. Features such as an Error Correction Code (ECC), Error Detecting Code (EDC), and error reporting are included. All error recovery routines are initiated and completed in the drive system itself without tying up the host system.

Up to three RA81 drive units may be mounted in a single cabinet, bringing storage capacity to a total of 1,368 Mbytes.

RA81 Specifications	
Formatted Capacity Per Drive	456 Mbytes
Peak Transfer Rate (To UDA50)	1.2 Mbytes
Average Access Time	36.3 ms
Average Seek Time	28 ms
Average Latency Time	8.33 ms
Dual-Port Capability	Standard (second I/O cable and controller are prerequisites)
Media Surfaces	7 data, 1 servo
Tracks Per Surface	1248
Sectors Per Track	52 (16-bit words)
Bytes Per Sector	512

RA81 Ordering Information	
RUA81-CA(CD)	RA81 cabinet-mounted disk drive and UDA50 controller PREREQUISITE: PDP-11/44, or VAX/VMS-based systems
RA81-CA(CD)	RA81 H9642 cabinet-mounted disk drive, no controller PREREQUISITE: RUA81-CA(CD)
RA81-AA(AD)	RA81 disk drive, no controller, no cabinet PREREQUISITE: RUA81-CA(CD)

RA60 Disk Subsystem

The RUA60 removable-media disk subsystem features medium-capacity storage for mid-range PDP-11 systems, the RA60 disk drive, and includes the UDA50 controller. The UDA50 controller provides several levels of performance optimization to improve disk throughput. A seek-ordering algorithm will reorder up to twelve I/O requests in the command queue of the UDA50 to minimize seek time, in single- or multidrive subsystems. The use of the UDA50 controller allows the user to mix RA60 disk drives with RA80 or RA81 disk drives.

Innovations of the RA60 disk drive include the use of enhanced servo technology which eliminates the need for alignment packs; new recording methods; microprocessor controlled diagnostics; 170-bit error correcting code; and modular design for easy maintenance. RA60 disk packs can be interchanged among RA60 disk drives without restriction or degradation in data reliability. To minimize the performance loss on a multisector transfer crossing track boundaries, RA60 cylinders are defined horizontally as opposed to vertically—thereby reducing the delay associated with a multisector transfer crossing track boundaries.

Up to three RA60 drive units may be mounted in the 42 in (108.7 cm) high H9642-AP(AQ) deep cabinet. A BC26V-12 cable is standard.

RA60 Specifications	
Formatted Capacity Per Drive	205 Mbytes
Peak Transfer Rate (To UDA50)	1.98 Mbytes/s
Average Access Time	50 ms
Average Seek Time	41.7 ms
Average Latency Time	8.33 ms
Dual-Port Capability	Standard (second I/O cable and controller are prerequisites)
Media Surfaces	6 data
Tracks Per Surface	1,600
Sectors Per Track	43 (16-bit words)

RA60 Ordering Information	
RUA60-CA(CD)	RA60-AA cabinet-mounted disk drive and UDA50 controller PREREQUISITE: PDP-11/44
RUA60-JA(JD)	RA60-AA cabinet-mounted disk drive and two UDA50 controllers PREREQUISITE: PDP-11/44
RA60-CA(CD)	RA60-AA H9642-AP(AQ) cabinet-mounted disk drive, no controller PREREQUISITE: RUA60-CA(CD), RUA60-JA(JD)
RA60-AA	RA60 rack-mounted disk drive, no cabinet, no controller PREREQUISITE: RUA60-CA(CD), RUA60-JA(JD)
RA60-P	RA60 disk pack
RA60-PB	Five RA60-P disk packs
RA60-PA	Ten RA60-P disk packs

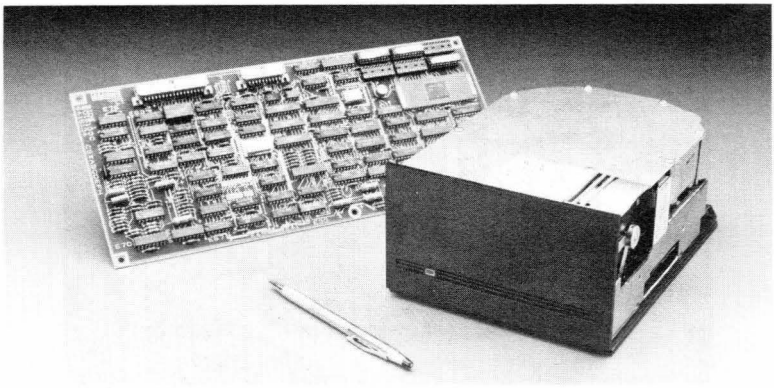


RCD50-AA Disk Subsystem

The RCD50-AA disk subsystem features proven Winchester technology utilizing a 5.25″ fixed disk. With 5MB formatted capacity and maintenance-free design, the RCD50-AA effectively meets the mass storage needs of DIGITAL's personal computer users.

Ideal for use with the Professional 360 in an office environment, the RCD50-AA provides quiet, space-efficient mass storage. A special single-board controller matches the RCD50-AA subsystem to the Professional 350. This disk is embedded in the Professional 350 system package, and receives power from the system power supply.

In addition, the RCD50-AA is complete with features to ensure data integrity and reliability. These include an hermetically sealed Head Disk Assembly (HDA); cyclic redundancy checks; full sector buffer; and modular construction to permit easy installation. The subsystem requires no preventive maintenance or field adjustments—translating to low cost for the user.



RCD50-AA Specifications	
Formatted Capacity	5 MB
Peak Transfer Rate	5 Mbits/sec
Height	3.25 in (8.25 cm)
Width	5.75 in (14.6 cm)
Depth	8.50 in (21.6 cm)
Weight	4.5 lb (2.27 kg)

RCD50-AA Ordering Information	
RCD50-AA	RCD50-AA Disk Subsystem and controller for PC350

RD51 Disk Subsystem

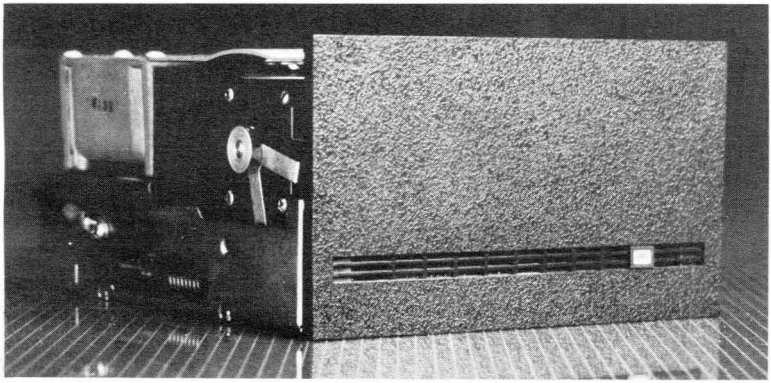
As a part of Digital's growing family of 5.25-inch Winchester disks, the RD51 is a state-of-the-art hard disk that's designed for the office environment. It offers 10 Mbytes of storage (the equivalent of 20,000 typed pages of text) so efficiently packaged that the RD51 can fit right into your computer's cabinet. The RD51 offers almost 10 times the storage capacity of the average floppy diskette subsystem. When you calculate how many filing cabinets, or how many floppy diskettes are needed to hold the same amount of data, you can see that the RD51 offers a lot of storage for your small computer.

The RD51 is optimized to be reliable and maintenance-free. The sealed Head Disk Assembly, modular construction, and other standard features act as a "turbocharger" for your personal computer to help it perform even better.

The efficiently-packaged, state-of-the-art RD51, as a subsystem option for your Professional 350 personal computer is a vital part of the total answer to today's information processing solution.

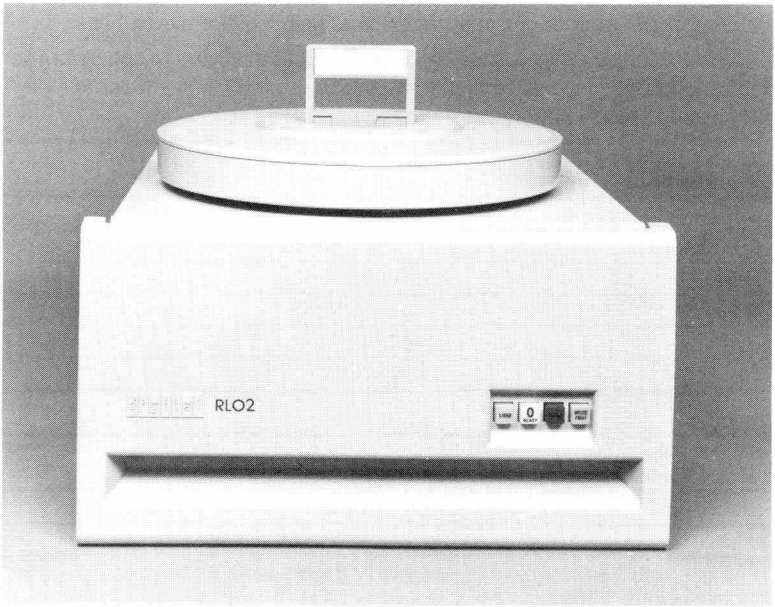
RD51 Specifications	
Formatted Capacity	10 Mbytes
Peak Transfer Rate	5 Mbits per second
Height	8.25 cm (3.25 in)
Width	14.60 cm (5.75 in)
Depth	20.44 cm (8.50 in)
Weight	2.27 kg (4.50 lb)

RD51 Ordering Information	
RCD51-AA	RD51 Disk Drive includes controller



RL02 Cartridge Disk Drive

The RL02 combines reliability and cartridge disk convenience in a low-cost, medium-capacity mass storage device. An embedded closed-loop servo positioning system improves data integrity by continuously sampling servo information with the same head that reads and writes the data. To ensure data integrity, a cyclic redundancy check (CRC) is performed on data transfers between the drive and controller. Also, a phase-locked-loop clock system and modified frequency modulation (MFM) recording provide reliable reading and recording techniques. Direct memory access (DMA) is used to provide rapid data transfer and efficient utilization of the host processor.



RL02 Specifications	
Formatted Capacity Per Drive	10.4 MB
Peak Transfer Rate	512 KB/s
Average Access Time	67.5 msec
Average Seek Time	55 msec
Average Latency Time	12.5 msec
Dual-Port Option	No
Media Surfaces	2 data
Tracks Per Surface	512
Sectors Per Track	40
Bytes Per Sector	256
Track-Track Seek	15 msec
Rotational Speed	2400 rpm
Drives Per Controller	4

RL02 Ordering Information	
RL211-AK*	RL02 top-loading, rack-mounting, removable-cartridge drive and controller with interconnect cabling.
RL02-AK	Add-on cartridge drive PREREQUISITE: RL211-AK
RL02K-DC	10.4 MB cartridge for the RL02

RL02 Accessories Ordering Information	
RL02K-DC	RL02 cartridge disks
RL02K-EF	Error-free RL02 cartridge disks
RL01K-AA	RL01/RL02 cartridge disk cleaner

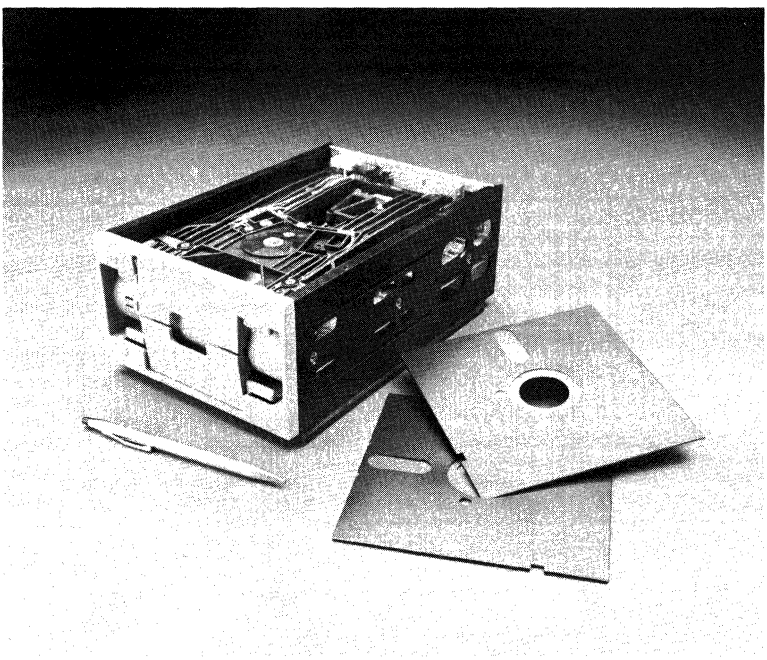
*This device is not supported as a system disk for VAX systems, except on the Dual RL02 VAX-11/730 system, but rather as a data file resident device for transport of data to or from other DIGITAL systems.

RX50 Diskette

The RX50 dual diskette drive is a low-cost, compact, random access mass memory subsystem that stores data in fixed-length blocks on two 5.25-inch flexible diskettes with preformatted industry-standard headers.

The RX50 consists of an extremely compact and reliable dual diskette drive. This configuration permits the data processing system to store and retrieve information from one side of each front-loading diskette. Two diskettes in tandem allow greater versatility than the standard minifloppy drive arrangement. With the RX50, a system can use one diskette for system storage and the other as a file device. With conventional drives, two separate devices are needed.

The drive mechanism can be mounted in a vertical or horizontal plane. It features dual counterrotating spindles that are driven by a single servomotor, for fewer moving parts.



RX50 Specifications	
Formatted Capacity Per Diskette	409 KB
Peak Transfer Rate	250 KB/s
Average Seek Time	164 msec
Track-Track Seek	6 msec
Rotational Speed	300 rpm
Average Latency Time	100 msec
Dual-Drive Option	Standard
Formatted Capacity Per Controller	1.6 MB
Tracks Per Diskette	80
Sectors Per Track	10
Tracks Per Inch	96
Drives Per Controller	2

RX50 Ordering Information	
RX50-AA	Dual Diskette Subsystem

RX02 Floppy Disk Subsystems

The RX02 double-density floppy disk drive provides an industry-compatible format and highly reliable operation. Direct memory access (DMA) is used to provide rapid data transfer and efficient utilization of the host processor. These subsystems include two RX02 0.5 MB drives (for a total of 1 MB) and a controller with interconnect cabling. The dual drives are packaged as a cabinet-mountable or tabletop unit.



RX02 Specifications	
Formatted Capacity Per Drive	0.5 MB (1 MB total)
Peak Transfer Rate	61 KB/s
Average Access Time*	262 msec
Average Seek Time	154 msec
Average Settling Time	25 msec
Average Latency Time	83 msec
Dual-Port Option	No
Media Surfaces	1 data
Tracks Per Surface	77
Sectors Per Track	26
Bytes Per Sector	256
Track-Track Seek	6 msec
Rotational Speed	360 rpm
Drives Per Controller	2

RX02 Ordering Information	
RX211-BK(BM) RX211-(BN)	Rack-mount dual RX02 floppy disk drives and controller to interface to the PDP-11 UNIBUS.
RXV21-EP(ES) RXV21-(ET)	System Option. Table top dual RX02 floppy disk drive and controller to interface the LSI-11 Bus
RXV21-EA(ED) RXV21-EC	Upgrade option for LSI-11 Bus. Order one of the following cabinet kits:
CK-RXV2E-KA	Cabinet kit. For use with BA23 (MICRO/PDP-11).
CK-RXV2E-KB	Cabinet kit. For use with BA11-M (PDP-11/23-S).
CK-RXV2E-KC	Cabinet kit. For use with H349 (PDP-11/23-PLUS).

RX02 Accessories Ordering Information	
RX02K-10	Formula One™ floppy diskettes (case of ten)
RX01K-MT	Floppy diskette case (holds ten)
RX01K-AE	Floppy diskette binder (holds ten)
RX01K-AH	Floppy diskette binder insert (package of ten)

Note: *Average access time is defined as the sum of the average seek time plus the average settling time plus the average latency.

TU80 Magnetic Tape Subsystem

The TU80 is a highly-reliable, low-cost, state-of-the-art nine-track magnetic tape subsystem. An easy-to-use UNIBUS storage device, the TU80 provides 1,600 bits per inch (Phase Encoded) of user storage and a maximum data transfer rate of 160 Kbytes per second. With fewer moving parts than comparable vacuum column or tension arm tape drives, the TU80 offers higher reliability and easier operation. Extensive diagnostics isolate and identify any possible malfunction and permit fast and simple repair.



The TU80 features streaming—a process in which constant movement across the read/write heads is maintained, allowing the use of low-powered drive motors and a simple tape path. This is accomplished by the tape transport using microprocessor controls to replace many of the expensive and short-lived mechanical devices needed to maintain proper tape tension and velocity in a start/stop drive. The TU80 can perform as a conventional start/stop ANSI drive operating at 25 inches per second, or operation in streaming mode at 25 and 100 inches per second, depending on the application, configuration, and operating environment.

TU80 Specifications	
Record Density	1,600
Read/Write Speed	25 in/s (start/stop) 25 and 100 in/s (streaming)
Capacity Per 2,400 Ft Reel	40 MB with 8 KB blocks (1,600 b/in)
Height	41.6 in (105.7 cm)
Width	21.25 in (54 cm)
Depth	30 in (76.2 cm)
Weight	225 lbs (102.5 kg)

TU80 Ordering Information	
TU80-AA(AB)	TU80 Magnetic Tape Subsystem

TU77 Magnetic Tape Subsystems

The TU77 is a nine-track, medium-capacity (40 Mbytes) storage device for PDP-11/70, VAX-11/750, and VAX-11/780 systems. It is designed to operate at high speeds for disk-to-tape backup, data acquisition, heavy transaction processing and journaling, tape interchange, and archival storage of large databases.

To reduce access time, the TU77 can read data in two directions, while verifying each bit of data immediately after recording it. The TU77 will automatically load magnetic tape and reload it if a misfeed is detected.



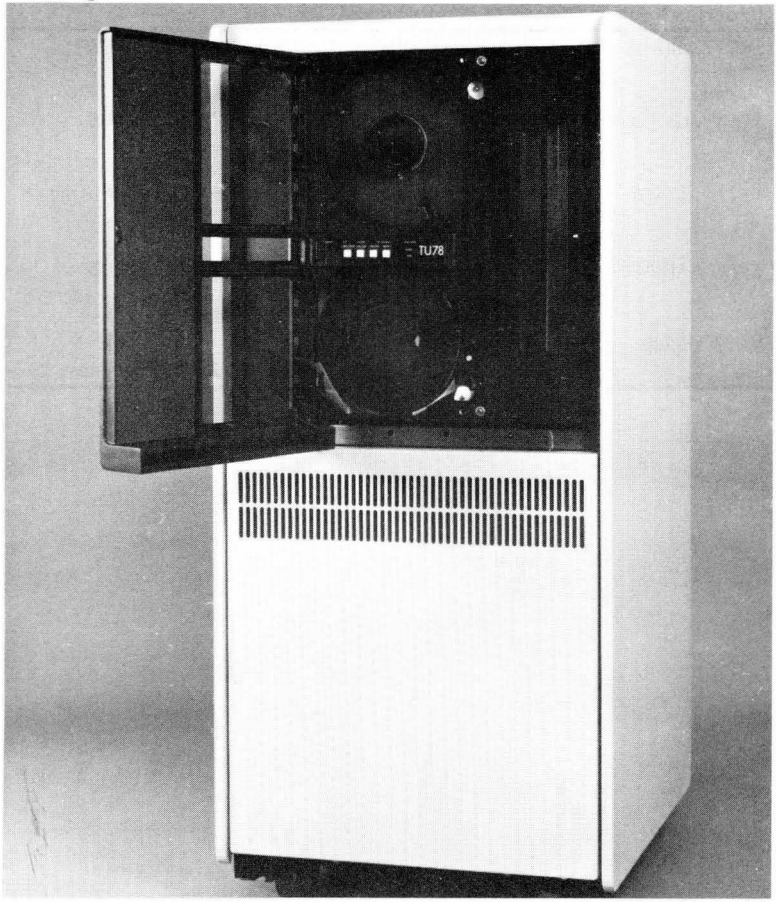
TU77 Specifications	
Record Density	1,600 or 800 b/in
Read/Write Speed	125 in/sec
Capacity Per 2,400 Ft Reel	40 MB with 8 KB blocks (1,600 b/in) 20 MB with 8 KB blocks (800 b/in)
Height	60 in (152.4 cm)
Width	28 in (71 cm)
Depth	30 in (76.2 cm)
Weight	630 lbs (286 kg)

TU77 Ordering Information	
TEU77-AB(AD)	TU77 magnetic tape transport and VAX-11/780 MASSBUS adapter PREREQUISITE: VAX-11/780
TGU77-AB(AD)	TU77 magnetic tape transport and VAX-11/750 MASSBUS adapter PREREQUISITE: VAX-11/750
TJU77-AB(AD)	TU77 magnetic tape transport and controller to interface to the PDP-11 UNIBUS PREREQUISITE: UNIBUS PDP-11
TWU77-AB(AD)	TU77 magnetic tape transport and PDP-11/70 MASSBUSS adapter PREREQUISITE: PDP-11/70
TU77-AF(AJ)	TU77 magnetic tape transport PREREQUISITE: TEU77-A, TGU77-A, or TJU77-A subsystem

TU78 Magnetic Tape Subsystem

The TU78 is a 9-track, large-capacity (140 Mbytes) storage device for VAX-11/750 and VAX-11/780 systems. It operates at high speeds, making it suitable for disk-to-tape backup, data acquisition, heavy transaction processing/journaling, tape interchange, and archival storage of large databases.

A microprocessor-based data formatter allows the TU78 system to read in a forward or reverse direction, reducing access time. It also verifies each bit of data immediately after recording it. The magnetic tape can automatically be loaded and will reload if a misfeed is detected. With the dual access option, two CPUs can share a single tape drive. Program-selectable recording densities make it possible to interchange data between systems. Self-tests are run continuously when data is not being transferred, and the CPU is alerted of a failure as soon as it occurs.



TU78 Specifications	
Record Density	6,250 or 1,600
Read/Write Speed	125 in/s
Capacity Per 2,400 Ft Reel	145 MB with 8 Kbytes blocks (6,250 b/in) 40 Mbytes with 8 Kbytes blocks (1,600 b/in)
Height	60 in (152.4 cm)
Width	28 in (71 cm)
Depth	30 in (76.2 cm)
Weight	630 lbs (286 kg)

TU78 Ordering Information	
TEU78-AB(AD)	TU78 magnetic tape transport, formatter, and VAX-11/780 MASSBUS adapter PREREQUISITE: VAX-11/780
TEU78-BB(BD)	Dual-ported TU78 magnetic tape transport, formatter, and two VAX-11/780 MASSBUS adapters PREREQUISITE: VAX-11/780
TGU78-AB(AD)	TU78 magnetic tape transport and VAX-11/750 MASSBUS adapter PREREQUISITE: VAX-11/750
TU78-AB(AD)	TU78 magnetic tape transport and formatter (master)* PREREQUISITE: VAX-11/780, MBA and round MASSBUS cable
TU78-AF(AJ)	TU78 magnetic tape transport (without formatter) PREREQUISITE: TEU78-AB(AD), TGU78-AB(AD) or TU78-AB(AD)
TM78-C	TU78 dual-port kit containing drive logic and cables to provide dual-porting capability to a TEU78-AB(AD) or TU78-AB(AD) PREREQUISITE: TEU78-AB(AD), TGU78-AB(AD), or TU78-AB(AD)

*Note: Requires a TM78-C for dual-porting capability.

LA50 Personal Printer

The LA50 Personal Printer is a lightweight, desktop, dot-matrix printer designed for use with Digital's personal workstations. Attach it to the printer ports on the VT100-family video terminals or to Digital's personal computers for complete compatibility. It features a text mode, an enhanced print-quality mode, and graphics capability. The LA50 printer can use regular office stationery, fan-fold paper, or multipart forms* on a 10 inch wide platen. For multilingual purposes a multinational character set (DIGITAL-standard) is resident in this terminal. The printer is customer-installable.



*DIGITAL recommends that multipart forms not exceed 0.028 cm (0.011 inches) in thickness. This is usually equivalent to a three-part form.

LA50 Specifications	
Baud Rate	110 to 4,800 b/s
Print Speed	100 characters/s (text mode); 50 characters/s (enhanced print mode)
Print Columns	80 to 132
Character Set	94 displayable-character ASCII set, 81 multinational set (DIGITAL-standard), JIS Katakana set option, 27 VT100 special graphics (line drawing) set plus ANSI-compatible escape sequences
Characters Per Inch	10, 12, 16.5 single width; 5, 6, 8.25 double width
Characters	7 x 9 dot matrix impact printing in text mode; 13 x 9 in enhanced print mode
Lines Per Inch	2, 3, 4, 6, 8, or 12
Parity	Switch-selectable to odd, even, mark, or space; 7 or 8 bits per character (selectable)
Print Density	144 or 180 dots per inch horizontal (switch-selectable) and 72 dots per inch vertical in graphics mode

LA50 Ordering Information	
LA50-RA	Desktop printer with tractor feed, 110V power supply.
LA50-RB	Desktop printer with tractor feed, 220V power supply.
LA50-RC	Desktop printer with tractor feed, 240V power supply.

LA12 DECwriter Correspondent

The DECwriter Correspondent (LA12) is a lightweight portable, interactive terminal which prints on plain bond paper, as well as fan-fold and roll paper. With the Correspondent, you can also print two-part forms. A variety of user-selectable features allows the terminal to be adapted to a number of applications in many locations. The Correspondent is well-suited to all four major application categories: on-line timesharing, database information retrieval, networking, or program development. You can select several integral communication modes—acoustic coupler, direct connect modem, and direct-connect EIA port—to connect your terminal to a computer from virtually any location. These flexible communication ports allow more location independence to the professional than ever before, so the LA12 terminal is ideal for the executive on the go.

For international use, the Correspondent is compatible with all Bell and European modem protocols. You can switch from English to any of nine other international character sets right on the keyboard.



LA12 Specifications	
Baud Rate	50 to 9,600 b/s
Print Speed	150 characters/s (text mode)
Slew Speed	5 in (12.7 cm)/s
Print Columns	40 to 132, user-selectable
Character Set	96-character ASCII set; 9 international sets; VT100 special graphics 27-character set; APL character set
Characters Per Inch	5, 6, 6.6, 8.25, 10, 12, 13.2, 16.5
Characters	9 x 9 dot matrix impact printing in text mode
Lines Per Inch	2, 3, 4, 6, 8, 12 host-selectable
Universal Power Supply, User-Selectable	
Parity	Switch-selectable to even, odd, or none; 7 or 8 bits per character selectable
VT100 Video Terminal Line Drawing Graphics Set	
Print Density	132 dots per inch horizontal; 72 dots per inch vertical (graphics mode)
Extensive Self-Contained User Diagnostics	

LA12 Ordering Information	
LA12-D	Portable hardcopy terminal with EIA interface and accessories—paper roll (100 ft), ribbon cartridge, instruction card, loop-back connector, and line cord.
LA12-C	LA12-D plus integral 300 baud acoustic coupler, carry case, shoulder strap
LA12-B	LA12-D plus 300/1,200 baud modem, carry case, shoulder strap.
LA12-A	LA12-D plus integral 300/1,200 baud modem, 300 baud acoustic coupler, carry case, shoulder strap.

LA100 Letterprinter and Letterwriter

The Letterprinter 100/Letterwriter 100 are desktop, microprocessor-controlled, hardcopy terminals. The Letterprinter 100 is the receive only (RO) version, while the Letterwriter 100 is a keyboard send/receive (KSR) terminal. Highly versatile and multimode, these terminals are ideal for use with video workstations and small business systems. These printers offer two text modes—data-quality and enhanced-quality—as well as bit map graphics. LA100s print on fan-fold computer paper, roll paper, and office stationery. The user can select from a variety of resident type faces or a greater selection of plug-in cartridges. The LA100-PC model, designed for use with Digital's personal computers, offers graphics compatibility with Professional 300-series computers. (*Note:* The LA100-PC model uses different font cartridges than the other LA100 models.) These printers can handle a wide variety of applications in distributed data processing, word processing, graphic imaging, communications, and electronic mail.

The LA100 printer operates on full-duplex asynchronous communications lines and each includes universal power supply, standard EIA interface, and EIA null modem cable (BC22A-xx). Since it is capable of communications with a wide variety of systems, the LA100 is ideal when a single terminal must support several systems.



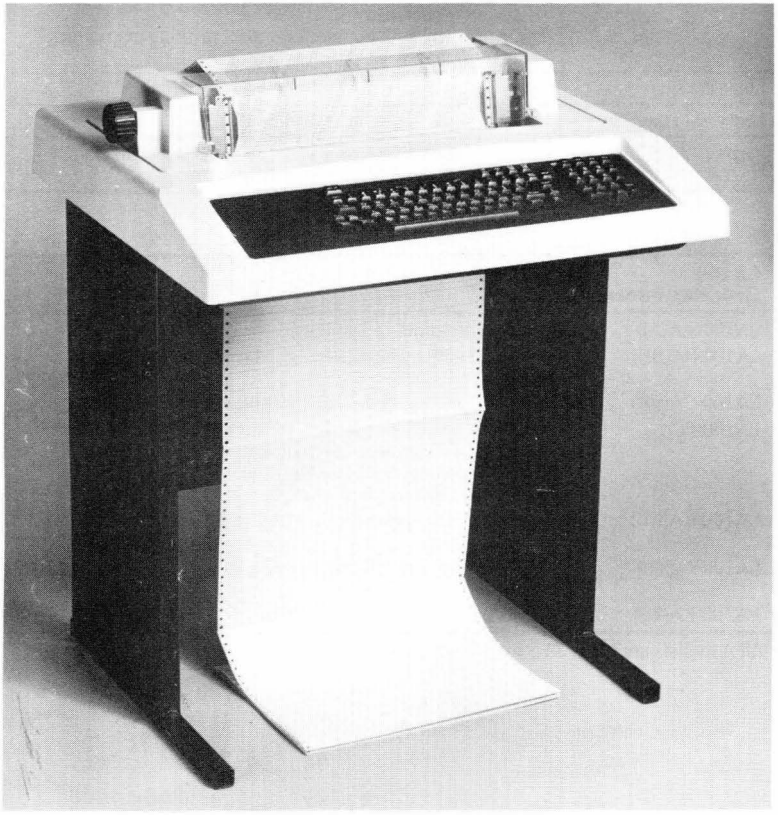
LA100 Specifications	
Baud Rate	50 to 9,600 b/s
Print Speed	240 characters/s in data mode 30 characters/s in correspondence mode 80 characters/s in enhanced printing may be ordered as an option
Slew Speed	12.7 cm/s (5 in/s)
Print Columns	217
Character Set	7-bit ASCII for 9 countries, plus ANSI-compatible escape sequences; 8-bit Digital-standard 169 multinational and VT100 line drawing graphics (for LA100-PC)
Characters Per Inch	5, 6, 6.6, 8.25, 10, 12, 13.2, 16.5
Characters	7 x 9 dot matrix impact printing in EDP mode; 33 x 9 dot matrix impact printing in memo mode; 33 x 18 dot matrix impact printing in correspondence mode; 132 x 72 dot matrix impact printing in grpahics mode
Lines Per Inch	2, 3, 4, 6, 8, 12
Universal Power Supply	
Parity	Even, odd, or none; 7 or 8 bits per character, selectable

LA100 Ordering Information	
LA100-AA(AB)	KSR hardcopy terminal.
LA100-BA(BB)	LA100-AA(AB) with numeric keypad, tractors, and BC22A-10 cable.
LA100-CA(CB)	LA100-BA(BB) plus multiple-font capability.
LA100-PC	RO hardcopy terminal for use with Digital's personal computers, includes 8-bit DEC standard 169 multinational character set, U.S. COURIER-10, multinational COURIER-10, VT100 line-drawing character set, tractors, built-in multiple-font option.
LA100-RA(RB)	English language RO printer with COURIER-10 and ORATOR-10 fonts.
LA100-YA(YB)	LA100-RA plus tractors, BC22A-10 cable, ribbon cartridge, and 1 roll of paper.
LA100-ZA(ZB)	LA100-YA(YB) plus multiple-font option.

*All A models are 120V, all B models are 220V.

LA120 DECwriter III Printing Terminal

The freestanding DECwriter III terminal is one of the sturdiest printers you can buy. It has been designed for the high duty-cycle environment. You can choose between receive-only (RO) and keyboard send/receive (KSR) versions. The LA120 is optimized for 1,200 baud communications, with capabilities for a dozen other rates from 50 to 9,600. Throughput is increased by combining bidirectional smart printing (seeks the terminal shortest path to next print position) with a 1,000 character buffer with fast horizontal and vertical skipping over white space. In addition, 45 setup features—like character size, line spacing, forms length, margins, and tabs—are easily selected from the keypad. The LA120 KSR printing terminal features a contoured, typewriter-styled keyboard with N-key roll-over. The LA120 operates on five half- and full-duplex asynchronous communications lines, with a 30-character answerback for security, and standard EIA/CCITT interface. Includes universal power supply.

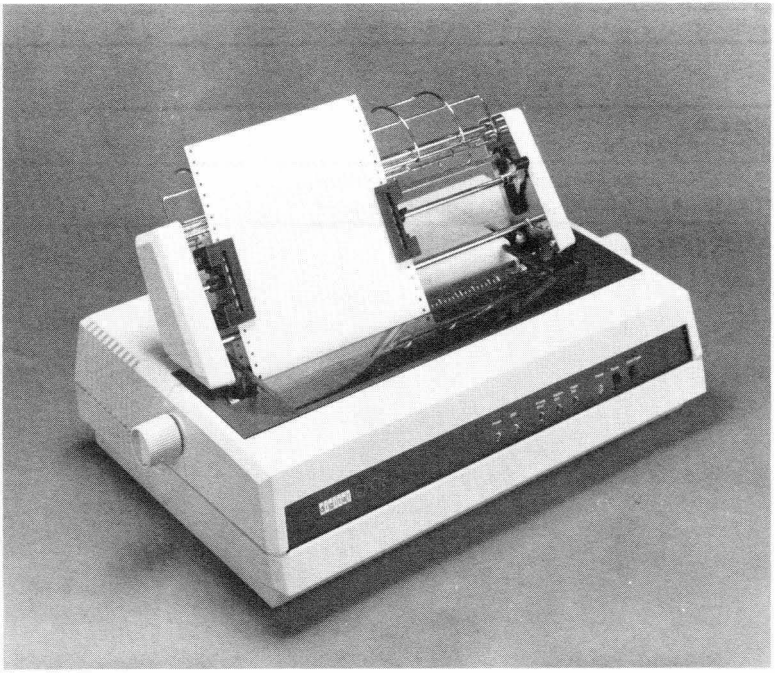


LA120 Specifications	
Baud Rate	50 to 9,600 b/s
Print Speed	180 characters/s
Lines Per Inch	2, 3, 4, 6, 8, 12
Slew Speed	5 in (12.7 cm)/s
Characters Per Inch	5, 6, 6.6, 8.25, 10, 12, 13.2 or 16.5
Characters	7 x 7 dot matrix
Character Set	7-bit ASCII plus ANSI-compatible escape sequences
Tabs	217 horizontal, 168 vertical
Font Sizes	8
Line Spacings	6
Parity	Odd, even, or none

LA120 Ordering Information	
LA120-DA	DECwriter III KSR hardcopy terminal.
LA120-RA	DECprinter III RO hardcopy terminal.

LQP02 Letter-Quality Printer

The LQP02 letter-quality printer is a desktop full-character impact printer that incorporates daisy-wheel print technology. For business letters, word processing, or formal documents, the LQP02 helps you make a great impression. This highly reliable, customer-installable terminal will print high-quality hardcopy on regular office stationery as well as fan-fold paper. Various character fonts can be used by simply changing printwheels. Daisy wheels are inexpensive, easily interchangeable, and available in over 100 type styles and special purpose fonts. Smart bidirectional printing increases speed, particularly over large areas of white space. It operates on full-duplex, asynchronous communication lines and includes a universal power supply and a standard EIA interface.



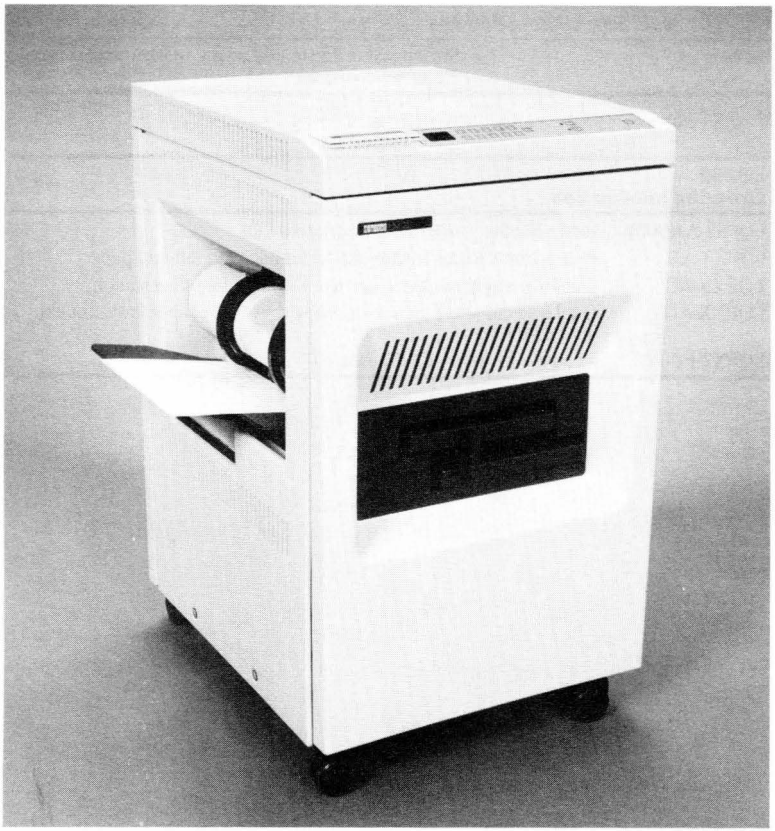
LQP02 Specifications	
Baud Rate	110 to 9,600 b/s
Print Speed	32 characters/s (Shannon Text)
Print Method	Impact, daisy wheel
Print Columns	132 at 10 characters/in 158 at 12 characters/in
Character Set	Over 100 different, 7-bit ASCII
Characters Per Inch	10/12 variable, software-selectable
Lines Per Inch	6 or 8, variable, software-selectable
Variable Horizontal Tabs And Margins	
Paper	Cut sheet feeder option
Ribbon	Fabric or mylar
Universal Power Supply, User-Selectable	
Parity	Switch-selectable to odd, even, mark, or space; 7 bits per character

LQP02 Ordering Information	
LQP02-AA(AD)	Letter-quality printer with Courier-10 font.
LQPX2-AA	Bidirectional forms tractor option for use with fan-fold paper.
LQPXX-AC	Dual-tray cut-sheet feeder for use with regular office stationery.
LQPXX-AD	Dual-tray cut-sheet feeder for use with A4 size paper for European applications.
LQPX2-FB(FD)	Acoustic cover for LQP02-AA(AD).

LN01 Laser Printer

The LN01 page printer is a high-quality nonimpact printer that employs laser technology. The LN01 provides the speed of a lineprinter with exceptional print quality. Using electrophotographic imaging and xerographic printing, the LN01 prints one page at a time, twelve pages per minute. The print resolution of 300-by-300 dots per inch produces perfectly formed characters of even density and alignment. Since every page is an original, every copy is as crisp and clear as the first.

The printer provides for the transfer of data via a parallel interface. Its quietness, high speed, high-resolution print quality, and flexibility makes the LN01 particularly well-suited to office environments, data centers, proof printing operations, reproduction departments, and scientific applications.



LN01 Specifications	
Printing Speed	12 pages/min maximum
Character Sets	2 188-character fixed-space fonts
Print Modes	Portrait and landscape
Print Resolution	300 x 300 dots per square inch
Print Columns	Up to 132
Lines Per Inch	8.57 U.S. and Europe
Characters Per Inch	13.6 for U.S., 12.5 for Europe
Paper Handling	Cut-sheet plain paper, 2 250-sheet cassettes (16-24 lb paper)
Paper Sizes	
	Standard—8.5 x 11 in (21.6 x 27.9 cm) Legal—8.5 x 14 in (21.6 x 35.6 cm) European—8.3 x 11.7 in (21 x 29.7 cm)
Noise Level	Less than 55 Dba

LN01 Ordering Information	
LN01-CA(CB)	Nonimpact 12 page/min laser printer with LP11 interface and 9.1 m (30-feet) cable.

Optional Printer Cables

Ordering Information

The following cables are used to connect an LA50, LA100, or LQP02 printer to a DECmate II:

BCC05-25	7.63 m (25 ft) printer cable
BCC05-50	15.25 m (50 ft) printer cable
BCC05-A0	30.48 m (100 ft) printer cable



Appendix A
Additional Literature

If you need more information on the products described in this book, please contact your Digital Sales Representative.

Your Sales Rep will be glad to order any of the following brochures, product bulletins and/or technical documentation for you.

Product Bulletins and Brochures

ALL-IN-1
Four Reasons to Buy VAX
Introduction to VAX Information Architecture
VAX—Develop More Software in Less Time
VAX Realtime Capabilities Brochure
Digital Network Architecture
Digital's Ethernet Products and Services
Digital and Dow Jones
Networking: Distributed Processing Applications Stories by Digital
VAX-11/730
VAX-11/750
VAX-11/780
VAX-11/782
MicroVAX
DECnet/VAX
DECnet/SNA
DECnet/SNA Brochure
DF03 Family of Modems
DMF32
DMP11
DMR11
DR780 Parallel Interface
DR750 Parallel Interface
Ethernet Hardware Products
Ethernet Communications Servers
FP730 Floating Point Accelerator

FP750 Floating Point Accelerator
Internets for Digital to IBM Communications
MA780 Multiport Memory
VAX APL
VAX BASIC
VAX C
VAX COBOL
VAX Common Data Dictionary
VAX Computer Interconnect Products
VAX Database Management System
VAX Data Processing Capabilities
VAX DATATRIEVE
VAX DEC/CMS
VAX Data Management System
VAX FMS
VAX FORTRAN
VAX Information Management Products
VAX PL/I
VAX PSI
VAXstation
VAX TDMS
VAX/VMS
VAX 2780/3780
VAX 3271
X.25

Handbooks/Guidebooks/Technical Summaries

Guide to Office Information Systems
DECmate II Handbook
Introduction to Local Area Networks
Rainbow Handbook
Terminals and Printers Handbook
VAX Architecture Handbook
VAX Software Handbook
VAX Hardware Handbook
VAXcluster Technical Summary
VAX Technical Summary

Product Catalogs

VAX Systems and Options Summary
PDP-11 Systems and Options Summary
DECnet/SNA Gateway Systems and Options Catalog

Ethernet Products and Services Catalog
Networks Systems and Options Catalog
Personal Computer Catalog

Technical Guides and Manuals

ALL-IN-1 Office Menu Primer
ALL-IN-1 Office Menu Installation Guide
ALL-IN-1 Office Menu Application Programmer's Reference Guide
DECmail Primer
DECmail User's Guide
EDT Editor Manual
VAX DATATRIEVE Reference Manual
VAX DATATRIEVE Interactive User's Guide
VAX FMS Software Reference Manual
VAX/VMS Command Language User's Guide
VAX/VMS Primer
VAX/VMS Software Installation Guide
CI780 User's Guide
Communication Servers
Communications Server Site Preparation and Planning Guide
Communications Server Installation Guide
Communications Server Operations and Maintenance Guide
DECnet Router Server Installation and Operation Guide
DECnet Router/X.25 Gateway Installation and Operation Manual
DELNI Installation/Owner's Guide
DELNI Technical Manual
DEUNA Technical Manual
DEUNA User's Guide
Ethernet Installation Guide
Ethernet Repeater Technical Manual
Ethernet Repeater Customer Installation Manual
H4000 Ethernet Transceiver Technical Manual
Introducing X.25 Packet Switched Networks
Introduction to the DECnet/SNA Gateway
Network Management Services
Terminal Server Installation and Operation Guide
Terminal Server User's Pocket Reference Guide
VT220 Owner's Manual
VT220 Installation Guide
VT240 Series Owner's Manual



Appendix B
Sales Office Locations

ALABAMA

Birmingham
Sales Office
Digital Equipment Corporation
2 Riverchase Office Plaza
Suite 208
Birmingham, AL 35244
TEL: (205) 988-5433

Huntsville
Sales Office
Digital Equipment Corporation
Holiday Office Center
555 Sparkman Dr.
Suite 1400
Huntsville, AL 35805
TEL: (205) 837-4010

Mobile
Field Service Office
Digital Equipment Corporation
1020 Downtowner Blvd.
Suite 110A
Mobile, AL 36609
TEL: (205) 432-2350

ALASKA

Anchorage
Field Service/Sales Office
Digital Business Center
Digital Equipment Corporation
471 W. 36th Ave.
Suite 104
Anchorage, AK 99503
TEL: (907) 279-0234

ARIZONA

Phoenix
Sales Office
Digital Equipment Corporation
2406 So. 24th St.
Suite E 112
Phoenix, AZ 85034
TEL: (602) 267-1364

Phoenix
Digital Business Center
Digital Equipment Corporation
Rosenweig Center
Suite C4
3800 No. Central Ave.
Phoenix, AZ 85012
TEL: (602) 277-4363

Tucson
Sales Office
Digital Equipment Corporation
6377 E. Tanque Verde Rd.
Suite 101
Tucson, AZ 85715
TEL: (602) 885-3551

ARKANSAS

Little Rock
Sales Office
Digital Equipment Corporation
3 Innwood Circle
Little Rock, AR 72211
TEL: (501) 661-0303

CALIFORNIA

Bakersfield
Field Service/Sales Office
Digital Equipment Corporation
1400 Easton Dr.
Suite 135 E
Bakersfield, CA 93309
TEL: (805) 322-1041

Colton
Field Service Office
Digital Equipment Corporation
935 So. Mount Vernon Ave.
Suite 107
Colton, CA 92324
TEL: (714) 877-1731

Costa Mesa
Sales Office
Digital Equipment Corporation
3390 Harbor Blvd.
Costa Mesa, CA 92626
TEL: (714) 979-2460

Culver City
Sales Office/
Digital Business Center
Digital Equipment Corporation
6101 W. Centinela Ave.
Suite One
P.O. Box 3890
Culver City, CA 90230
TEL: (213) 417-5011

El Segundo
Aerospace/Commercial
Sales Office
Digital Equipment Corporation
831 So. Douglas St.
Suite 119
El Segundo, CA 90245
TEL: (213) 973-1818

Fresno
Field Service/Sales Office
Digital Equipment Corporation
4709 No. El Capitan
Suite 101
Fresno, CA 93711
TEL: (209) 275-0955

Irvine
Sales Office
Digital Equipment Corporation
24 Executive Park
Suite 100
Irvine, CA 92714
TEL: (714) 979-7593

Livermore
Field Service Office
Digital Equipment Corporation
2111 Research Dr., Unit 3
Livermore, CA 94550
TEL: (415) 455-0145

Los Angeles
Field Service Office
Educational Services Center
Digital Equipment Corporation
4311 Wilshire Blvd.
Suite 400
Los Angeles, CA 90019
TEL: (213) 937-3870

Milbrae
Field Service Office
Digital Equipment Corporation
800 El Camino Real
Suite B
Milbrae, CA 94030
TEL: (415) 872-1956

Modesto
Field Service Office
Digital Equipment Corporation
1620 No. Carpenter Rd.
Suite D-45
Modesto, CA 95351
TEL: (209) 521-0275

Oakland
Sales Office
Digital Equipment Corporation
7700 Edgewater Dr.
Suite 125
Oakland CA 94621
TEL: (415) 562-8375

Reseda
Sales Office
Digital Equipment Corporation
18040 Sherman Way,
Suite 400
Reseda, CA 91335
TEL: (213) 708-0778

Ridgecrest
Field Service Office
Digital Equipment Corporation
1653 No. Triangle Dr.
Ridgecrest, CA 93555
TEL: (714) 446-6575

Sacramento
Sales Office
Digital Equipment Corporation
9719 Lincoln Village Dr.
Suite 406
Sacramento, CA 95827
TEL: (916) 362-2420

San Diego
Sales Office
Digital Equipment Corporation
5471 Kearny Villa Rd.
P.O. Box 85033
San Diego, CA 92138
TEL: (619) 292-1818

San Diego
Digital Business Center
Digital Equipment Corporation
949 Second Ave.
San Diego, CA 92101
TEL: (714) 232-0888

San Francisco
Sales Office
Digital Equipment Corporation
100 Bush St.
7th Floor
San Francisco, CA 94104
TEL: (415) 391-6925

San Francisco
Digital Business Center
Digital Equipment Corporation
369 Pine St.
San Francisco, CA 94104
TEL: (415) 392-0284

Santa Barbara
Sales Office
Digital Equipment Corporation
5320 Carpenteria Ave.
Carpenteria, CA 93013
TEL: (805) 684-8641

Santa Clara
Sales Office
Educational Services Center
Digital Equipment Corporation
2525 Augustine Dr.
Santa Clara, CA 95051
TEL: (408) 748-4427

Santa Monica
Field Service Office
Digital Equipment Corporation
2950 31st St.
Santa Monica, CA 90405
TEL: (213) 450-9411

Sherman Oaks
Digital Business Center
Digital Equipment Corporation
15436 Ventura Blvd.
Sherman Oaks, CA 91403
TEL: (213) 501-5256

Sunnyvale
Field Service Office
Digital Equipment Corporation
632 East Caribbean Dr.
Sunnyvale, CA 94089
TEL: (408) 734-4915

West Covina
Sales Office
Digital Equipment Corporation
1900 W. Garvey Ave. South
Suite 350
West Covina, CA 91790
TEL: (213) 960-9561

COLORADO

Arvada
Sales Office
Digital Equipment Corporation
7828 Vance Dr.
Suite 100
Arvada, CO 80003
TEL: (303) 425-9604

Colorado Springs
Field Service/Sales Office
Digital Diagnosis Center
Digital Equipment Corporation
301 Rockrimmon Blvd. South
Colorado Springs, CO 80963
TEL: (303) 599-4111

Colorado Springs
Telephone Support Center
Digital Equipment Corporation
4405 No. Chestnut St.
Colorado Springs, CO 80907
TEL: (303) 599-0549

Denver
Sales Office
Digital Equipment Corporation
8850 E. Arapahoe Rd.
Englewood, CO 80112
TEL: (303) 773-6535

Denver
Digital Business Center
Digital Equipment Corporation
Ptarmigan Place
3773 Cherry Creek Dr. North
Suite 140
Denver, CO 80209
TEL: (303) 388-6853

CONNECTICUT

Bridgeport
Sales Office
Digital Equipment Corporation
500 Sylvan Ave.
Bridgeport, CT 06606
TEL: (203) 371-6947

Hartford
Field Service/Sales Office
Digital Equipment Corporation
Corporate Center West
433 So. Main St.
W. Hartford, CT 06110
TEL: (203) 244-1800

Meriden
Sales Office
Digital Business Center
Digital Equipment Corporation
300 Research Pkwy.
Meriden, CT 06450
TEL: (203) 634-5388

New London
Field Service Office
Digital Equipment Corporation
393 Bayonet St.
New London, CT 06320
TEL: (203) 442-4014

DELAWARE

Laurel
Field Service Office
Digital Equipment Corporation
Route 13 North
P.O. Box 637
Laurel, DE 19956
TEL: (302) 875-4220

Wilmington
Sales Office
Digital Equipment Corporation
1 Pike Creek Center
New Linden Hill Rd.
Wilmington, DE 19808
TEL: (302) 995-2111

DISTRICT OF COLUMBIA

Digital Business Center
Digital Equipment Corporation
International Square
1850 K St. Northwest
Washington, DC 20006
TEL: (202) 466-8926

Field Service/Sales Office
Digital Equipment Corporation
2nd Floor
1825 Eye St. Northwest
Washington, DC 20006
TEL: (202) 429-9200

FLORIDA

Jacksonville
Field Service/Sales Office
Digital Equipment Corporation
Norco Executive Center
6620 Southpoint Dr. South
Suite 150
Jacksonville, FL 32216
TEL: (904) 731-0992

Maitland
Sales Office
Digital Equipment Corporation
2300 Maitland Center Pkwy.
Suite 140
Maitland, FL 32751
TEL: (305) 660-2100

Melbourne
Field Service/Sales Office
Digital Equipment Corporation
Building A
Suite 3
50 Woodlake Dr. West
Palm Bay, FL 32905
TEL: (305) 729-6111

Miami
Sales Office
Digital Business Center
Digital Equipment Corporation
18425 N.W. 2nd Ave.
Suite 200
Miami, FL 33169
TEL: (305) 652-6841

Pensacola
Field Service/Sales Office
Gulf Coast Office Building
4700 Bayou Blvd.
Building 3
Pensacola, FL 32503
TEL: (904) 478-6753

Tampa
Sales Office
Digital Equipment Corporation
405 North Reo St.
Suite 100
Tampa, FL 33609
TEL: (813) 879-9760

GEORGIA

Atlanta
Sales Office
Digital Equipment Corporation
5775 Peach Tree Dunwoody Rd.
Suite 100D
Atlanta, GA 30342
TEL: (404) 257-2422

Atlanta
Digital Business Center
Digital Equipment Corporation
Trust Company Tower
25 Park Place Northeast
Suite 100
Atlanta, GA 30303
TEL: (404) 523-2105

Atlanta
Customer Services
Product Support Center
Digital Equipment Corporation
360 Interstate No. Pkwy.
Suite 600
Atlanta, GA 30339
TEL: (404) 953-0953

Atlanta
National Sales Desk
Digital Equipment Corporation
360 Interstate No. Pkwy.
Suite 560
Atlanta, GA 30339
TEL: (404) 953-8080

Columbus
Field Service Office
Digital Equipment Corporation
2609 Cross Country Dr.
Suite 929
Columbus, GA 31906
TEL: (404) 563-2910

Norcross
Field Service Office
Digital Equipment Corporation
6400 Atlantic Blvd.
Suite 100
Norcross, GA 30071
TEL: (404) 448-6261

HAWAII

Honolulu
Sales Office
Digital Equipment Corporation
222 No. School St.
Honolulu, HI 96817
TEL: (808) 531-4306

IDAHO

Boise
Field Service/Sales Office
Digital Equipment Corporation
202 So. Cole Rd.
Boise, ID 83709
TEL: (208) 375-7090

ILLINOIS

Arlington Heights
Sales Office
Digital Equipment Corporation
No. Atrium Centre
Building. #1
1155 W. Dundee Rd.
Arlington Heights, IL 60004
TEL: (312) 394-6003

Calumet City
Field Service Office
Digital Equipment Corporation
Narco River Business Center
1600 167th St.
Suite 3
Calumet City, IL 60409
TEL: (312) 891-9101

Champaign
Field Service Office
Digital Equipment Corporation
1711 So. Neil St.
Suite A
Champaign, IL 61820
TEL: (217) 352-2774

Chicago
Sales Office
Digital Equipment Corporation
5600 Apollo Dr.
Rolling Meadows, IL 60008
TEL: (312) 640-5543

Chicago
Digital Business Center 1
Digital Equipment Corporation
Merchandise Mart Plaza
Suite 150
Chicago, IL 60654
TEL: (312) 527-0730

Chicago
Digital Business Center 2
Digital Equipment Corporation
Woodfield Commons West
1037 E. Golf Rd.
Schaumburg, IL 60194
TEL: (312) 843-7857

Chicago
Chicago Loop Sales Office
Digital Equipment Corporation
1 No. Wacker Dr.
Suite 605
Chicago, IL 60606
TEL: (312) 263-3240

Naperville
Field Service Office
Digital Equipment Corporation
1717 No. Naper Blvd.
Suite 108
Naperville, IL 60540
TEL: (312) 369-8850

Northfield
Field Service Office
Digital Equipment Corporation
191 Waukegan Rd.
Northfield, IL 60091
TEL: (312) 446-6930

Peoria
Sales Office
Digital Equipment Corporation
2400 No. Main St.
East Peoria, IL 61611
TEL: (309) 694-4231

Schaumburg
Digital Servicenter
Field Service Office
Product Repair Center
Digital Equipment Corporation
1207 E. Remington Rd.
Suites B-D, H-N
Schaumburg, IL 60195
TEL: (312) 640-5612

Springfield
Field Service Office
Digital Equipment Corporation
1999 Wabash Ave.
Springfield, IL 62704
TEL: (217) 787-7926

Westchester
Field Service Office
Digital Equipment Corporation
10001 Derby Lane
Westchester, IL 60153
TEL: (312) 343-8118

INDIANA

Ft. Wayne
Field Service Office
Digital Equipment Corporation
4618 E. State Blvd.
Suite 125
Fort Wayne, IN 46815
TEL: (219) 482-9539

Indianapolis
Sales Office
Digital Equipment Corporation
11611 No. Meridian St.
Carmel, IN 46032
TEL: (317) 848-8818

IOWA

Bettendorf
Sales Office
Digital Equipment Corporation
4711 Brady St., #1
Davenport, IA 52806
TEL: (319) 388-0320

Cedar Rapids
Field Service Office
Digital Equipment Corporation
Larken Plaza
3330 Southgate Ct. Southwest
Cedar Rapids, IA 52402
TEL: (319) 365-4614

Des Moines
Field Service/Sales Office
Digital Equipment Corporation
625-629 E. 2nd St.
Des Moines, IA 50309
TEL: (515) 282-0056

KANSAS

Wichita
Field Service/Sales Office
Digital Equipment Corporation
Building P
520 So. Holland St.
Suite 207
Wichita, KS 67209
TEL: (316) 722-7856

KENTUCKY

Henderson
Field Service Office
Digital Equipment Corporation
936 8th St.
Henderson KY 42420
TEL: (502) 827-2849

Lexington
Field Service Office
Digital Equipment Corporation
386 Waller Ave.
Lexington, KY 40504
TEL: (606) 278-9413

Louisville
Sales Office
Digital Equipment Corporation
Nolan Building
2100 Gardiner Lane
Suite 117
Louisville, KY 40205
TEL: (502) 459-7476

LOUISIANA

Baton Rouge
Field Service Office
Digital Equipment Corporation
4354 So. Sherwood Forest Blvd.
Suite 150
Baton Rouge, LA 70816
TEL: (504) 292-2141

Metaire
Sales Office
Digital Equipment Corporation
4405 I-10 Service Rd.
Metairie, LA 70002
TEL: (504) 888-7230

Monroe
Field Service Office
Digital Equipment Corporation
Suite F
2204 Liberty Ave.
Monroe, LA 71204
TEL: (318) 323-0558

Shreveport
Field Service Office
Digital Equipment Corporation
745 Olive St.
Suite 111
Shreveport, LA 71104
TEL: (318) 424-0310

MAINE

Augusta
Digital Business Center
Digital Equipment Corporation
500 Civic Center Dr.
Augusta, ME 04330
TEL: (207) 623-2911

Portland
Field Service/Sales Office
Digital Equipment Corporation
28 Atlantic Place
South Portland, ME 04106
TEL: (207) 774-6600

MARYLAND

Baltimore
Sales Office
Digital Business Center
Digital Equipment Corporation
6707 White Stone Rd.
Baltimore, MD 21207
TEL: (301) 298-1516

Landover
Sales Office
Digital Equipment Corporation
8301 Professional Place
Landover, MD 20785
TEL: (301) 459-7900

Landover
Software Services Office
Digital Equipment Corporation
8300 Professional Place
Landover, MD 20785
TEL: (301) 792-0811

Lanham
Digital Servicenter
Digital Equipment Corporation
9730 George Palmer Highway
Lanham, MD 20706
TEL: (301) 459-4084

Lanham
Educational Services Center
Digital Equipment Corporation
Lanham 30 Office Building
5900 Princess Garden Pkwy.
Lanham, MD 20706
TEL: (301) 459-7900

Odenton
Sales Office
Digital Equipment Corporation
Academy Junction Plaza
419 Telegraph Rd.
Odenton, MD 21113
TEL: (301) 674-5550

MASSACHUSETTS

Auburn
Field Service Office
Digital Equipment Corporation
19 Midstate Dr.
Auburn, MA 01501
TEL: (617) 832-5991

Bedford
Corporate Educational Services
The Digital Bookstore
Digital Equipment Corporation
12 Crosby Dr.
Bedford, MA 01730
TEL: (617) 276-4413

Boston
Sales Office
Digital Equipment Corporation
7th Floor
175 Federal St.
Boston, MA 02110
TEL: (617) 426-0300

Boston
Digital Business Center
Digital Equipment Corporation
1st Floor
175 Federal St.
Boston, MA 02110
TEL: (617) 426-0300

Burlington
Sales Office
Digital Equipment Corporation
1 Burlington Woods Dr.
Burlington, MA 01803
TEL: (617) 273-6589

Burlington
Sales Office
Digital Equipment Corporation
5 Burlington Woods Dr.
Burlington, MA 01803
TEL: (617) 229-7162

Burlington
Education Services Center
Field Service Office
Digital Equipment Corporation
30 North Ave.
Burlington, MA 01803
TEL: (617) 273-7679

Holyoke
Sales Office
Digital Equipment Corporation
489 Whitney Ave.
Suite 300
Holyoke, MA 01040
TEL: (413) 536-8391

Lowell
Product Repair Center
Digital Equipment Corporation
205 Industrial Ave. East
Lowell, MA 01852
TEL: (617) 459-4568

Somerville
Field Service Office
Digital Equipment Corporation
Assembly Square
5 Middlesex Ave.
Somerville, MA 02145
TEL: (617) 628-7170

Stow
Field Operations/Sales Headquarters
Digital Equipment Corporation
40 Old Bolton Rd.
Stow, MA 01775
TEL: (617) 496-9929

Waltham
Sales Office
Digital Equipment Corporation
235 Wyman St.
Waltham, MA 02154
TEL: (617) 895-5476

Westford
Customer Services
Digital Equipment Corporation
P.O. Box 2038
Westford, MA 01886
TEL: (617) 692-1152

MICHIGAN

Detroit
Sales Office
Digital Equipment Corporation
21333 Haggerty Rd.
Novi, MI 48050
TEL: (313) 348-8900

East Detroit
Field Service Office
Digital Equipment Corporation
26091 Sherwood Dr.
Suite 2
Warren, MI 48092
TEL: (313) 758-3660

Farmington
Field Applications Center
Digital Equipment Corporation
24730 Crestview Ct.
Farmington Hills, MI 48018
TEL: (313) 471-6450

Flint
Sales Office
Digital Equipment Corporation
62377 So. Linden Rd.
Suite C
Flint, MI 48504
TEL: (313) 733-6380

Grand Rapids
Field Service Office
Digital Equipment Corporation
5369 44th St. Southeast
Grand Rapids, MI 49508
TEL: (616) 957-1670

Kalamazoo
Sales Office
Digital Equipment Corporation
5320 Holiday Terr.
Suite 200
Kalamazoo, MI 49009
TEL: (616) 375-6300

Lansing
Field Service Office
Digital Equipment Corporation
302 So. Waverly Rd.
Lansing, MI 48917
TEL: (517) 321-7273

Midland
Field Service Office
Digital Equipment Corporation
4012 W. Wackerly Rd.
Midland, MI 48640
TEL: (517) 631-1128

MINNESOTA

Minneapolis
Sales Office
Digital Equipment Corporation
Metro Office Park
2901 Metro Dr.
Suite 400
Minneapolis, MN 55420
TEL: (612) 853-9746

Minneapolis
Digital Business Center
Digital Equipment Corporation
WCCO Building
629 Second Ave. South
Minneapolis, MN 55402
TEL: (612) 340-9250

MISSISSIPPI

Jackson
Field Service Office
Digital Equipment Corporation
460 Briarwood Dr.
Suite 12B
Jackson, MS 39206
TEL: (601) 957-2702

MISSOURI

Columbia
Field Service Office
Digital Equipment Corporation
East Gate Office Building.
2100 E. Broadway
Suite 300
Columbia, MO 65201
TEL: (314) 874-1191

Kansas City
Sales Office
Digital Equipment Corporation
6700 Corporate Dr.
Suite 101
Kansas City, MO 64120
TEL: (816) 483-5340

St. Louis
Digital Business Center
Digital Equipment Corporation
Northwest Plaza Shopping Center
305 Northwest Plaza
St. Ann, MO 63704
TEL: (314) 291-0774

St. Louis
Sales Office
Digital Equipment Corporation
Creve Coeur Executive Office Park
655 Craig Rd.
P.O. Box 27320
St. Louis, MO 63141
TEL: (314) 991-6400

Springfield
Field Service Office
Digital Equipment Corporation
3 Corporate Sq.
Suite 3-111
Springfield, MO 65804
TEL: (417) 882-7333

MONTANA

Billings
Field Service Office
Digital Equipment Corporation
550 No. 31st St.
Suite 102
Billings, MT 59101
TEL: (406) 248-1863

NEBRASKA

Omaha
Sales Office
Digital Equipment Corporation
10822 Old Mill Rd.
Suite 6
Omaha, NE 68154
TEL: (402) 330-5610

NEVADA

Las Vegas
Field Service/Sales Office
Digital Equipment Corporation
1850 E. Flamingo Rd.
Suite 130
Las Vegas, NV 89109
TEL: (702) 737-3145

Reno
Field Service Office
Digital Equipment Corporation
2105 Capurro Way
Suite B
Sparks, NV 89431
TEL: (702) 331-6330

NEW HAMPSHIRE

Bedford
Sales Office
Digital Equipment Corporation
47 Constitution Dr.
Bedford, NH 03102
TEL: (603) 472-8821

Manchester
Digital Business Center
Digital Equipment Corporation
The Mall of New Hampshire
1500 South Willow
Manchester, NH 03103
TEL: (603) 668-4005

NEW JERSEY

Cherry Hill
Small Systems/Terminals
Field Service Office
Digital Equipment Corporation
1790 E. Route 70
Cherry Hill, NJ 08003
TEL: (609) 665-8711

Cherry Hill
Sales Office
Digital Equipment Corporation
6 Cherry Hill Executive Campus
Route 70
Cherry Hill, NJ 08002
TEL: (609) 665-8711

Holmdel
Communications Sales Office
Digital Equipment Corporation
960 Holmdel Rd.
Holmdel, NJ 07733
TEL: (201) 946-9403

Parsippany
Sales Office
Digital Equipment Corporation
4 Wood Hollow Dr.
Parsippany, NJ 07054
TEL: (201) 386-5666

Piscataway
Sales Office
Digital Equipment Corporation
Corporate Park 287
10 Corporate Place South
Piscataway, NJ 08854
TEL: (201) 981-9020

Princeton
Sales Office
Product Repair Center
Digital Equipment Corporation
U.S. Rte. 1
CN-2
Princeton, NJ 08540
TEL: (609) 452-2940

NEW MEXICO

Albuquerque
Sales Office
Digital Equipment Corporation
P.O. Box 499
5700 Kirchner Blvd. Northeast
Albuquerque, NM 87103
TEL: (505) 345-4471

Los Alamos
Sales Office
Digital Equipment Corporation
800 Trinity Dr.
Los Alamos, NM 87544
TEL: (505) 662-2011

NEW YORK

Albany
Sales Office
Digital Equipment Corporation
Corporate Plaza East
Washington Ave. Ext..
Albany, NY 12203
TEL: (518) 869-8461

Big Flats
Field Service/Sales Office
Digital Equipment Corporation
Professional Building
Suite 1
315 Route 352
Big Flats, NY 14814
TEL: (607) 562-8411

Binghamton
Field Service/Sales Remote Office
Digital Equipment Corporation
Oakdale Medical Center
700 Harry L Dr.
Johnson City, NY 13790
TEL: (607) 252-2223

Buffalo
Sales Office
Digital Equipment Corporation
490 Center Rd.
West Seneca, NY 14224
TEL: (716) 675-7230

Fairport
Sales Office
Digital Equipment Corporation
800 Perinton Hills Office Park
Fairport, NY 14450
TEL: (716) 223-2360

Fairport
Sales Office Annex
Digital Equipment Corporation
530 Crosskeys Office Park
Fairport, NY 14450
TEL: (716) 223-2360

Fresh Meadow
Field Service Office
Digital Equipment Corporation
174-15 Horace Harding Expressway
Fresh Meadow, NY 11365
TEL: (212) 357-7117

Garden City
Digital Business Center
Digital Equipment Corporation
Roosevelt Field
300 Garden City Plaza
Garden City, NY 11530
TEL: (516) 741-6484

Ithaca
Sales Office
Digital Equipment Corporation
704 W. Clinton St.
Ithaca, NY 14850
TEL: (602) 277-1670

Liverpool
Sales Office
Digital Equipment Corporation
290 Elwood Davis Rd.
Suite 315
Liverpool, NY 13088
TEL: (315) 451-6550

Melville
Sales Office
Digital Equipment Corporation
1 Huntington Quadrangle
Suite 1507
Melville, NY 11747
TEL: (516) 694-4131

New York
Field Service/Sales Office
Digital Equipment Corporation
One Penn Plaza
8th Floor
New York, NY 10119
TEL: (212) 971-6774

New York
Digital Business Center 1
Digital Equipment Corporation
One Penn Plaza
8th Floor
New York, NY 10119
TEL: (212) 971-3300

New York
Digital Business Center 2
Digital Equipment Corporation
71 Broadway
New York, NY 10006
TEL: (212) 422-4780

New York
Wall Street Sales Office
Digital Equipment Corporation
65 Broadway
New York, NY 10006
TEL: (212) 742-9063

New York
Downtown Commercial
Field Service Office
Digital Equipment Corporation
19 Rector St.
11th Floor
New York, NY 10006
TEL: (212) 943-7275

New York
Uptown Commercial
Field Service Office
Digital Equipment Corporation
220 E. 42nd St.
15th Floor
New York, NY 10017
TEL: (212) 309-0600

Rome
Field Service Office
Digital Equipment Corporation
1721 Black River Blvd.
Rome, NY 13440
TEL: (315) 451-6550

Tarrytown
Sales Office
Digital Business Center
Digital Equipment Corporation
200 White Plains Rd.
Tarrytown, NY 10591
TEL: (914) 684-5700

NORTH CAROLINA

Chapel Hill
Sales Office
Digital Equipment Corporation
800 Eastowne Dr.
Suite 100
Chapel Hill, NC 27514
TEL: (919) 493-2531

Charlotte
Sales Office
Digital Equipment Corporation
8301-L Arrowridge Blvd.
Charlotte, NC 28224
TEL: (704) 525-1602

Kernersville
Field Service Office
Digital Equipment Corporation
802 Birch Lane
Kernersville, NC 27284
TEL: (919) 996-5735

Winston Salem
Field Service Office
Digital Equipment Corporation
8064 No. Point Blvd.
Suite 110
Winston Salem, NC 27106
TEL: (919) 727-0654

NORTH DAKOTA

Fargo
Field Service Office
Digital Equipment Corporation
1323 23rd St. South
Fargo, ND 58102
TEL: (701) 293-7144

OHIO

Akron
Field Service/Sales Office
Digital Equipment Corporation
470 Portage Lakes Dr.
Akron, OH 44319
TEL: (216) 644-2200

Cincinnati
Sales Office
Digital Equipment Corporation
11305 Reed Hartman Highway
Suite 111
Cincinnati, OH 45241
TEL: (513) 891-8900

Cincinnati
Digital Business Center
Digital Equipment Corporation
Central Trust Tower
4th and Vine Streets
Suite 100
Cincinnati, OH 45202
TEL: (513) 241-0888

Cleveland
Sales Office
Digital Equipment Corporation
Building 1
3733 Park East
Cleveland, OH 44122
TEL: (216) 831-6000

Cleveland
Digital Business Center
Digital Equipment Corporation
Union Commerce Building
1903 E. 9th St.
Cleveland, OH 44114
TEL: (216) 241-6180

Columbus
Sales Office
Digital Equipment Corporation
6400 E. Broad St.
Columbus, OH 43213
TEL: (614) 868-1900

Columbus
Digital Business Center
Digital Equipment Corporation
Borden Building
180 E. Broad St.
Columbus, OH 43215
TEL: (614) 868-1900

Dayton
Sales Office
Digital Equipment Corporation
Southtown Building
6500 Poe Ave., F2
Dayton, OH 45414
TEL: (513) 898-0920

Toledo
Field Service Office
Digital Equipment Corporation
1550 Dartford Rd.
Maumee, OH 43537
TEL: (419) 866-1228

OKLAHOMA

Oklahoma City
Sales Office
Digital Equipment Corporation
4334 Northwest Expressway
Suite 253
Oklahoma City, OK 73116
TEL: (405) 840-5651

Tulsa
Sales Office
Digital Equipment Corporation
Koger Executive Center
4150 So. 100 East Ave.
Cherokee Building
Suite 100
Tulsa, OK 74145
TEL: (918) 664-1330

OREGON

Eugene
Field Service Office
Digital Equipment Corporation
72 Centennial Loop
Eugene, OR 97401
TEL: (503) 687-2260

Portland
Sales Office
Digital Equipment Corporation
9570 S.W. Barbur Blvd.
Portland, OR 97219
TEL: (503) 245-1341

PENNSYLVANIA

Allentown
Branch Office
Digital Equipment Corporation
1621 No. Cedar Crest Blvd.
Suite 105
Allentown, PA 18104
TEL: (215) 433-3234

Blue Bell
Sales Office
Digital Equipment Corporation
Whitpain Office Campus
Building B
1740 Walton Rd.
Blue Bell, PA 19422
TEL: (215) 825-4200

Erie
Field Service/Sales Office
Digital Equipment Corporation
140 W. 13th St.
Erie, PA 16501
TEL: (814) 454-8688

Harrisburg
Sales Office
Digital Equipment Corporation
4000 Vine St.
Middletown, PA 17057
TEL: (717) 944-1412

Monroeville
Sales Office
Digital Equipment Corporation
Executive House
First Floor
339 Haymaker Rd.
Monroeville, PA 15146
TEL: (412) 856-7200

Philadelphia
Digital Business Center
Digital Equipment Corporation
Centre Square West
1500 Market St.
Philadelphia, PA 19102
TEL: (215) 568-3530

Pittsburgh
Digital Business Center
Digital Equipment Corporation
The Kossman Building
Forbes and Stanwix Streets
Pittsburgh, PA 15222
TEL: (412) 765-2751

State College
Field Service Office
Digital Equipment Corporation
1402 So. Atherton St.
State College, PA 16801
TEL: (814) 238-0316

RHODE ISLAND

Providence
Sales Office
Digital Equipment Corporation
5 Catamore Blvd.
E. Providence, RI 02914
TEL: (401) 438-6750

SOUTH CAROLINA

Columbia
Sales Office
Digital Equipment Corporation
Saluda Building
Suite 123
101 Executive Center Dr.
Columbia, SC 29210
TEL: (803) 798-9494

Greenville
Field Service/Sales Office
Digital Equipment Corporation
Marion Building
650 Executive Center Dr.
Suite 100, B-105
Greenville, SC 29615
TEL: (803) 288-8427

TENNESSEE

Knoxville
Sales Office
Digital Equipment Corporation
9041 Executive Park Dr.
Suite 234
Knoxville, TN 37923
TEL: (615) 690-1521

Memphis
Sales Office
Digital Equipment Corporation
825 Crossover Lane
Suite 220
Memphis, TN 38117
TEL: (901) 761-6792

Nashville
Sales Office
Digital Equipment Corporation
287 Plus Park Blvd.
Suite A
Nashville, TN 37217
TEL: (615) 361-5404

TEXAS

Amarillo
Field Service Office
Digital Equipment Corporation
Amarillo Building
414 W. 8th St.
Amarillo, TX 79101
TEL: (806) 373-4032

Austin
Sales Office
Digital Equipment Corporation
6937 No. Interregional Highway
Suite 116
Austin, TX 78752
TEL: (512) 458-1281

College Station
Field Service/Sales Remote Site
Digital Equipment Corporation
505 University Dr.
Suite 501
College Station, TX 77840

Corpus Christi
Field Service Office
Digital Equipment Corporation
5262 So. Staples Dr.
Suite 140
Corpus Christi, TX 78411
TEL: (512) 993-3740

Dallas
Sales Office
Digital Equipment Corporation
12100 Ford Rd.
Suite 200
Dallas, TX 75234
TEL: (214) 620-2051

Dallas
Educational Services Center
Digital Equipment Corporation
12100 Ford Rd.
Suite 110
Dallas, TX 75234
TEL: (214) 620-2051

Dallas
Digital Business Center
Digital Equipment Corporation
1625 W. Mockingbird Lane
Suite 114
Dallas, TX 75235
TEL: (214) 631-2520

El Paso
Field Service/Sales Office
Digital Equipment Corporation
4100 Rio Bravo St.
Suite 200
El Paso, TX 79902
TEL: (915) 544-6211

Fort Worth
Sales Office
Digital Equipment Corporation
6800 Manhattan
Suite 401
Fort Worth, TX 76112
TEL: (817) 457-1041

Houston
Sales Office
Digital Equipment Corporation
6200 Savoy Dr.
Suite 1000
Houston, TX 77036
TEL: (713) 977-7575

Houston
Digital Business Center
Digital Equipment Corporation
2 Post Oak Central
1980 So. Post Oak
Houston, TX 77056
TEL: (913) 840-0730

Lubbock
Field Service/Sales Office
Digital Equipment Corporation
Megaron Building
8212 Ithaca
Suite W6
Lubbock, TX 79423
TEL: (806) 797-1814

San Antonio
Sales Office
Digital Business Center
Digital Equipment Corporation
4335 Northwest Loop 410
San Antonio, TX 78229
TEL: (512) 349-2840

Webster
Field Service Office
Digital Equipment Corporation
100 E. Nasa Rd. One
Suite 103
Webster, TX 77598
TEL: (713) 332-2651

UTAH

Salt Lake City
Sales Office
Digital Equipment Corporation
3950 So. 700 East
Salt Lake City, UT 84107
TEL: (801) 268-3392

VERMONT

Burlington
Field Service/Sales Office
Digital Equipment Corporation
20 Kimball Ave.
So. Burlington, VT 05401
TEL: (802) 864-5244

VIRGINIA

Fairfax
Sales Office
Digital Equipment Corporation
Eskridge Center
2929 Eskridge Rd.
Fairfax, VA 22031
TEL: (703) 698-5390

Lynchburg
Field Service/Sales Office
Digital Equipment Corporation
104 Candlewood Ct.
Lynchburg, VA 24502
TEL: (804) 237-6262

Norfolk
Sales Office
Digital Equipment Corporation
Pembroke Office Park
Pembroke #5
Suite 525
Virginia Beach, VA 23462
TEL: (804) 490-0555

Richmond
Sales Office
Digital Equipment Corporation
Commerce Plaza Building
2809 Emerywood Pkwy.
Suite 200
Richmond, VA 23229
TEL: (804) 285-1700

WASHINGTON

Bellevue
Sales Office
Digital Equipment Corporation
11040 Main St.
Bellevue, WA 98004
TEL: (206) 455-8471

Seattle
Digital Business Center
Digital Equipment Corporation
1100 4th Ave.
Seattle, WA 98101
TEL: (206) 625-0002

Spokane
Field Service Office
Digital Equipment Corporation
No. 300 Mullen St.
Suite 101
Spokane, WA 99206
TEL: (509) 928-4977

Tacoma
Field Service/Sales Office
Digital Equipment Corporation
Lakewood Business Park
10027 So. Tacoma Way
Building G
Tacoma, WA 98499
TEL: (206) 453-5500

WEST VIRGINIA

Charleston
Sales Office
Digital Equipment Corporation
1 Dunbar Plaza
Suite D
Dunbar, WV 25064
TEL: (304) 768-7527

Westover
Field Service Office
Digital Equipment Corporation
124A Holland Ave.
Westover, WV 26505
TEL: (304) 296-5539

WISCONSIN

Appleton
Field Service Office
Digital Equipment Corporation
Lincoln Pkwy.
3033 W. Spencer St.
Appleton, WI 54911
TEL: (414) 739-2548

Brookfield
Sales Office
Digital Equipment Corporation
Bishops Wood Office Park
165 Bishops Way
Suite 100
Brookfield, WI 53005
TEL: (414) 784-1311

Lacrosse
Field Service Office
Digital Equipment Corporation
333 Buchner Place
Lacrosse, WI 54601
TEL: (608) 782-4215

Madison
Field Service/Sales Office
Digital Equipment Corporation
1846 Hoffman
Suite 110
Madison, WI 53714
TEL: (608) 241-2357

Schofield
Field Service Office
Digital Equipment Corporation
1328 Schofield St.
Schofield, WI 54476
TEL: (715) 359-4214

ARGENTINA

Buenos Aires
Argentina Distributor
Coasin Computacion
Moreno 490
Buenos Aires 1091
Argentina

AUSTRALIA

Adelaide
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
199 Ward St.
P.O. Box 232
North Adelaide 5006
South Australia

Aitken Vale
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
1st Floor,
Commonwealth Bank Building
Nathan St.
Aitken Vale, Queensland 4814
Australia

Albury
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
553 Kiewa St., 3rd Floor
Albury, New South Wales 2640
Australia

Alice Springs
Field Service/Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
c/o Collins Radio Corporation
Wilkinson St.
Alice Springs, Northern Territory 5750
Australia

Armidale
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
University of New England
Armidale, New South Wales 2351
Australia

Braddon Act
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
28 Lonsdale St.
Braddon Act 2601
Australia

Brisbane
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
Scottish Amicable House
265 Coronation Dr.
Milton, Queensland 4064
Australia

Cairns
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
Suite 5, Pentagon Building
29 Grafton St.
Cairns 4870
Australia

Chatswood
Sales Office
Educational Services Center
Digital Equip. Corp. Australia Pty. Ltd.
Northern Tower
Railway St.
P.O. Box 384
Chatswood, New South Wales 2067
Australia

Darwin
Field Service/Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
Hooker Building
1st Floor
47 Mitchell St.
Darwin, Northern Territory 5790
Australia

Hobart
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
200 Elizabeth St.
Hobart, Tasmania 7000
Australia

Launceston
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
62A Tamar St.
Launceston, Tasmania 7250
Australia

Mackay
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
c/o Computer Service Bureau
"Dunkeld Gardens" Victoria St.
Mackay, Queensland 4740
Australia

Melbourne
Sales Office
Digital Equip. Corp. Australia Pty. Ltc
836-850 Whitehorse Rd.
Box Hill, Victoria 3128
Australia

Newcastle
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
Griffith Trade Center
57 Crescent Rd., Unit 7
Waratah, New South Wales 2298
Australia

Perth
Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
41-43 Ord St.
West Perth, Western Australia 6005
Australia

Pymble
Field Service Office
Product Repair Center
Digital Equip. Corp. Australia Pty. Ltd.
10-12 West St.
Pymble, New South Wales 2073
Australia

Rockhampton
Field Service/Sales Office
Digital Equip. Corp. Australia Pty. Ltd.
Heritage Building, Suite 6
Corner Quay and William Streets
Rockhampton, Queensland 4700
Australia

Sydney
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
48-56 Epsom Rd.
Waterloo, New South Wales 2017
Australia

Wollongong
Field Service Office
Digital Equip. Corp. Australia Pty. Ltd.
P. O. Box 1078
T & G Building, 1st Floor
Crown St., Suite 10
Wollongong, New South Wales 2500
Australia

AUSTRIA

Vienna
Sales Office
Digital Equipment Corporation GMBH
Shopping City Sued
Postfach 3
A-2334 Vosendorf-Sued
Austria

BELGIUM

Brussels
Field Service/Sales Office
Digital Equipment NVSA
Rue De L'Aeronef, 1
Luchtschipstraat, 1
B-1140 Evere
Belgium

BERMUDA

Hamilton
Bermuda Distributor
Business Systems Limited
53 Union St.
Hamilton 5-25
Bermuda

BRAZIL

Rio de Janeiro
Sales Office
Digital Equip.
Comercio E Industria, LTDA
Averida Presidente Wilson
231-26 Floor
Rio de Janeiro 20030 RJ
Brazil

Sao Paulo
Sales Office
Digital Equip. Comercio E Industria, LTDA
Avenida 9 De Julho, 3741
01407 Sao Paulo-SP
Brazil

CANADA

Arvida
Field Service Office
Digital Equipment of Canada, Ltd.
429 Bauman St.
Jonquiere, Quebec G7S 4S4
Canada

Burlington
Sales Office
Digital Equipment of Canada, Ltd.
3390 So. Service Rd.
Burlington, Ontario L7N 3M6
Canada

Calgary
Sales Office
Digital Equipment of Canada, Ltd.
6815 8th St. Northeast
Suite 200
Calgary, Alberta T2E 7H7
Canada

Dartmouth
Sales Office
Digital Equipment of Canada, Ltd.
Queen Square, Suite 1600
45 Alderney Dr.
Dartmouth, Nova Scotia B2Y 2N6
Canada

Edmonton
Sales Office
Digital Equipment of Canada, Ltd.
9803 31st Ave.
Edmonton, Alberta T6N 1C5
Canada

Kanata
Field Service/Sales Office
Digital Equipment of Canada, Ltd.
P. O. Box 13000
100 Herzberg Rd.
Kanata, Ontario K2K 2A6
Canada

Kingston
Sales Office
Digital Equipment of Canada, Ltd.
Progress Square
745 Gardiners Rd.
Kingston, Ontario K7M 3Y5
Canada

Kitchner
Remote Service Point
Digital Equipment of Canada, Ltd.
25 Bruce St.
Kitchner, Ontario N2B 3J8
Canada

London
Sales Office
Digital Equipment of Canada, Ltd.
240 Wharncliffe Rd. North
London, Ontario N6H 4P2
Canada

Montreal
Sales Office
Digital Equipment of Canada, Ltd.
394 Isabey St.
St. Laurent, Quebec H4T 1V3
Canada

Ottawa
Sales Office
Digital Equipment of Canada, Ltd.
Carling Square II
785 Carling Ave., 3rd Floor
Ottawa, Ontario K1S 5H4
Canada

Quebec City
Field Service/Sales Office
Digital Equipment of Canada, Ltd.
2025 Lavoisier, Suite 115
Parc Jean-Talon North
Ste-Foy, Quebec GIN 4L6
Canada

Regina
Sales Office
Digital Equipment of Canada, Ltd.
418 McDonald St.
Regina, Saskatchewan S4N 6E1
Canada

Rexdale
Sales Office
Digital Equipment of Canada, Ltd.
165 Attwell Dr.
Rexdale, Ontario M9W 5Y5
Canada

Richmond
Sales Office
Digital Equipment of Canada, Ltd.
10711 Cambie Rd., Suite 130
Richmond, British Columbia V6X 3C9
Canada

Sarnia
Remote Service Point
Digital Equipment of Canada, Ltd.
373 Videl St.
Suite D1
Sarnia, Ontario N7T 2V3
Canada

Saskatoon
Remote Service Point
Digital Equipment of Canada, Ltd.
Bay 1, 501 45th St. West
Saskatoon, Saskatchawan S7L 5Z9
Canada

Toronto
Sales Office
Digital Equipment of Canada, Ltd.
425 University Ave., 7th Floor
Toronto, Ontario M5G 1T6
Canada

Victoria
Field Service/Sales Office
Digital Equipment of Canada, Ltd.
1520 Fort St.
Victoria, British Columbia V85 5J2
Canada

Winnipeg
Sales Office
Digital Equipment of Canada, Ltd.
26-1313 Border Place
Winnipeg, Manitoba R3H 0X4
Canada

CHILE

Santiago
Santiago Distributor
S.O.N.D.A. LTDA
Teatinos 574
Santiago
Chile

COLUMBIA

Bogota
Columbia Distributor
Calle 72, NRO. 6-44
Piso 10
Systemas De Tecrobgia Avanzada
P.O. Box 19168
Bogota D.E.
Columbia

DENMARK

Gentofte
Sales Office
Digital Equipment Corporation A/S
Sandtoften 9
DK-2820 Gentofte
Denmark

EGYPT

Cairo
Cairo Distributor
Giza Systems Engineering Ltd.
P.O. Box 1913
2 El Mesaha Square
Dokki
ET-Cairo
Egypt

EUROPEAN AREA HEADQUARTERS

Digital Equipment Corporation Int'l
12, Avenue des Morgines
Case Postale 510
CH-1213 Petit-Lancy 1 (Geneva)
Switzerland
TEL: [41]-(22)-933311

FEDERAL REPUBLIC OF GERMANY

Berlin
Sales Office
Digital Equipment GMBH
Ernst-Reuter-Platz 10
D-1000 Berlin 10
Federal Republic of Germany

Cologne
Sales Office
Digital Equipment GMBH
Stolbergerstrasse 90
D-5000 Cologne 41
Federal Rebulic of Germany

Hamburg
Field Service/Sales/
Software Services Office
Digital Equipment GMBH
Schulterblatt 120
D-2000 Hamburg 6
Federal Republic of Germany

Hannover
Sales Office
Digital Equipment GMBH
Niedersachsenring 13
D-3000 Hannover
Federal Republic of Germany

Munich
Sales Office
Digital Equipment GMBH
Luetzelsteinerstrasse 1
D-8000 Munich 45
Federal Republic of Germany

Munich
Educational Services Center
Digital Equipment GMBH
Wallensteinplatz 2
D-8000 Munich 40
Federal Republic of Germany

Munich
Field Service/Sales Office
Digital Equipment GMBH
DEC Park
Freischuetzstrasse 91
D-8000 Munich 81
Federal Republic of Germany

Neuisenburg
Sales Office
Digital Equipment GMBH
AM Forsthaus Gravenbruch 9-11
D-6078 Neuisenburg 2
Federal Republic of Germany

Nuremberg
Sales Office
Digital Equipment GMBH
Konigstorgraben 3
D-8500 Nuremberg
Federal Republic of Germany

Ostfildern
Sales Office
Digital Equipment GMBH
Marco Polo Strasse 1
D-7302 Ostfildern 4
Federal Republic of Germany

FINLAND

Espoo
Sales Office
Digital Equipment Corporation O.Y.
Koulutie 4
PL 16
02201 Espoo 20
Finland

FRANCE

Bihorel Les Rouen
Field Service Office
Digital Equipment France
Avenue Des Hauts Grigneux
Horizon 2000 Mach 5
F-76420 Bihorel Les Rouen
France

Bordeaux
Sales Office
Digital Equipment France
Parc D'Activite Du Chateau Rouquet
Avenue President Kennedy
F-33700 Merignac
France

Evry
Sales Office
Digital Equipment France
B.P. 136
Les Epinettes
2 Rue Gaston Cremieux
F-91004 Evry Cedex
France

Grenoble
Field Service Office
Digital Equipment France
7 Rue Paul Doumer
F-38100 Grenoble
France

Lille
Sales Office
Digital Equipment France
Le Chateau Rouge
276 3/4 Avenue De Lar Marne
F-59700 Marcq En Baroeul
France

Lyon
Sales Office
Digital Equipment France
17 Rue Louis Guerin
F-69626 Lyon-Villeurbanne
France

Marseille
Sales Office
Digital Equipment France
Le Mirabeau
4 Quai D'Arenc
F-13002 Marseille
France

Metz
Field Service Office
Digital Equipment France
11 Rue De La Poulue
F-57070 Metz-Borny
France

Montrouge
Field Service Office
Digital Equipment France
85 Rue Gabreil Peri
F-92120 Montrouge
France

Nantes
Field Service Office
Digital Equipment France
Rue De La Garde CP0354
Zi Le Bois Briand
F-44085 Nantes Cedex
France

Puteaux
Field Service Office
Digital Equipment France
74-80 Rue Roque De Fillol
F-92800 Puteaux La Defense
France

Rungis
Sales Office
Digital Equipment France
Silac 225
18 Rue Saarinen
F-94528 Rungis Cedex
France

Rungis
Terminals Sales Office
Digital Equipment France
40 Rue Du Jura
F-94528 Rungis Cedex
France

Rungis
Field Service Office
Product Repair Center
Digital Equipment France
7 Rue De L'Esterel-Silac 225
F-94528 Rungis Cedex
France

Rungis
Field Service Office
Digital Equipment France
45 Rue De L'Esterel
F-94528 Rungis Cedex
France

Rungis
Field Service Office
Digital Equipment France
25 Place De La Loire
F-94528 Rungis Cedex
France

Saint Avertin
Field Service Office
Digital Equipment France
16 Rue De La Tuilerie
Les Grands Galands
F-37170 Saint Avertin
France

Saint Laurent Du Var
Field Service Office
Digital Equipment France
Z.I. Secteur C
Rue Claude Bernard
F-06700 St. Laurent Du Var
France

Schiltigheim
Sales Office
Digital Equipment France
20 Rue Contades
F-67300 Schiltigheim
France

Toulouse
Field Service Office
Digital Equipment France
4 Rue Des Saules
F-31000 Toulouse
France

GIA HEADQUARTERS

Digital Equipment Corporation
100 Nagog Park
Acton, MA 01720
U.S.A.
TEL. (617) 264-6854

HONG KONG

Kowloon
Field Service/Sales Office
Digital Computer Hong Kong Ltd.
5-7 Asean Plaza
94 Granville Rd.
Tsimshatsui East
Kowloon
Hong Kong

INDIA

Bangalore
India Distributor
Hinditron Computers Pvt. Ltd.
33½4A Rajmahal Vilas Extension
8th Main Rd.
Bangalore 560 080
India

Bombay
India Distributor Headquarters
Hinditron Computers Pvt. Ltd.
504 Raheja Chambers
Backbay Reclamation
Nariman Point
Bombay 400 021
India

Calcutta
India Distributor
Hinditron Computers Pvt. Ltd.
Shantiniketan 6th Floor
8 Camac St.
Calcutta 700 017
India

New Delhi
India Distributor
Hinditron Computers Pvt. Ltd.
204, 5-6 Hemakunt Towers
98, Nehru Place
New Delhi 110 019
India

Secundrabad
India Distributor
Hinditron Computers Pvt. Ltd.
5 1/2 Srinath Complex
1-1-58 1/8 to 1-1-58 1/8 1
Sarojini Devi Rd.
Secundrabad 500 003
India

IRELAND

Dublin
Sales Office
Digital Equipment Ireland Ltd.
Park House
North Circular Rd.
Dublin 7
Ireland

ISRAEL

Herzliya
Israel Sales Group
Digital Equipment Ltd.
Acadia Junction
P.O. Box 2033
Herzliya 46120
Israel

ITALY

Cinisello Balsamo
Sales Office
Product Repair Center
Digital Equipment SPA
Viale Fulvio Testi 11
Ang. Via Gorki 105
20092 Cinisello Balsamo
Italy

Monza
Field Service/Sales Office
Digital Equipment SPA
Technical Building
Via Mentana 23
20052 Monza
Italy

Padova
Sales Office
Digital Equipment SPA
Via Provvidenza 13
Sarmeola Di Rubano
35030 Padova
Italy

Rome
Sales Office
Digital Equipment SPA
Via Silvio D'Amico 40
I-00145 Rome
Italy

Turin
Field Service/Sales/
Software Services Office
Digital Equipment SPA
Corso Svizzera 30
I-10143 Turin
Italy

JAPAN

Akita
Field Service Office
Nihon Digital Equipment Corporation
GS Building No. 207
2-16, Kawajiri-Okawacho
Akita-Shi, Akita-Ken 010
Japan

Atsugi
Field Service Office
Nihon Digital Equipment Corporation
Yasohachi Building 6 F
1-17-12, Sakas-Cho
Atsugi-Shi, Kanagawa-Ken 243
Japan

Chiba
Field Service Office
Nihon Digital Equipment Corporation
Shin Taiso Building Chiba
No. 2, 6 F
14-2 Shinjuku, 2-Chome
Chiba-Shi, Chiba-Ken 280
Japan

Fukuoka-Shi
Sales Office
Nihon Digital Equipment Corporation
Sunlife No. 5 Building, 7 F
6-28 Hakataeki Higashi, 2-Chome
Hakata-Ku, Fukuoka-Shi 812
Japan

Hiroshima
Field Service Office
Nihon Digital Equipment Corporation
Miyuki Park Mansion, 14F, No. 1409
9-26, Miyuki, 1-Chome
Hiroshima-Shi, Hiroshima-Ken 734
Japan

Ibaragi
Sales Office
Nihon Digital Equipment Corporation
Maruzen Tsukuba Building, 2 F
9-1, Amakubo, 3-Chome, Sakura-Mura
Niihari-Gun, Ibaragi-Ken 300-31
Japan

Ishikawa
Field Service Office
Nihon Digital Equipment Corporation
No. 107 Hirokoji Heights
31-12, Nomachi, 2-Chome
Kanazawa-Shi, Ishikawa-Ken 921
Japan

Kanagawa
Sales Office
Nihon Digital Equipment Corporation
Marine Building, 2 F
23, Kaigan-Dori, 4-Chome, Naka-Ku
Yokohama-Shi, Kanagawa-Ken 231
Japan

Kanda
Field Service Office
Nihon Digital Equipment Corporation
Sugayama Building, 5 F
2-23 Kanda Awajicho
Chiyoda-Ku
Tokyo 101
Japan

Kyoto
Field Service Office
Nihon Digital Equipment Corporation
Matsuo Building, 2 F
Iseyamachi 406
Marutamachi Sagaru, Kawaramachi-Dohri
Kamikyo-Ku, Kyoto-Shi 602
Japan

Mitaka
Field Service Office
Nihon Digital Equipment Corporation
Green Park, 5 F
32-4 Shimorenjyaku
3-Chome, Mitaka-Shi
Tokyo 181
Japan

Mito
Field Service Office
Nihon Digital Equipment Corporation
Ebata Heights 101
3440 Ikazuchi, Higashi-Ishikawa-Aza
Katsuta-Shi, Ibaragi-Ken 312
Japan

Miyagi
Field Service Office
Nihon Digital Equipment Corporation
Fuji Building, 3 F
9-12 Honcho, 2-Chome
Sendai-Shi, Miyagi-Ken 980
Japan

Nagoya
Sales Office
Nihon Digital Equipment Corporation
Nagoya Seni Building
9-27, Nishiki, 2-Chome
Naka-Ku, Nagoya-Shi 460
Japan

Nara
Field Service Office
Nihon Digital Equipment Corporation
Nihon-Seimei Nara Building
8-1, Hayashi-Kohjico
Nara-Shi, Nara-Ken 630
Japan

Numazu
Field Service Office
Nihon Digital Equipment Corporation
Numazu Suruga Building
165 Otemachi
Namazu-Shi, Shizuoka-Ken 410
Japan

Osaka
Educational Services Center
Nihon Digital Equipment Corporation
Koei Building, Shinkan 3-7
Nishi Temma, 6-Chome
Kita-Ku, Osaka-Shi 530
Japan

Osaka
Sales Office
Nihon Digital Equipment Corporation
Umeshin Higashi Building
7-2 Nishi Temma, 6-Chome
Kita-Ku, Osaka-Shi 530
Japan

Sapporo
Field Service Office
Nihon Digital Equipment Corporation
No. 2 Ryokuen Building, 8 F
5, Nishi, 7-Chome
Kita 4 Joy, Chuo-Ku,
Sapporo 060
Japan

Shinjuku
Field Service Office
Nihon Digital Equipment Corporation
Taiso Shinjuku Building No. 1
26-12, Shinjuku, 1-Chome
Shinjuku-Ku
Tokyo 160
Japan

Tanashi
Customer Support Center
Nihon Digital Equipment Corporation
7-12, Honmachi, 1-Chome
Tanashi-Shi
Tokyo 188
Japan

Tochigi
Field Service Office
Nihon Digital Equipment Corporation
Maeda No. 1 Building, 5 F
4-8, Nikocho
Utsunomiya-Shi, Tochigi-Ken 320
Japan

Tokyo
Field Service Office
Nihon Digital Equipment Corporation
Shin-Taiso Building No. 5, 6 F
10-7, Dogenzaka, 2-Chome
Shibuya-Ku
Tokyo 150
Japan

Tokyo
Sales Office
Nihon Digital Equipment Corporation
Sunshine-60, P.O. Box 1135
1-1, Higashi-Ikebukuro, 3-Chome
Tokyo 170
Japan

KUWAIT

Safat
Kuwait Distributor
National Computer Services Ltd.
7th Floor
Suuk Al-Khabir Building
Fahed Al-Salem Street
P.O. Box 766
Safat
Kuwait

MEXICO

Guadalajara
Field Service/Sales Office
Digital Equipment de Mexico SA DE CV
Ave. Lopez Mateos 427-1
Guadalajara, Jalisco
Mexico

Mexico City
Sales Office
Digital Equipment de Mexico SA DE CV
Apartado Postal 18-990
Col. Napoles
03810 Mexico, D.F.
Mexico

Monterrey
Sales Office
Digital Equipment de Mexico SA DE CV
Degollado Sur 708
Col. Obispado
Monterrey Nuevo Leon
Mexico

NEW ZEALAND

Auckland
Sales Office
Digital Equip. Corp. New Zealand Ltd.
540 Great South Rd.
P.O. Box 17039
Greenlane, Auckland
New Zealand

Christchurch
Sales Office
Digital Equip. Corp. New Zealand Ltd.
78 Peterborough St.
P.O. Box 25155
Christchurch
New Zealand

Dunedin
Field Service Office
Digital Equip. Corp. New Zealand Ltd.
P. O. Box 1016
56 York Place
Dunedin
New Zealand

Hamilton
Field Service Office
Digital Equip. Corp. New Zealand Ltd.
P.O. Box 474
AA Mutual Building, 2nd Floor
Anglesa & London Streets
Hamilton
New Zealand

Palmerston North
Field Service Office
Digital Equip. Corp. New Zealand Ltd.
Metropolitan Life Building
118 Fitzherbert Ave.
P.O. Box 959
Palmerston North
New Zealand

Wellington
Sales Office
Digital Equip. Corp. New Zealand Ltd.
169 The Terrace
P.O. Box 1300
Wellington
New Zealand

NIGERIA

Ikeja, Lagos
Nigeria Distributor
Data Sciences Nigeria Ltd.
P.O. Box 6352
Ikeja Lagos
Nigeria

NORWAY

Bergen
Field Service Office
Digital Equipment Corp. A/S
Fjosangerveien 57
N-5000 Bergen
Norway

Oslo
Sales Office
Digital Equipment Corp. A/S
Pottemakerveien 8
N-Oslo 5
Norway

Trondheim
Field Service Office
Digital Equipment Corp. A/S
Hornebergveien 4
Fossegrenda
N-7000 Trondheim
Norway

PAKISTAN

Karichi
Pakistan Distributor
Jaffer Brothers Limited
Panorama Centre
Raja Ghazanfar Ali Rd.
Karichi-04
Pakistan

PHILIPPINES

Manilla
Philippines Distributor
Decision Systems Corporation
64 Salcedo Center Building
138 H.V. Dela Costa St.
Salcedo Village
Makati, Metro Manilla
Philippines

PUERTO RICO

Santurce
Sales Office
Digital Equip. Corp. Latin America
P.O. Box 11038
Fernandez Juncos Station
Santurce 00919
Puerto Rico

REPUBLIC OF SINGAPORE

Singpore
Sales Office
Digital Equipment Singapore PTE Ltd.
San Centre, 1st Floor
Chin Swee Rd.
Singapore 0316
Republic of Singapore

SAUDI ARABIA

Riyadh
Saudi Distributor
Natcom
P. O. Box 7902
Riyadh
Saudi Arabia

SOUTH KOREA

Seoul
Korea Distributor
Oricom, Inc.
108-4 Susung-Dong, Chongro-Gu
C.P.O. Box 289
Seoul
South Korea

SPAIN

Barcelona
Sales Office
Digital Equipment Corp. S.A.
Edificio Mapfre
Gram Via Carlos III, 136-138
Barcelona, 34
Spain

Madrid
Subsidiary Office
Digital Equipment Corp. S.A.
Sucursal En Espana
Augustin de Foxa 27
E-Madrid 16
Spain

SWEDEN

Gothenburg
Sales Office
Digital Equipment AB
Prinsgaten 12
S-41305 Gothenburg
Sweden

Malmoe
Sales Office
Digital Equipment AB
Hasselgatan 6
S-21434 Malmoe
Sweden

Stockholm
Sales Office
Product Repair Center
Digital Equipment AB
P.O. Box 1250
Englundavagen 7
S-17124 Solna 1
Sweden

SWITZERLAND

Basel
Field Service Office
Digital Equip. Corp. S.A.
Postfach 433
CH-4021 Basel
Switzerland

Berne
Field Service Office
Digital Equip. Corp. S.A.
Parkstrasse 11/11A
CH-3014 Berne
Switzerland

Chatelaine
Field Service/Software Services
European Headquarters
Digital Equip. Corp. Intl.
65 Chemin De L'Etang
CH-1211 Chatelaine
Switzerland

Geneva
Sales Office
Digital Equip. Corp. S.A.
9 Route De Jeunes
Case Postale 191
CH-1211 Geneva 26
Switzerland

Geneva
European Area Office
Digital Equip. Corp. Intl.
12 Ave. Des Morgines
Case Postale 510
CH-1213 Petit-Lancy 1 (Geneva)
Switzerland

Geneva
Sales Office
Digital Equip. Corp. Intl.
111 Chemin Du
Pont-Du-Centenaire
CH-1228 Plan-Les-Quates (Geneva)
Switzerland

Glattbrugg
Field Service Office
Digital Equip. Corp. S.A.
Kanalstrasse 21
CH-8152 Glattbrugg
Switzerland

Klotenzh
Sales Office
Product Repair Center
Digital Equip. Corp. S.A.
Schaffhauserstrasse 144
CH-8302 Kloten
Switzerland

TAIWAN (REPUBLIC OF CHINA)

Taipei
Field Service Office
Digital Computer Taiwan Ltd.
3rd Floor, Nanking Enterprise Building
No. 180 Nanking East Rd., Sec. 4
Taipei 105
Taiwan, Republic of China

Taipei
Taiwan Distributor
China Computer Corp.
Room A, 5th Floor
126 Nanking E. Rd., Sec. 4
Taipei 105
Taiwan, Republic of China

THE NETHERLANDS

Amstelveen
Sales Office
Digital Equipment B.V.
Rembrandt Building
Biesbosch 225
NL-1181 JC-Amstelveen
The Netherlands

Delft
Sales Office
Digital Equipment B.V.
Martinus Nijhofflaan 2
NL-2624 Es Delft
The Netherlands

Gouda
Terminal Service Centre
Digital Equipment B.V.
Muiderweg 2
NL-2803 PR Gouda
The Netherlands

Hoogeveen
Field Service Office
Digital Equipment B.V.
Beukemastraat 6
NL-7906 AM Hoogeveen
The Netherlands

Ijsselstein
Product Repair Center
Digital Equipment B.V.
Produktieweg 1
NL-3401 MG Ijsselstein
The Netherlands

Nieuwegein
Educational Services Center
Digital Equipment B.V.
Ratelaar 38
NL-3434 Nieuwegein
The Netherlands

Oss
Field Service Office
Digital Equipment B.V.
Raadhuislaan 23
NL-5341, GL OSS
The Netherlands

Utrecht
Sales Office
Digital Equipment B.V.
Kaap Hoorndreef 38
P.O. Box 9064
3563 AV Utrecht
The Netherlands

TRINIDAD

Port of Spain
Field Service/Sales Office
Digital Equipment (Trinidad) Inc.
11 Maraval Rd.
4th Floor
Port of Spain
Trinidad

TURKEY

Ankara
Ankara Distributor
UTE Engineering and Trade Co. Ltd.
Guniz Sokak No. 22
Kavaklidere, Ankara
Turkey

Istanbul
Istanbul Distributor
UTE Engineering and Trade Co. Ltd.
Barraros Bulvari No. 39 5/8
Besiktas, Istanbul
Turkey

UNITED ARAB EMIRATES

Abu Dhabi
Abu Dhabi Distributor
National Computer Services Ltd.
P.O. Box 6386
Abu Dhabi
United Arab Emirates

UNITED KINGDOM

Basingstoke
Sales Office
Remote Diagnosis
Telephone Support
Digital Equipment Co. Ltd.
Wimgrove House
Basing View
Basingstoke Hampshire RG21 2UR
England
United Kingdom

Basingstoke
Customer Service
Technical Centre
Digital Equipment Co. Ltd.
Jay's Close
Basingstoke Hampshire RG22 4BS
England
United Kingdom

Belfast
Sales Office
Digital Equipment Co. Ltd.
Belfast-Rushmere House
46 Cadogan Park
Belfast BT9 6HH
Northern Ireland
United Kingdom

Birmingham
Sales Office
Digital Equipment Co. Ltd.
Knight's House
The Parade
Sutton Coldfield
West Midlands B72 1PD
England
United Kingdom

Bristol
Sales Office
Digital Equipment Co. Ltd.
500 Park Ave.
Aztec West
Almondsbury BS12 4RD
England
United Kingdom

Coulsdon
Field Service Office
Digital Equipment Co. Ltd.
Unit C, Redlands
Marlpit Lane Industrial Estate
Coulsdon Surrey CR3 2HT
England
United Kingdom

Earlstown
Field Service Office
Digital Equipment Co. Ltd.
Unit 16
Deacon Estate
Newton-Le-Willows
Earlstown WA12 9XQ
England
United Kingdom

Edinburgh
Sales Office
Digital Equipment Co. Ltd.
Peel House
Ladywell East
Livingston West Lothian EH54 6AC
Scotland
United Kingdom

Epsom
Sales Office
Digital Equipment Co. Ltd.
Old Manor House
17 West St.
Epsom Surrey KT18 7RU
England
United Kingdom

Hants
Educational Services Center
Digital Equipment Co. Ltd.
Highfield Park
Heckfield
Basingstoke
Hants RG27 0LD
England
United Kingdom

Horsforth
Sales Office
Digital Equipment Co. Ltd.
Techno Centre
Lister Hill
Horsforth Leeds LS18 5AZ
England
United Kingdom

London
Sales Office
Digital Equipment Co. Ltd.
James Watt House
279 Tottenham Court Rd.
London W1P 9AA
England
United Kingdom

London
Sales Office
Digital Equipment Co. Ltd.
Evelyn House, 3rd Floor
62 Oxford St.
London
England
United Kingdom

Maidstone
Field Service Office
Digital Equipment Co. Ltd.
Equity & Law House
2 London Rd.
Maidstone Kent ME16 8PZ
England
United Kingdom

Manchester
Sales Office
Digital Equipment Co. Ltd.
Kelvin Close
Birchwood Science Park North
Risley Warrington WA3 7PB
England
United Kingdom

Manchester
Educational Services Center
Digital Equipment Co. Ltd.
Arndale House, 3rd Floor
Chester Road Streford
Manchester M32 9BH
England
United Kingdom

Newmarket
Sales Office
Digital Equipment Co. Ltd.
Suffolk House
Fordham Rd.
Newmarket Suffolk CB8 7AA
England
United Kingdom

Reading
Field Service/Sales/
Software Services Office
Educational Services Center
Digital Equipment Co. Ltd.
Digital Park
Worton Grange, Imperial Way
Reading Berkshire RG2 OTE
England
United Kingdom

Reading
Educational Services Center
Digital Equipment Co. Ltd.
Fountain House
Butts Centre
Reading Berkshire RG1 7QN
England
United Kingdom

Reading
Sales Office
Digital Equipment Co. Ltd.
252-256 Kings Rd.
Reading RG1 4HP
England
United Kingdom

Redcar
Field Service Office
Digital Equipment Co. Ltd.
N.E.E.B. Building
Limerick Road
Dormanstown
Redcar TF10 5JU
England
United Kingdom

Welwyn
Sales Office
Digital Equipment Co. Ltd.
Welwyn Hall
30 Church St.
Welwyn Herts AL6 9LX
England
United Kingdom

VENEZUELA

Carcas
Venezuela Distributor
Digimatica, C.A.
Centro Comercial Paseo
Las Mercedes Nivel 2
Apartado Postal 60039
Caracas 1060-A
Venezuela

YUGOSLAVIA

Belgrade
Yugoslavia Distributor
Iskra Delta
Milentija Popovica 9
YU-11080 Zemun Belgrade
Yugoslavia

Ljubljana
Yugoslavia Distributor
Iskra Delta
Parmova 43
YU-61000 Ljubljana
Yugoslavia

Zagreb
Yugoslavia Distributor
Iskra Delta
Spasicev Prilaz 7
Zagrebacki Velesajam
YU-41000 Zagreb
Yugoslavia

ZIMBABWE

Harare
Zimbabwe Distributor
Realtime (PVT) Limited
P.O. Box 4567
4th Floor
Koblemz House
51 Speke Ave.
Harare
Zimbabwe

digital

PRINTED IN U.S.A. EB-25810-52/83 120 04 75 COPYRIGHT© 1983 DIGITAL EQUIPMENT CORPORATION ALL RIGHTS RESERVED