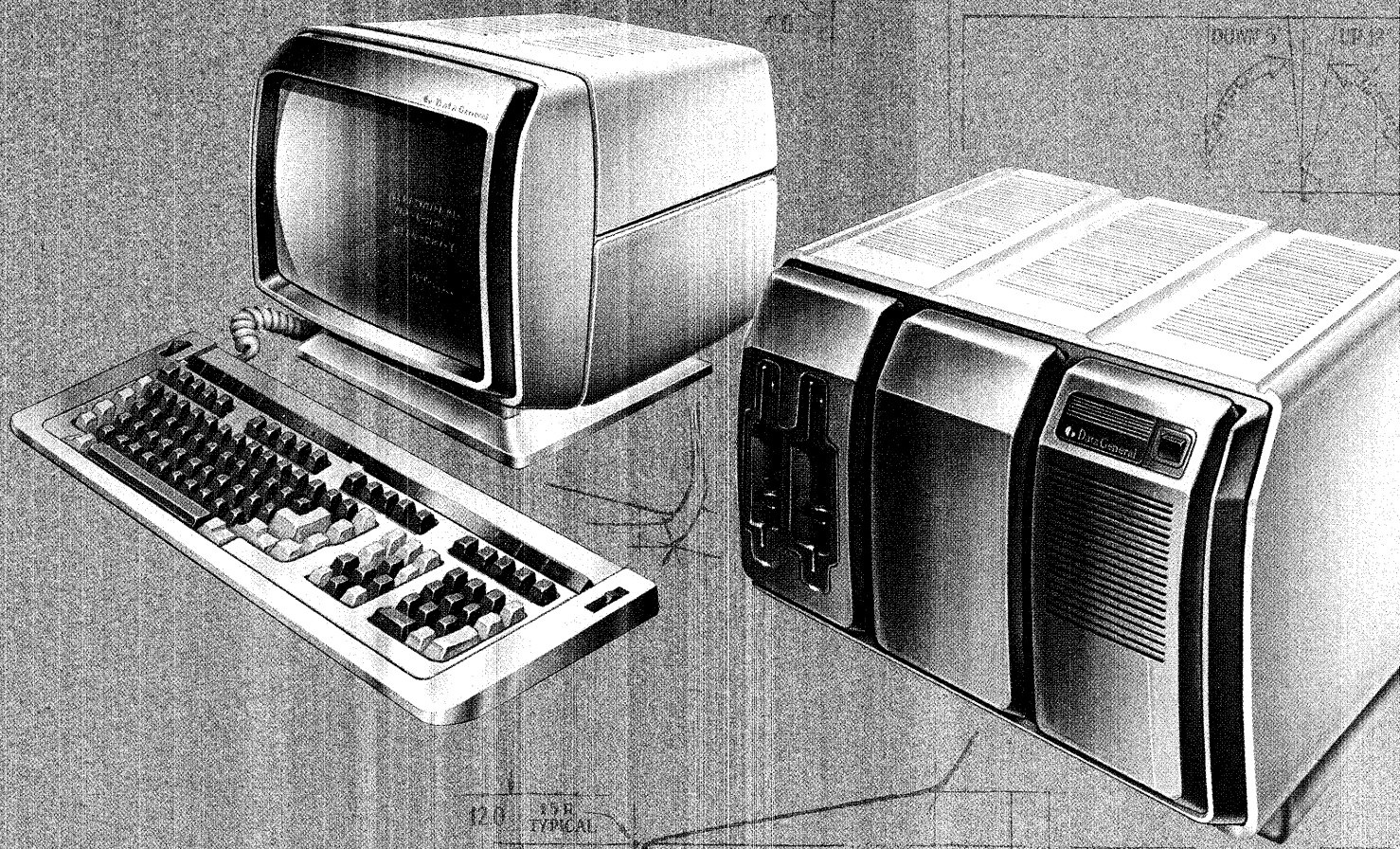
Data General

The DESKTOP GENERATION™



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Ordering No. 014-000751

Printed in the United States of America
Rev. 00, July 1983

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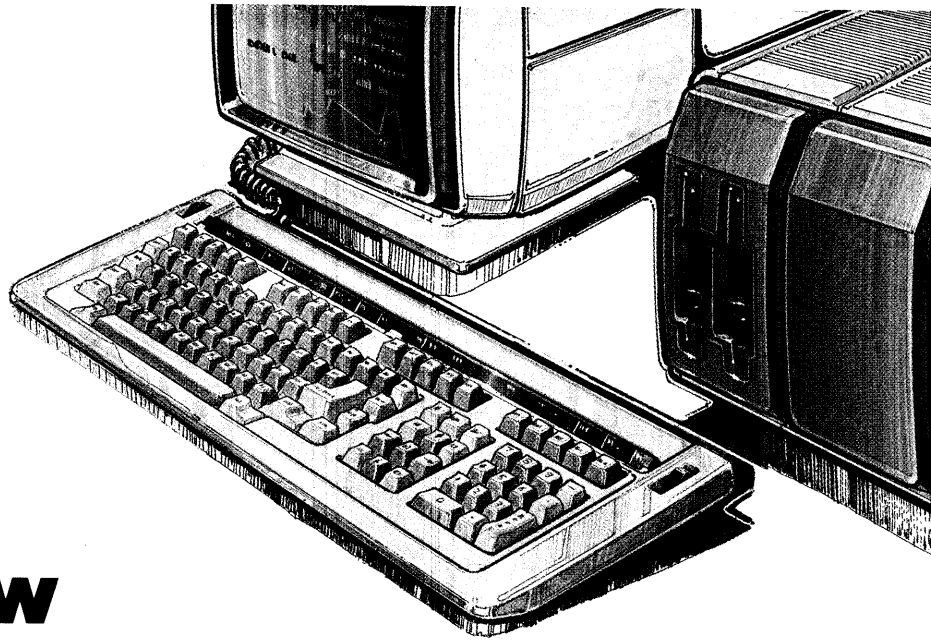


1 Overview

In its first year, 1968, Data General designed and marketed its first computer — the NOVA computer. The NOVA was also a first in the computer industry: the first small computer to offer big computer architecture and performance at a small computer price. Ten years later Data General revenues topped 500 million, earning its place on the roster of Fortune 500 companies. And today, with over 125,000 computer systems at work for customers around the world, Data General is the second-largest manufacturer of small computers and one of the largest in the entire industry.

Who is Data General, and to what does it owe its success? Traditionally, Data General products have been chosen by the most demanding consumers — computer professionals and other computer companies. These consumers buy our products, often in volume; integrate them with their own systems; and market them to end-users of every conceivable description. Customers like these require an experienced and stable manufacturer with a reliable and truly compatible product line. They expect the latest technologies, training for their staff, and dependable support for their purchase. Above all, they demand the most performance for the least cost. Consistently, computer professionals choose Data General for its ability to meet — or exceed — these demands.

More recently, Data General has developed highly integrated systems for nonprofessional computer users — systems like its Comprehensive Electonic Office (CEO), perhaps the most complete office automation system available. New computer users choose our systems for the same reasons that professional users do: experience and support, a product line more compatible than any other, superior technology, and the best price/performance ratio in the industry.

We believe that this track record is especially important to the inexperienced buyer: the capabilities that led to our past successes guarantee our ability to serve you now.

New and experienced computer users choose Data General systems for the same reasons: experience and support, the most compatible product line, superior technology, and outstanding price/performance.

Data General's Philosophy

Data General was founded on, and is governed by, the goals of providing better technology at lower cost; ensuring the compatibility of all products, past, present, and future; and offering complete solutions to your computing needs.

High Technology at Low Cost

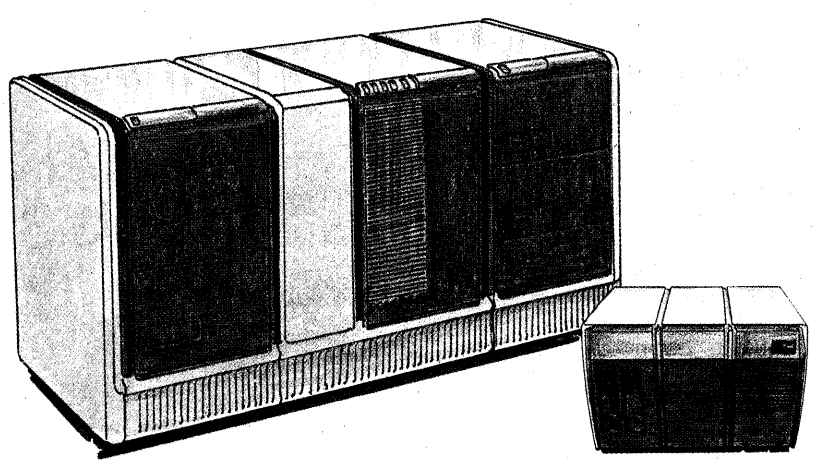
Historically, as computer functions have increased, computer prices have decreased. Nowhere is this better demonstrated than in Data General's product history, where each new generation of computer systems realizes increased productivity, lower costs, and better quality for the consumer. Data General shares with its customers the savings from economical manufacturing and improved technologies in the form of lower prices for higher levels of performance.

Compatible Products

One consideration often overlooked in the purchase of a computer system is compatibility. Will the system you buy today be appropriate as your use of computers expands? Will it work with, and become part of, your larger system? Will the programs and applications you write run on other machines?

From our earliest NOVA to our most powerful ECLIPSE MV/10000, all Data General computer systems have each other in common. All systems — both hardware and software — can be configured to each customer's particular need because our products are integrated at every level: from chips through 32-bit systems, with memory sizes ranging from 8 Kbytes to 16 Mbytes.

The product line is integrated at every level, so it can accomodate your needs as they grow.



True compatibility requires far-sighted product planning and a manufacturer's commitment to your future as well as its own. No other company offers such extensive integration and configurability as Data General, protecting your initial investment as your computing needs change and grow.

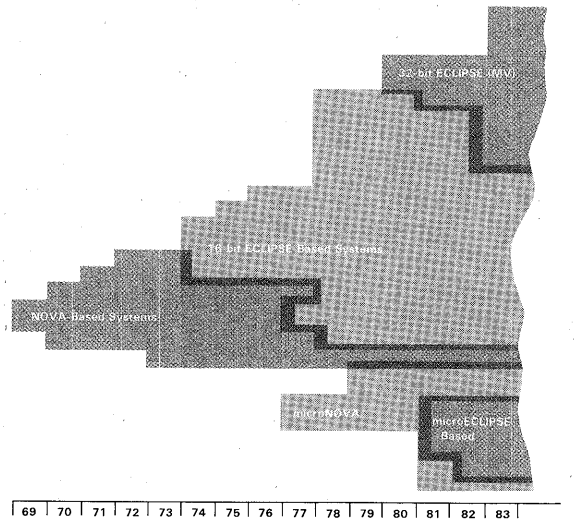
Complete Solutions

For every computing problem or need there is a unique solution, achieved by the knowledgeable integration of hardware, software, and accessories. As a full-line manufacturer and supplier of computer products, Data General markets whole systems, not just components; whole solutions, rather than partial ones.

Office automation is a case in point: Data General's solution extends beyond word processing to include virtually all office functions in its Comprehensive Electronic Office system. Our industrial and process control systems or data processing clusters provide further examples. With 15 years of problem-solving experience and a large, responsive support network, Data General can confidently recommend and demonstrate intelligent solutions for you.

Data General Products

Data General computers include the 16-bit NOVA, ECLIPSE, and microNOVA families; and the 32-bit ECLIPSE MV/family. All are supported by Data General operating systems, among them AOS, MP/AOS, and RDOS. Data General also offers communications, networking, and office automation software; interfaces and protocols for IBM compatibility; and an extensive range of services and support.



Data General systems are used in manufacturing, banking, commerce, science, engineering, education, medicine, and government. Applied to everything from counting job tickets, to financial planning, to analyzing brain waves, these systems help people save time, money, energy, and even lives.

From inception to announcement and sale, Data General sets the following criteria for its products:

- Technical innovation
- Compatibility
- Interconnectability
- Coherent solutions
- Customer satisfaction

Data General invests one dollar in every ten in R&D to bring you the best performance for the best price.

Technical innovation. In the process of generating improved products for reduced costs, Data General has become a leading innovator in an industry that thrives on innovation.

The first NOVA, the ECLIPSE S/20, the MV/10000, the operating systems RDOS, AOS, AOS/VS, and AOS/RT32, and the Comprehensive Electronic Office — each of these Data General products represents a specific achievement in system design, commanding the respect of customers and competitors. To make these achievements happen, Data General invests nearly one dollar in every ten in research — a greater percentage of total revenues than most other computer companies.

Compatibility. Data General implements either the same instruction set or a subset across its computer families. As a result, its product line is compatible from the assembly language level all the way through. The microECLIPSE chip, for example, is the heart of our ECLIPSE S/20 computer and the basis for our Desktop Generation™ computers; and the S/20 instruction set is itself a subset of the 32-bit instruction set for our ECLIPSE MV family of systems.

On the software side, Data General offers unsurpassed cross-development opportunities and transportability because

1. Our operating systems share the widest possible set of system calls, and
2. Most of our languages feature common compilers.

This means that you can develop programs on our 32-bit systems, such as AOS/VS, that will run on our 16-bit systems, or build a program that combines different languages and runs on several machines — all without rewriting your source code.

Data General regularly reviews industry-accepted standards and supports them in communications packages that give you the broadest applicability.

Interconnectability. The extent to which one computer system can communicate with another is determined by the kind of communications protocol it uses. Unlike many companies that design protocols unique to themselves, Data General continually reviews industry-wide standards and incorporates them into its communications packages. This means that you can connect Data General computers with one another; connect a cluster or network of Data General computers to an IBM host; or connect your Data General computer to one of any other manufacturer's that uses industry-standard protocols. With communications software from Data General, you can easily move or transport programs and files to any area of your network.

Coherent Solutions. The maturity and popularity of Data General operating systems has encouraged software development houses to write thousands of applications programs for them. This fact, combined with the standard communications and built-in compatibility of our own software, enable Data General computer systems to fulfill an unusually broad range of computing requirements.

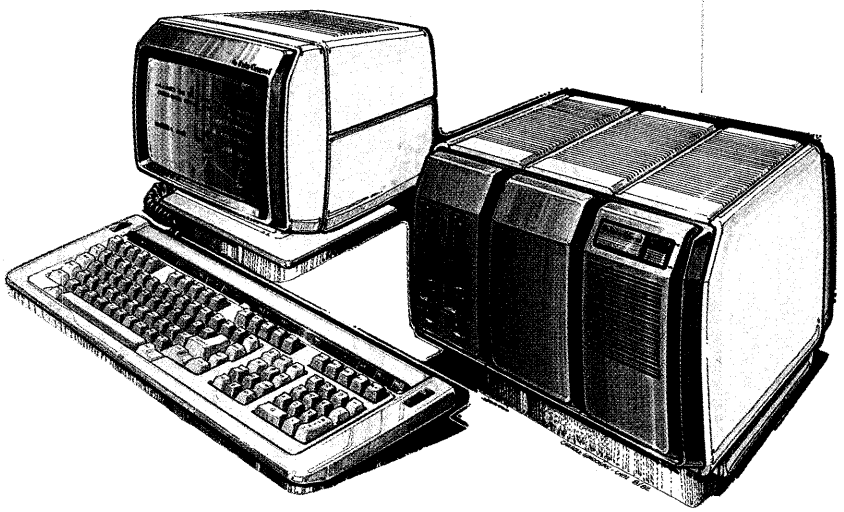
Customer Satisfaction. Training and service help you obtain the most productive results from your computer system. Data General's education centers throughout the US offer courses on all major products. Alternatively, these courses can be delivered at your site. A selection of self-study packages are also available for those who prefer to learn at their own pace.

Data General's maintenance and service organization is staffed by systems and field engineers, with bases and depots throughout the world. This organization plans a support strategy for every product long before it reaches the market, applying state-of-the-art techniques — phone-in facilities, remote diagnostics, and many other options — to achieve customer satisfaction.

The Desktop Generation ™

As the information processing industry grows rapidly in the 1980s, Data General will be there with ever-improving systems that help people process data, control operations, and broaden their understanding of themselves and their world.

As part of this effort, Data General announces a new achievement: its Desktop Generation computer systems. Supported by 15 years of experience in computer engineering and manufacture, these systems are intelligent personal workstations, bridging the gap between personal computers and professional systems.



Desktop Generation systems give you the popular applications of personal computers with the 16-bit power of professional ones.

Desktop Generation Models

There are four basic models of Desktop Generation computers. Models 10 and 10/SP of the Desktop Generation family give you a minicomputer's performance for a microcomputer's price. These are single-solution desktop systems — single-solution, because they let you run the same popular programs that run on personal computers while giving you an entree into Data General's powerful line of 16-bit software.

Models 20 and 30 of the Desktop Generation family are 16-bit computers that fit on your desk. Both use the ECLIPSE S/20 processor, which recently won industry-wide recognition for the technology it uses to achieve its excellent price/performance characteristics.

Desktop Generation Features

Like the Data General systems that preceeded them, Desktop Generation computer systems meet our high standards for innovation, compatibility, interconnectability, applications software for complete solutions, and responsive service.

Leading Technology

Models 10 and 10/SP feature dual processors that implement the CP/M-86, MS-DOS, and Data General operating systems for a reasonable price. The processor for Models 20 and 30 puts the ECLIPSE central processing unit on a single chip and the power of a minicomputer on your desk.

Compatibility

As fully integrated members of the Data General product line, Desktop Generation systems open growth paths once closed to microcomputer users. These paths support both horizontal and vertical migration and encourage growth.

Desktop Generation systems open up growth paths never before available, supporting horizontal, upward and downward growth.

Running MS-DOS on a Desktop Generation Model 10 or 10/SP gives you broad compatibility with IBM's Personal Computer and access to the world of applications written for MS-DOS. Running CP/M-86 on Models 10 or 10/SP, you have access to the wealth of software created for this popular operating system.

At the same time, Desktop Generation systems can be transported to larger systems because they use the same instruction set and operating systems. You can even add your Desktop Generation system to our largest system — the ECLIPSE MV/10000. And you can run applications written for other AOS- or RDOS-based systems on a Desktop Generation computer without rewriting your code.

Interconnectability

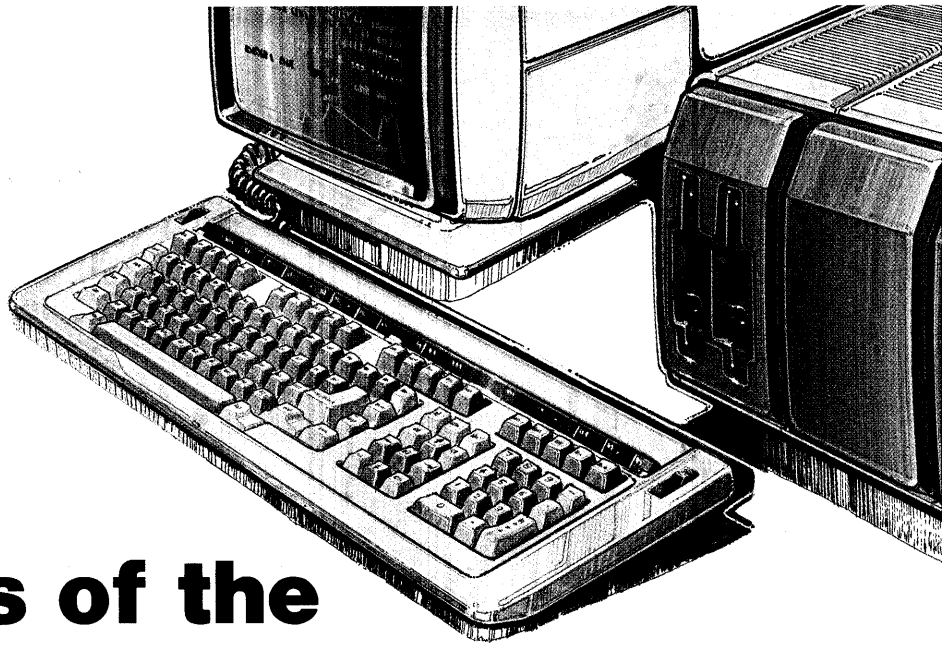
Data General supplies the communications protocol and software you need to connect a Desktop Generation system with public databases such as The Source™, with networks of Data General systems, with an IBM host computer, or with a non-IBM host system. This gives Desktop Generation computers an edge over other desktop systems in communications ability.

Available Software

For an idea of the spectrum of application programs you can run on a Desktop Generation system, consider Data General's software packages — many of them are described in the pages ahead — include the number of specialized packages created by software developers for Data General's operating systems, RDOS and AOS; and add the popular, "off-the-shelf" programs designed for the industry-standard operating systems, CP/M-86 and MS-DOS. Together these software packages for Desktop Generation systems total in the thousands, giving our newest family of computers greater currency and applicability than any other.

Service and Support

The versatility of Desktop Generation systems attracts customers of many descriptions — the computer professional and the new computer user, the one-person business and the international corporation. To accommodate each user's unique needs, our maintenance and service organization offers eight choices of coverage, each scaled to different needs and budgets. This program is the most comprehensive ever offered by a computer manufacturer, delivered by one of industry's largest and most experienced service organizations.



2 Features of the Desktop Generation

The Desktop Generation offers four different models of workstation — Models 10, 10/SP, 20, and 30 systems. The following table briefly summarizes the features of the eight packaged systems configured from these models. The next four chapters tell you more about each model, its configurations, and the options available for it.

	Desktop Generation Model			
Features	**10**	**10/SP**	**20**	**30**
CPU	microECLIPSE			
	8086			
Floating-point instruction set		Firmware		Hardware with commercial instruction set
Memory				
Minimum	128-256 Kbytes	256 Kbytes	256-512 Kbytes	512 Kbytes
Maximum	768 Kbytes		2 Mbytes	1.5 Mbytes
System console	Monochrome or graphics monitor and keyboard		Any DASHER terminal	
Number of				
Diskette(s) (368.6 Kbytes)	1 or 2			
15 Mbyte disks	0 or 1			1
Power supplies	1 or 2			2
Operating system	RDOS			
		AOS		
	MP/AOS-SU			
	MS-DOS			
	CP/M-86			

Compatability and Interconnection

Total solutions to the spectrum of computing needs — from personal to corporate and industrial applications.

The Desktop Generation brings to desktop workstations the unique hardware and software compatability which has been a Data General standard for over a decade. This, together with Data General's commitment to state-of-the-art communications products using national and international standards, makes the Desktop Generation the best total solution to an extremely wide range of computer applications.

Single-User Desktop Generation Systems

Most desktop microcomputers are single-user systems only. With Data General's single-user Model 10 and Model 10/SP configurations, the Desktop Generation systems offer the same range of applications software as the "personal computers" which support the MS-DOS and CP/M-86 operating systems.

In addition, however, Model 10 and Model 10/SP systems support the huge number of application packages that have been developed for Data General's RDOS and AOS operating systems, and offer the communications software needed to access public data bases such as The Source and banking systems.

Multiuser Desktop Generation Systems

The Desktop Generation Models 10, 10/SP, 20 and 30 all support multiterminal applications and development. These configurations offer extremely low cost per user — and, in many cases, they can replace larger, more expensive minicomputer systems without any loss of performance.

When configured in multiterminal systems, Desktop Generation computers offer extremely low cost per user.

Again, Data General compatability means transportability of applications, minimizing loss in your software investment. Applications presently executing under Data General's 16-bit operating systems — AOS, RDOS, and MP/AOS-SU — also execute on the Desktop Generation systems. The reverse also holds true. Applications created on a Desktop Generation computer execute on other Data General computer systems, in many cases right up to the ECLIPSE MV family of computers.

Desktop Generation Workstation Clusters

Interconnected workstations enable a number of users, each with their own dedicated workstation, to share resources and to automate office functions.

With a cluster of Desktop Generation workstations, users can share peripherals, such as a letter quality printer, a plotter, and graphics input devices. In addition, however, the communications software is available to allow the cluster to participate in an automated office based on Data General's CEO, which offers electronic mail, electronic calendar, word processing, information management, list processing, and spreadsheet facilities. Models 10/SP, 20 and 30 are especially suited to cluster configurations using the CEO software.

Desktop Generation Systems in Networks

Networks provide the most efficient use of computer resources. In this type of configuration, several workstations are interconnected and the entire cluster connects to a remote host computer. The workstations in a cluster can be dedicated to local tasks such as word processing and data collection, while the host computer is used for applications that require large amounts of computing power and on-line mass storage — the data processing or management information area of a large corporation, for example.

The Desktop Generation provides excellent workstations for use in interconnected systems and networks. Communications hardware and software are available to enable interconnection to virtually any host system. Since Data General software is compatible across product lines, Desktop Generation workstations can execute smaller versions of the same software being executed on a Data General host machine; locally, they can execute MS-DOS, CP/M-86, AOS, or RDOS applications as well.

Desktop Generation clusters, running CEO and linked to a host computer, brings office automation to your entire network.

Data General's CEO office automation software provides the ability to communicate across the entire network. Data General's ECLIPSE MV family of 32-bit superminicomputers, particularly the ECLIPSE MV/10000 computer, provides exceptionally powerful host facilities.

Networks are easily expandible by adding extra workstations to a cluster, extra clusters to a host, or small host machines (such as the ECLIPSE MV/4000 computer) to some clusters of workstations.

The key features of an efficient network are the range of communications software available, the compatability of software between machines in the network, and well-designed office automation software. The Desktop Generation offers all of these features. Models 10/SP, 20, and 30 are particularly impressive in a network context.

Host Computers for Desktop Generation Workstations

Desktop Generation workstations can be used in networks driven by a variety of host computers. In addition to Data General host systems, the Desktop Generation computers link to both IBM and any other host systems using industry-acceptable protocols.

Data General Host Systems

The Data General MV family of computers make excellent host systems. Desktop Generation systems support the XODIAC communications software that enables your workstations and host to communicate in a CEO, or automated office, context as large as the entire network.

Standard communications protocol and software give Desktop Generation computers virtually complete compatibility with IBM systems — including the IBM PC.

IBM Host Systems

The Desktop Generation supports the communications protocols to connect with virtually any IBM host system (eg, X.25). In addition, software is available to transfer data in real-time or in batch mode between the host system and Desktop Generation workstations (eg, 2780/3780).

Other Host Systems

Because Desktop Generation systems support the most widespread international and IBM communications protocols, they can be interconnected to *any* host system which also uses these protocols.

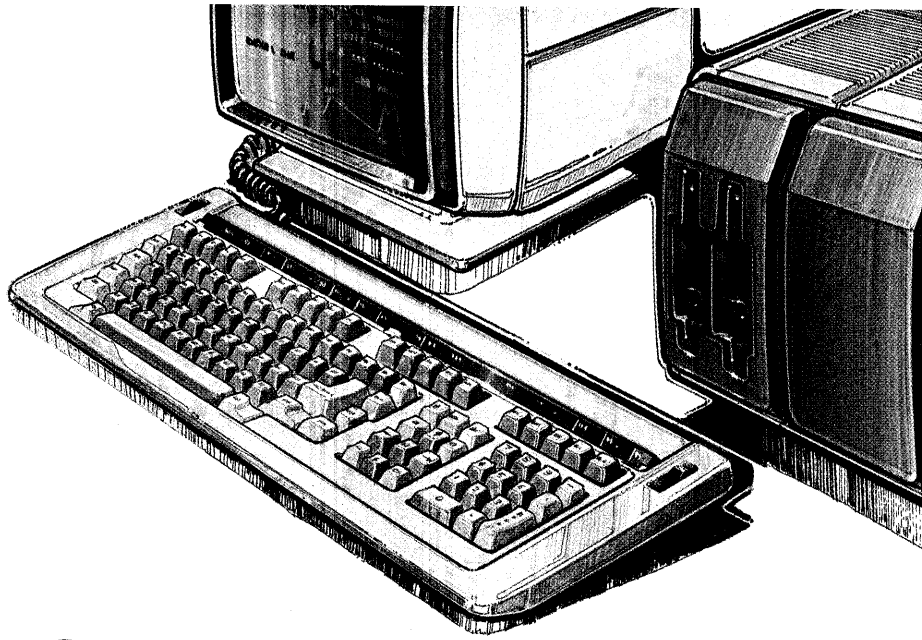
Data General is committed to remaining a leader in the use of national and international communications standards. As the telecommunications industry continues to offer new technologies and ever-widening choices of information access, Data General will ensure that its product lines include the features necessary to link into such systems. This is particularly relevant in the case of the Desktop Generation.

Compatability With the IBM PC

The Desktop Generation Models 10 and 10/SP support the standard operating system MS-DOS. This is the basis of the DOS operating system that runs on the IBM PC. In addition, the diskettes that you load into Desktop Generation systems are compatible with diskettes for the IBM PC.

These features make it easy to transfer data between a Desktop Generation workstation and an IBM PC. Many program files can be transferred and executed, using diskettes as the transport medium. Communications software is also available to transfer programs and files over a communications line.

What this means is that the Desktop Generation is highly compatible with the IBM PC. In addition, however, the Desktop Generation can execute applications designed for CP/M-86, RDOS, and AOS. And it is compatible with Data General's 16-bit (ECLIPSE) and 32-bit (ECLIPSE MV) computer systems.



3 Desktop Generation Systems

Data General's Desktop Generation computer systems are desktop systems for any application. The Desktop Generation systems support single-user and multiuser environments, running both Data General 16-bit operating systems and non-Data General operating systems, and executing the thousands of application packages that are available for these operating systems.

Desktop Generation computer systems are personal computers; small business systems; distributed processing systems for large corporations; technical, professional, and clerical workstations; or real-time control systems.

What is a Desktop Generation Computer?

A Desktop Generation computer system is a compact desktop system that is easy to install and maintain, and even easier to use.

Data General's Desktop Generation computers are available in four models: Model 10, Model 10/SP, Model 20, and Model 30. Identical in appearance and similar in operation, each is flexibly designed for numerous applications.

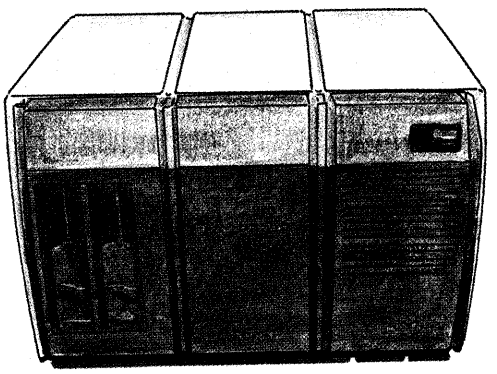
Model 10 and 10/SP computers are single-solution, professional desktop microcomputers running both industry-standard and Data General software.

Model 20 and Model 30 computers move Data General's 16-bit computer line onto a desktop. Their capabilities exceed those of microcomputers, taking you into the mid-range of 16-bit computing.

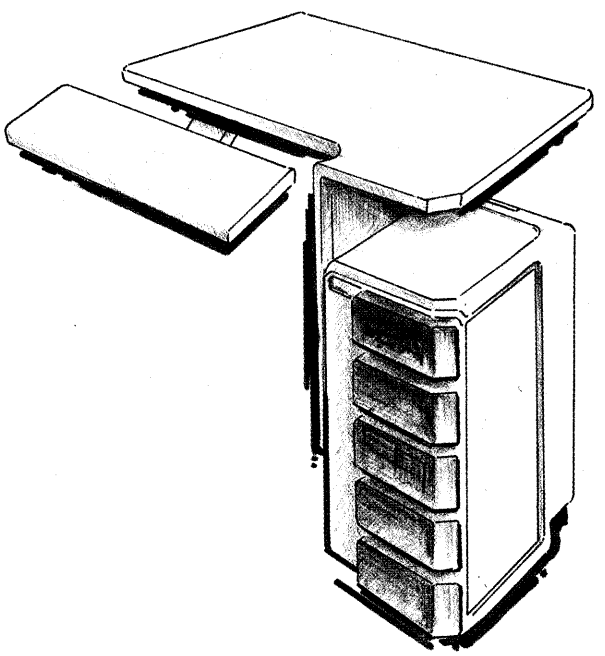
The foundation for each Desktop Generation system is a three-module basic Desktop Generation computer unit.

Modular Design

Each hardware module in the basic Desktop Generation unit is enclosed in its own plastic case. These modules, as well as many of the optional modules you may select, snap into place for fast and easy installation. The optional expansion cards plug into sockets within the slots of the modules. This snap-together, modular design provides flexibility in system configuration and extensive expansion capabilities.



Compact in size, these modules are easy to assemble and install neatly into your work area. Each module measures only 4.5 inches wide by 12 inches deep by 9 inches high; the system console compares in size to a portable television. The Desktop Generation system fits into locations where space is scarce — on your desktop, shelf, bookcase, or even under your desk. Desktop Generation systems are comfortable to use with such ergonomically-designed features as tilt monitors and sculptured keyboards.



Compact in size and modular in design, Desktop Generation computers fit neatly on your desktop, shelf, or bookcase.

Basic Desktop Generation Systems

Each Desktop Generation computer system consists of a computer unit, a system console, and optional plug-in components for expansion.

The basic Desktop Generation computer unit includes

- CPU card module containing the system cards and slots for additional memory and I/O cards.
- Diskette module containing one diskette drive and a slot for an additional diskette drive.
- Power supply module containing the power supply, a slot for an additional power supply, and a fan.

Like the hardware, the software for Desktop Generation computers is also modular: as your Desktop Generation system software requirements expand, the hardware can be expanded to accommodate it.

After choosing your basic software — an operating system (or systems) — you can add other software modules, selecting from an extremely wide range of applications packages, utilities, and programming tools.

CPU Card Module

The slots of the CPU card module hold the system processing unit and memory cards for the Desktop Generation computers. The major card is the central processing unit (CPU), which manipulates data both within the CPU and between peripherals. The memory for the Desktop Generation computers is contained either on the CPU card and on a separate card, or completely on separate cards. Two or more slots in the CPU card module are reserved for the CPU and memory; the remaining slots are available for optional plug-in cards. These cards include the graphics controller card, the floating-point accelerator card, and input/output (I/O) cards.

If the number of optional I/O cards you require exceeds the capacity of the CPU card module, other slots are available in the card expansion module.

Central Processing Unit. Running your operating system and applications software is the CPU's function. In fulfilling this function, the CPU

- moves data between memory and peripherals (diskette and disk drives, printers, terminals);
- performs the necessary calculations on data;
- governs memory access.

A serial printer port (EIA RS-232-C) connects a Model 10 or 10/SP computer to its optional printer or graphics plotter. A real-time clock and programmable interval timer are included on the CPU card as standard programming aids.

The central processor for the Desktop Generation systems is the microECLIPSE, the same used in Data General's S/20 computer systems. The microECLIPSE implements the 16-bit ECLIPSE character instruction set, the same instruction set used in the 16-bit microECLIPSE computer line. This instruction set supports the proven 16-bit Data General operating systems: AOS, RDOS, and MP/AOS-SU.

In addition to the microECLIPSE processor, the Model 10 and 10/SP CPU contains an Intel 8086 processor. This processor supports the popular microprocessor operating systems, MS-DOS and CP/M-86. MS-DOS is identical to DOS, the most commonly used operating system for IBM PC systems. As well as running on the IBM PC, these operating systems run on a variety of different manufacturers' computer systems.

For processing scientific instructions, the ECLIPSE floating-point instruction set is available. (This feature is standard for Model 10/SP, Model 20, and Model 30.) Certain programming languages, such as FORTRAN 5 and FORTRAN 77, DG/L, PL/I, and SP/Pascal, require the floating-point instruction set.

Additionally, a hardware floating-point accelerator card is available. This card is required to implement the 16-bit ECLIPSE Commercial Instruction Set which is necessary to run the COBOL and RPG II programming languages. Both the floating-point card and the commercial instruction set are standard features of Model 30 computers.

Memory. Memory cards for the Desktop Generation systems consist of dynamic random-access memory (RAM) chips. All memory cards contain parity checking. Parity provides data reliability by protecting your memory data without requiring central processor assistance. When data is written into memory, parity information is added to the data. When this data is read back from memory, the parity information is checked to determine if the data remains unchanged.

The memory allocation and protection (MAP) unit provides additional reliability. A minicomputer feature incorporated into a microcomputer, the MAP is a unique facility which allots and secures the programming address space for each user. The MAP allows multiple users and programs to coexist by eliminating interference with each other's allocated memory space.

The minimum memory configuration for Model 10 computers is 128 or 256 Kbytes of RAM which is contained on the CPU cards. The minimum memory configuration is 256 Kbytes for the Model 10/SP. Memory for all Model 10 and 10/SP computers can expand to the 768-Kbyte maximum with the optional plug-in memory cards of 256 Kbytes or 512 Kbytes each.

Separate memory cards contain the memory for Model 20 and Model 30 computers. Memory for Model 20 computers ranges from 256 or 512 Kbytes to 2 Mbytes, while memory for Model 30 computers ranges from 512 Kbytes to 1.5 Mbytes. Optional plug-in memory cards are available to increment memory by 256 or 512 Kbytes.

	Model 10 and 10/SP	Model 20	Model 30
CPU type (processor)	microECLIPSE 8086		
Number of CPU cards	2	1	
Memory on CPU cards			
minimum memory	128 or 256 Kbytes (Model 10) 256 Kbytes (Model 10/SP)	256 or 512 Kbytes	512 Kbytes
maximum memory	768 Kbytes	2 Mbytes	1.5 Mbytes
Expansion memory cards with parity	256 or 512 Kbytes		

Power Supply Module

The power supply module contains a regulated d.c. power supply and a fan for cooling. An empty slot in the module accommodates an optional second power supply, required when the power drawn by expansion elements such as a disk drive exceeds the capacity of the first supply.

The Desktop Generation computer system's power cord plugs into a standard wall socket. In addition to the United States voltage of 120V, Desktop Generation computer systems can accomodate international voltages of 100V and 220-240V at 50 and 60 Hertz.

Power supply type	Switch type a.c. to d.c. converter
a.c. input	90-132 Vac or 187-264 Vac
Line frequency	Single phase, 47-63 Hz
Line current	2.6 A per supply
Wattage	123 per supply
d.c. output	Maximum per supply + 5V @ 16.3 A − 5V @ 0.5 A +12V @ 2.5 A −12V @ 0.8 A

Diskette Module

The Desktop Generation computer's diskette module contains one diskette drive, which accepts removable, industry-standard, 5 1/4-inch, double-density, single- or double-sided diskettes. The diskette drives for the Desktop Generation systems accept both Data General diskettes and those of other manufacturers that comply with MS-DOS and CP/M-86 standards.

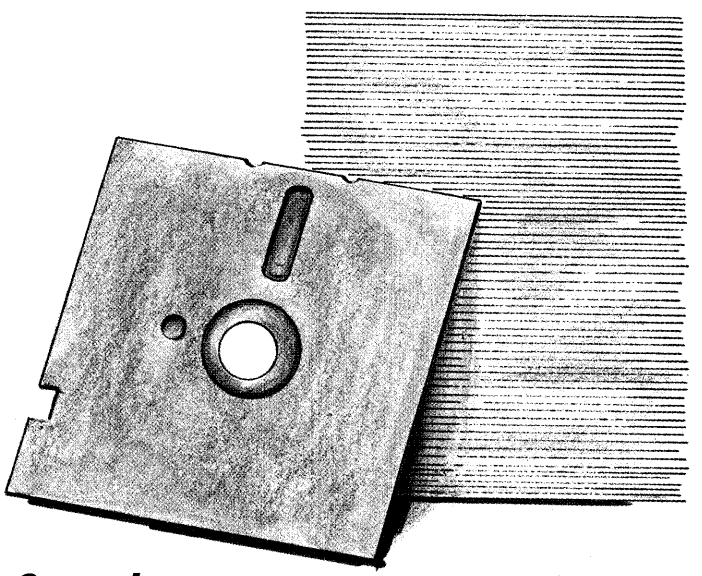
The Desktop Generation systems can access diskettes formatted for IBM PC computer systems.

The diskette module for the Model 20 and Model 30 systems contains a diskette controller card that manages the transfer of data to and from diskettes. The single controller card governs both the standard diskette drive and the optional, second diskette drive.

Both the standard and optional Model 10 and 10/SP diskette drives are managed by a diskette controller located on the CPU card in the CPU card module. This leaves an open slot in the diskette module that you may use for an optional I/O card.

Applications and system software are stored, distributed, and run on the diskettes. The diskettes can be formatted in either Data General standard or IBM PC format. In Data General standard format, each diskette's capacity is 368.6 Kbytes.

Diskette Drive	
Drives per system	1 or 2
Data transfer rates	250 Kbytes/second
Access times	Minimum 21 ms Maximum 249 ms
Rotational speed	300 rpm
Diskettes (Data General standard format)	
Capacity per diskette	368.6 Kbytes
Recorded surfaces	2
Tracks per inch	48
Tracks per recording head	40
Sectors per track	9
Words per sector	256



System Console

The system console, the primary interface with your Desktop Generation system, is a display monitor with a separate keyboard.

Desktop Generation monitors incorporate raster scan technology with tilt bases, no-glare screens, and other features for operator comfort.

The system console accepts input from you through the keyboard and displays output from the computer on the monitor. When your Desktop Generation system supports more than one terminal, the system console is the control console for the system.

Monitors. Three factors have been considered in designing each Desktop Generation display monitor: the user's physical comfort, state-of-the-art technology, and the monitor's function in increasing productivity.

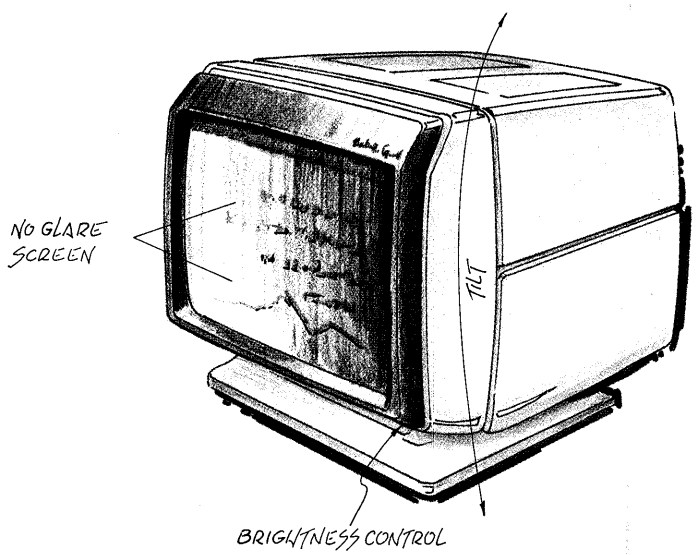
Monitors for the Desktop Generation computer system are *raster scan*, that is, similar to a television monitor. A superior technology for presenting solid two-dimensional objects, raster scan monitors provide bright displays, variable intensity, and selective erasing and refreshing of the screen.

Graphic resolution is one method of assessing a monitor's visual clarity. Graphic resolution is measured by the number of pixels (picture elements) that may be presented on the screen: the more pixels per square inch, the clearer the picture. The resolutions for the Desktop Generation system monitors range from 640 pixels (horizontal) by 240 pixels (vertical) for the Model 10 and 10/SP systems to 810 pixels (horizontal) by 288 pixels (vertical) for the Model 20 and Model 30 systems.

The number of lines and number of characters per line (columns) determine the alphanumeric qualities of a monitor. Most Desktop Generation system monitors display 24 lines in 80 columns.

The monitors for Desktop Generation products are conveniently sized for your desk or shelf. Thoughtfully designed with the operator's comfort in mind, they incorporate the following features.

- Tilt bases permitting you to raise and lower the monitors for optimum viewing;
- Underscore, blink, dim, and reverse video capability;
- No-glare screen to eliminate overhead light reflection;
- Sensitive brightness control placed in front to allow easy access;
- A high image-per-second refresh rate (equal to the line frequency) to reduce screen flicker;
- Green phospor screen to reduce eyestrain.



The standard display monitor for Model 10 and Model 10/SP computer systems is a monochrome monitor. A color monitor is optional. Both display monitors have alphanumeric and compatible graphics capabilities and use the same keyboard. The monochrome monitor screen measures 12 inches diagonally and displays green characters on a black phosphor background to reduce eyestrain. The monochrome monitor displays reverse video as black characters on a green background. The color monitor screen measures 13 inches diagonally. A graphics interface card is required to control the color monitor which can produce 16 colors simultaneously from a palette of 4096 possible colors.

For Model 20 and Model 30 system consoles, you may choose from a variety of terminals: the Data General DASHER series D210, D211, D410, and D460 terminals. Each has a detachable keyboard. More information about the D210, D211, D410, and D460 terminals is given in the options chapter.

Desktop Generation keyboards feature sculptured keys, advanced functions, and an exceptionally well-planned layout.

Keyboards. One way to enter information into your Desktop Generation computer system is to type it on the monitor keyboard. A cord connects the lightweight detachable keyboard for the Desktop Generation computer system to the monitor. This flexible, coiled cord allows you to move both the monitor and keyboard into comfortable working positions. In addition, both the monitor and the keyboard tilt.

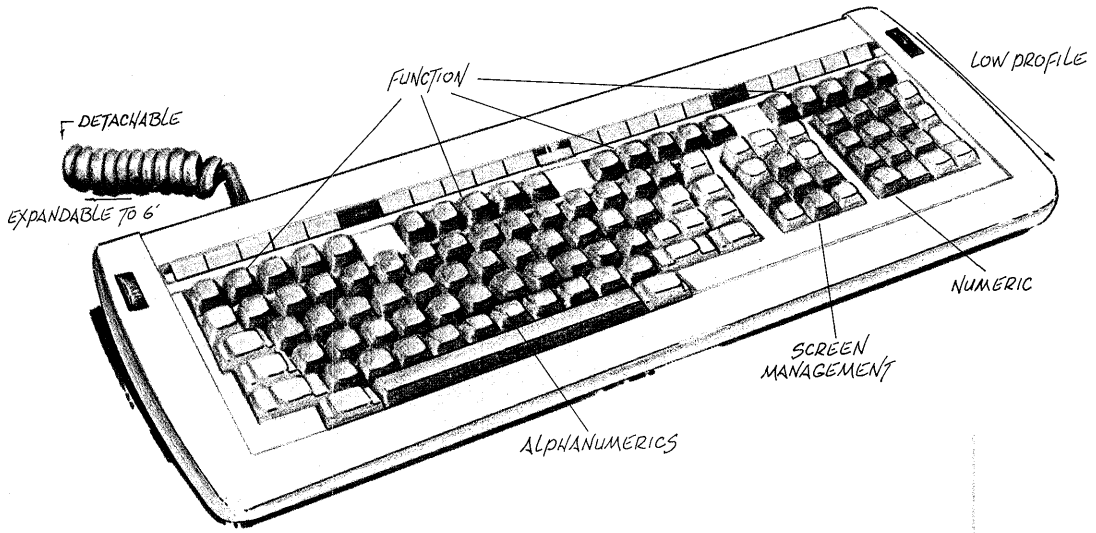
Other keyboard features designed to increase your comfort and productivity include sculptured keys and a well-planned keypad layout. Keyboards are available with international character fonts, in either a single language or user-selectable bilingual versions.

The keys are arranged into four groups to help you eliminate errors and increase your data entry speed.

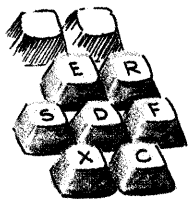
- *Main keypad.* Similar to a standard typewriter-style keyboard, this is the primary data entry keypad. All displayable alphanumeric characters can be entered from this keypad.
- *Screen-management keypad.* This keypad is used for special editing functions and for controlling the cursor. (The cursor is a spot of light on the monitor screen that moves to indicate where the next character will be entered.)
- *Numeric keypad.* Used like a calculator, this keypad simplifies the entry of long lists of numbers. It is useful for accounting, statistics, or cash management applications.
- *Function keypad.* Depending on the software you are running, this keypad performs various application-specific operations.

The keyboard offers the following advanced features for faster typing and data entry.

- *N key rollover.* The keyboard transmits the last key you press, even if other keys are not released.
- *Non-slip keycaps.* Contoured and textured keycaps with matte finish reduce typing errors.
- *Keyclick.* Each time you press a key, an audible keyclick verifies whether the key has operated properly.



Cord	2 feet coiled / 6 feet stretched Plugs into display monitor
Keys	107 sculptured, matte textured-finished keys
Keypads	
Main	61 keys
Numeric	14 keys
Function	20 keys
Screen-management	12 keys



Diagnostics

Desktop Generation computer diagnostics include both memory-based and diskette-based diagnostics. The Desktop Generation computer system performs self-diagnostics when you apply power to your computer. These diagnostics verify reliable operation of the central processor, and memory, before loading the operating system.

The diskette-based diagnostics available with Desktop Generation computers are advanced software programs. However, they are also simple to use, menu-driven programs requiring a minimum of user interaction. These tests identify the failing module, so you can replace the component yourself or inform your field service engineer, depending upon your service plan. The service and support chapter explains each of the eight service plans Data General offers for the Desktop Generation computer systems.

Operating System Software

An operating system is a program or group of programs that acts as an interface between you and the hardware of your computer system. By managing access to processor time, memory, and input and output devices, an operating system helps you create and execute your programs.

An operating system acts as an interface between you and your computer hardware, helping you to create and execute programs.

Each Desktop Generation computer supports several widely-used operating systems. Data General 16-bit operating systems run on all Desktop Generation computers. Popular microcomputer operating systems also run on Model 10 and Model 10/SP systems.

Data General's 16-bit operating systems include the Real-time Disk Operating System (RDOS), Advanced Operating System (AOS), and Microprocessor/Advanced Operating System (MP/AOS-SU). The microcomputer operating systems include Microsoft Corporation's disk operating system (MS-DOS) and Digital Research's operating system for 16-bit microcomputers (CP/M-86). A significant feature of the Desktop Generation is the ability of Model 10 and Model 10/SP systems to run MS-DOS or CP/M-86 concurrently with the Data General operating systems AOS or RDOS.

Each operating system for the Desktop Generation computers gives you access to a wide range of standard industry software. Within this range are tools to meet your specific needs. Your choice of operating system determines which software applications packages, utility programs, and program development languages will run on your system.

The operating system(s) suitable for your environment depends on the software you wish to use. If you plan to run only Data General packages, you need only RDOS, AOS, or MP/AOS-SU. If you plan to run other packages, you need the MS-DOS or CP/M-86 operating system software.

Data General's operating systems provide an upward growth path to larger Data General computer systems. You can move data and program files not only between Desktop Generation computers, but also to larger Data General systems.

Data General's 16-bit operating systems, AOS and RDOS, support single-user and multiuser and single-terminal or multiterminal environments. You can run single-user AOS on the Model 10/SP, and multiuser AOS on a Model 20 and Model 30. All Model 10s support single-user RDOS; the Model 10 with a 4-line communications card, both Model 20s, and Model 30 provide the base for multiuser RDOS. Of course, the appropriate memory configurations must be used.

	10	10/SP	20	30
AOS				
Multiuser	—	—	X[1]	X[1]
Single-user	—	X	X	X
RDOS				
Multiuser	X[1]	X[1]	X[1]	X[1]
Single-user	X	X	X	X
MP/AOS-SU	—	X		
MS-DOS	X	X		
CP/M-86	X	X		

[1]*Requires 4-line communications card.*

Data General Operating Systems

All Desktop Generation systems with the appropriate instruction set option support Data General's AOS, RDOS, and MP/AOS-SU operating systems. Each of these systems runs on most Data General 16-bit minicomputers. Each supports multitasking, in which a single program controls and coordinates several operations. Both RDOS and AOS also support up to five or six standard Data General terminals, depending on the configuration.

RDOS supports a single-user or a multiuser environment, executing one or two processes at a time. RDOS is a real-time operating system with general-purpose program development capabilities.

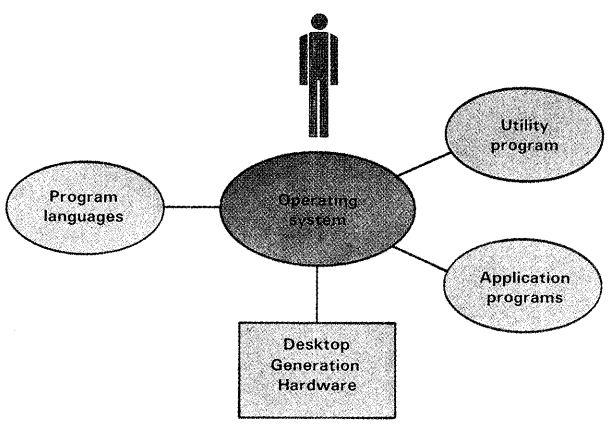
The AOS environment can be either a single-user or a multiuser, with multiple processes executing at the same time. A general-purpose operating system, AOS simultaneously supports time sharing and multiple batch streams.

MP/AOS-SU supports a single-user environment, executing one process at a time. It is a real-time, technical operating system with program development capabilities.

All these operating systems support

- A multitude of applications packages, either Data General's or those of a variety of independent software vendors.
- Utilities for simplifying file manipulation, program development, and system management.
- A variety of programming languages and program development utilities.

RDOS and AOS invisibly control the input and output of data for MS-DOS or CP/M-86 when either non-Data General operating system (or its applications software) is running on the Model 10 or 10/SP system console.



RDOS

RDOS is a popular, proven, and economical operating system, supporting both commercial and real-time applications.

The Real-time Disk Operating System (RDOS) for Desktop Generation computers is a memory-resident operating system, capable of executing two programs at once (foreground/background processing). This allows concurrency for a single user, such as executing a payroll program in the background while working with a text editor. RDOS supports real-time process control, program development, and most standard user applications.

Your primary interface with RDOS is its Command Line Interpreter (CLI), whose command syntax is a communications path to the system. The CLI also provides access to the remainder of the system utilities, which support

communications,
system administration,
software development,
data backup,
graphics creation,
general business applications.

In addition to a macroassembler for assembly language, RDOS supports program-development languages for software development:

FORTRAN IV,
FORTRAN 5,
DG/L,
Extended BASIC,
Business BASIC,
Interactive COBOL.

AOS

AOS is a powerful, general-purpose operating system noted for its sophisticated and economical design.

The Advanced Operating System (AOS) for Desktop Generation computers is a general-purpose, disk-based operating system that controls and monitors user program processing. AOS manages

- many program control, I/O, and file access functions;
- system and user resources dynamically to optimize the performance of all system functions;
- simultaneous time sharing or multiple batch streams.

AOS supports a full complement of utilities. You access these utilities using your primary system interface — the AOS CLI utility. Additional AOS system utilities include

software development aids,
interactive debugger for program development assistance,
log-on system,
accounting facility,
general-purpose help facility,
system administration facilities,
data management and backup aids.

AOS program development languages include

Extended BASIC,
Business BASIC,
FORTRAN IV,
FORTRAN 5,
FORTRAN 77,
Interactive COBOL,
COBOL,
DG/L,
PL/I,
RPG II.

AOS also supports graphics runtime libraries for various program development languages.

MP/AOS-SU

The Microprocessor/Advanced Operating System (MP/AOS-SU) acts as a real-time executive that minimizes overhead in a disk-based development system. In applications, it is very responsive as a result of fast task switching, priority-driven scheduling, interprocess communication, and sophisticated memory management. MP/AOS-SU is designed to provide an efficient basis for user-designed applications such as real-time process control, data acquisition, and medical instrumentation.

Compatible with AOS, MP/AOS-SU is a fast and efficient operating system supporting real-time applications.

As with RDOS and AOS, your main interface with the system is through the CLI. MP/AOS-SU supports a full complement of utilities, including system management utilities, program development aids, and file management facilities. Additional system utilities include

text editor,
macroassembler,
file tracking software,
process monitoring and reporting,
file transfer utility.

The MP/AOS-SU program development languages include

MP/BASIC,
MP/FORTRAN IV,
MP/Pascal,
SP/Pascal.

MP/AOS-SU is designed for compatibility with AOS; programs prepared under AOS, using the cross-development utilities, can be executed on any Desktop Generation computer under MP/AOS-SU.

MS-DOS and CP/M-86 are industry-standard operating systems. Both systems — and hundreds of "off-the-shelf" applications written for them — run on Model 10 and 10/SP computers.

Non-Data General Operating Systems

The Model 10 and Model 10/SP computer systems support two non-Data General microcomputer operating systems — Microsoft's MS-DOS and Digital Research's CP/M-86. For file compatibility, Data General's operating systems, RDOS and AOS, run concurrently with either non-Data General operating system, handling data input and output operations for the operating system and its applications software.

MS-DOS

The MS-DOS disk operating system is Microsoft Corporation's operating system for the Intel 8086 and 8088 microprocessors. The MS-DOS operating system is intended for single-user, single-task, interactive applications such as program development and debugging, small business computing, and graphics applications.

The MS-DOS operating system runs on any Model 10 or Model 10/SP computer system. Under MS-DOS, the Model 10 and 10/SP computers execute application software and programming languages written for MS-DOS. Non-device-dependent applications written for MS-DOS run unmodified on Model 10 and 10/SP computers. These include applications written for the IBM PC whose operating system, DOS, is basically the same as MS-DOS.

CP/M-86

CP/M-86 (Control Program for Microcomputers) is a popular operating system for microcomputers. Originally developed by Digital Research, CP/M-86 is an upward extension of their original and widely used general-purpose operating system for 16-bit microprocessors, specifically the Intel 8086 and 8088 microprocessors. The CP/M-86 operating system is intended for single-user, single-task, interactive applications such as program development and debugging, small business computing, and word processing. Digital Research's languages and programming tools are designed for the professional programmer writing commercial software packages.

The CP/M-86 operating system runs on Models 10 and 10/SP, enabling these computer systems to execute all applications software and programming languages written for CP/M-86.

Program Development Languages

The Desktop Generation computer systems support most program development languages currently available for Data General 16-bit computers. In addition, the languages supported by MS-DOS and CP/M-86 — GW-BASIC and CBASIC, respectively — are available.

RDOS, AOS, and MP/AOS-SU are the same operating systems that run on Data General's larger computer systems. If your present computer runs any of these operating systems, you have probably already developed applications that will run on the Desktop Generation computers.

Since the languages supported by RDOS, AOS, and MP/AOS-SU execute either under these or other Data General operating systems, the applications you develop will be compatible with the entire line of Data General computers — from our Desktop Generation computers to our 32-bit MV/family of computers. As your business and your use of computers expands, you benefit from the return on your initial investment in software and hardware.

Language Prerequisites

The prerequisites for some programming languages dictate which Desktop Generation model supports which language. In general, scientific languages require the floating-point instruction set, so you need a Model 10/SP, a Model 20, or a Model 30 system, each of which contains a standard floating-point instruction set.

Some languages require the commercial instruction set. COBOL and RPG II, for example, execute on Model 30 computers which include a hardware floating-point unit with the commercial instruction set.

		Model				
Operating System	**Language**	**10**	**10/SP**	**20**	**30**	**Major Use**
MS-DOS	GW-BASIC	X	X			General-purpose
CP/M-86	CBASIC	X	X			General-purpose
RDOS	Extended BASIC	X	X	X	X	General-purpose
	Business BASIC	X	X	X	X	Commercial
	FORTRAN IV	X	X	X	X	Technical/numerical
	FORTRAN 5		X	X	X	Technical/numerical
	Interactive COBOL	X	X	X	X	Commercial
	DG/L		X	X	X	Systems development
AOS	Extended BASIC		X	X	X	General-purpose
	Business BASIC		X	X	X	Commercial
	MP/BASIC		X	X	X	General-purpose
	FORTRAN IV		X	X	X	Technical/numerical
	FORTRAN 5		X	X	X	Technical/numerical
	FORTRAN 77		X	X	X	Technical/numerical
	Interactive COBOL		X	X	X	Commercial
	COBOL				X	Commercial
	PL/I		X	X	X	General-purpose
	DG/L		X	X	X	Systems development
	RPGII				X	Report generation
MP/AOS-SU	MP/BASIC		X	X	X	General-purpose
	MP/FORTRAN IV		X	X	X	Technical/numerical
	MP/Pascal		X	X	X	Business
	SP/Pascal		X	X	X	Systems development

General-Purpose Languages

BASIC

BASIC, originally developed at Dartmouth College, is easy to learn, use, and debug — a model people-oriented language.

BASIC (Beginner's All-purpose Symbolic Instruction Code) was originally developed at Dartmouth College as a beginner's programming language. BASIC has evolved continually, but remains a model people-oriented language.

As a language, BASIC is easy to learn, use, and debug, suitable not only for students but for fairly sophisticated business and scientific applications. It uses an interactive interpreter to allow easier and faster program development than most high-level languages. The BASIC interpreter checks your code as you enter it, signalling you immediately if it detects certain errors.

BASIC may also be used outside the context of program development as a desktop calculator to produce immediate results to arithmetic computations.

Data General's BASIC languages are available as either Extended BASIC or Business BASIC, both executing under either AOS or RDOS; and MP/BASIC, which executes under AOS and MP/AOS-SU. A non-Data General BASIC, GW-BASIC, executes under MS-DOS.

MP/BASIC, an extended, ANSI-standard programming language, produces user programs that are easy to follow and maintain. Among its major features are real data type and string manipulation capabilities. MP/BASIC's extensions to ANSI standard BASIC include integer data type, string dimensioning and concatenation, substrings, letter-digit array names, extensive built-in string and mathematical functions, and fixed and variable length file manipulations. Program swapping and chaining and exception handling are additional features. An interface with assembly language provides for user device handling. MP/BASIC is a compatible subset of VS/BASIC, which runs on Data General's ECLIPSE MV/system.

Extended BASIC is a general-purpose BASIC that offers many extensions to the original Dartmouth BASIC. These extensions suit it for applications ranging from scientific to commercial programming. In addition to BASIC's string-handling ability and matrix support, the extensions add versatility for formatting output and performing I/O on fixed and variable files. Another Extended BASIC mechanism enables you to call assembly language programs.

Designed for commercial data processing, Business BASIC offers the advantages of Extended BASIC plus additional features:

its own text editor with command repertoire;
terminal function keys, justification, and output formatting;
special arithmetic, data management, and screen formatting facilities suited to business needs.

The AOS BASIC interpreter allows multiple users to create, test, debug, or execute programs concurrently and independently. It is packaged with a library of subroutines and utilities.

GW-BASIC, executing under MS-DOS, is an implementation of Microsoft BASIC-86. GW-BASIC supports graphics for the Model 10 and Model 10/SP system console with dual-mode graphics capabilities (medium and high resolution) for either the monochrome or color monitors. Drawing statements help you to create lines and circles, or paint the screen. The screen editor implements special function keys (reassignable within your program) and multistatement lines. GW-BASIC allows you to call machine language subroutines, merge multiple programs, and transfer control to specific program lines when certain events occur.

COBOL, a pioneering language, was designed to manipulate large volumes of character and numeric data.

Commercial Languages

Data General's commercial languages have all the features needed to develop applications for business and data processing contexts.

COBOL

COBOL, the most widely-used business data processing language, is designed to manipulate large volumes of character and numeric data, such as names, addresses, and part numbers.

The Desktop Generation systems support two Data General versions of COBOL: AOS COBOL and Interactive COBOL. Both AOS COBOL and Interactive COBOL feature a sort/merge facility, extra data types, structured program support, and the ability to call assembly language routines within a COBOL program. AOS COBOL executes on the Model 30, while Interactive COBOL executes on any Desktop Generation system.

Data General's Interactive COBOL, which runs under both RDOS and AOS, offers many advantages for implementing applications systems. Since its syntax resembles the English language, its programs are easier to document and maintain. Data General's extensions make Interactive COBOL useful for the creation of interactive, transaction-driven systems: full screen management, special display terminal functions, program-defined keys, and multilevel security (file, record, system, and program).

Interactive COBOL is easily learned by experienced COBOL programmers. It is an interpretive language with various utilities for writing source code and documentation; designing, coding, and documenting display screen formats; compiling and debugging programs. Application programs and data files created under Interactive COBOL can be transported and executed under other Data General operating systems.

Data General's AOS COBOL provides you with high-level language capabilities, powerful data management and screen handling facilities, and extensive program development aids. The language is efficient and easy to use. AOS COBOL's integration with Data General's data management software gives you access to sophisticated screen-management capabilities.

FORTRAN's easy syntax, computational power, and formatted output make it an ideal scientific tool.

Scientific/Technical Lanaguages

Data General's scientific and technical languages have all the features needed to develop applications for technical and numerical manipulations.

FORTRAN

FORTRAN (FORmula TRANslation) was an early step upward from assembly language. Originally designed for technical and scientific applications, it has evolved continuously and is now also widely used in education, the social sciences, industry, and business.

FORTRAN's easy syntax, computational abilities, and formatted output make it an ideal scientific tool. In addition to software development, FORTRAN is useful in such endeavors as real-time control and monitoring, scientific computation, economic modeling, market or statistical analysis, forecasting, accounting, data reduction, inventory control, educational programming, and various clerical duties.

Both RDOS and AOS support two versions of FORTRAN — FORTRAN IV and its superset FORTRAN 5. AOS also supports FORTRAN 77, which conforms to the full ANSI standard (X3.9-1978). MP/AOS-SU supports MP/FORTRAN IV, an extended, ANSI 1966 standard programming language.

Data General's FORTRAN languages contain some extensions that increase the flexibility and power of the language. Multitasking, combined with FORTRAN's reentrant code, facilitates real-time uses.

The AOS FORTRAN languages have a series of real-time and file control extensions for monitoring and controlling real-world environments. All FORTRAN languages also interface with many Data General language-related libraries and utilities.

Since its development in the early 1970s, Pascal has gained currency as a systems programming, scientific, and business tool.

Pascal

Pascal was developed in the early 1970s by Niklaus Wirth. Since it was originally designed to be a teaching language, its notation is simple. Pascal has the following advantages:

- Block structure that lends itself easily to structured programming techniques;
- Data-typing facility for creating new data types;
- Record structure composed of different data types to make structuring information easy.

Data General's Pascal programming languages, MP/Pascal and SP/Pascal, execute under MP/AOS-SU (SP/Pascal also being available under AOS) and are useful as systems programming, scientific, and business tools.

MP/Pascal, an extended, structured programming language based on Pascal, produces programs that are easy to understand and maintain while requiring less execution space than other program development languages. MP/Pascal's extensions to Pascal include separate compilation modules for sharable routines and data, assembly language interface, dedicated application programmability, dynamic string data types for text manipulation, multitasking, AOS compatibility for cross-development, and full access to MP/AOS-SU system functions.

SP/Pascal, an extended Pascal for system development, shares all the features of MP/Pascal and is also equipped with unique capabilities that

- generate highly efficient machine code,
- introduce exception handling and routine signaling support,
- utilize floating-point instructions for single- and double-precision real arithmetic operations,
- allow structured constants for use as constants or literals,
- permit scalar expresssions in most constant contexts.

PL/I

A versatile, general-purpose, machine-independent language, AOS PL/I is well-suited to structured programming. Originally named Programming Language One because it incorporated the best features of existing languages, PL/I remains a flexible, multifunction language that manipulates numbers and handles strings and data files as well as COBOL, and provides the bit manipulation and linked list capability of systems languages, such as DG/L described below.

Flexible and multifunctional, PL/I is well-suited for computation, data processing, and systems programming.

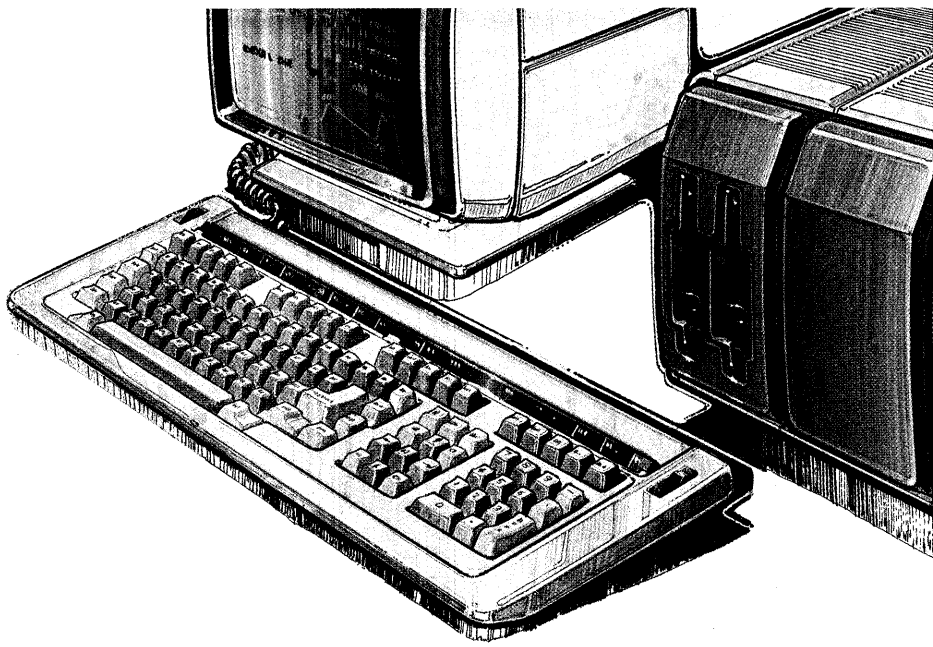
PL/I software supports Data General's data management software for information access. This reduces the requirements for storing redundant data and increases data security. A high-level call interface supports all access methods. PL/I is well-suited for scientific/engineering (computational), commercial (data processing), and systems programming applications.

DG/L

DG/L (Data General's systems development language) is a flexible language resembling ALGOL. As a systems implementation language, it allows you to nest expressions, statements, and blocks recursively.

DG/L is a structured programming language with a simple, yet powerful, syntax designed for a wide range of sophisticated applications, such as the development of system-level software — compilers, assemblers, sort/merge programs, and other utilities. Its arithmetical and mathematical library functions make it ideal for computational tasks; its string handling and string arithmetic features enable commercial applications.

DG/L software permits development on ECLIPSE computers for execution across Data General's Desktop Generation, ECLIPSE, NOVA, and microNOVA product lines, under the AOS/VS, AOS, RDOS, RTOS, or DOS operating systems.



4 Desktop Generation Options

The basic Desktop Generation models provide you with instant systems for most applications. And, as the Desktop Generation systems are modular, so too are the options available for expanding or custom-designing your computer system. The modular design, versatility, and high performance of each Desktop Generation computer option makes it possible for you to configure a system that meets all your needs. Because you can buy the modules as you need them, your cost savings will be both long-range and immediate. All Desktop Generation optional cards and modules are designed and manufactured by Data General: each fits easily into the Desktop Generation family of computers; each meets our exacting standards; each receives support from one source — Data General.

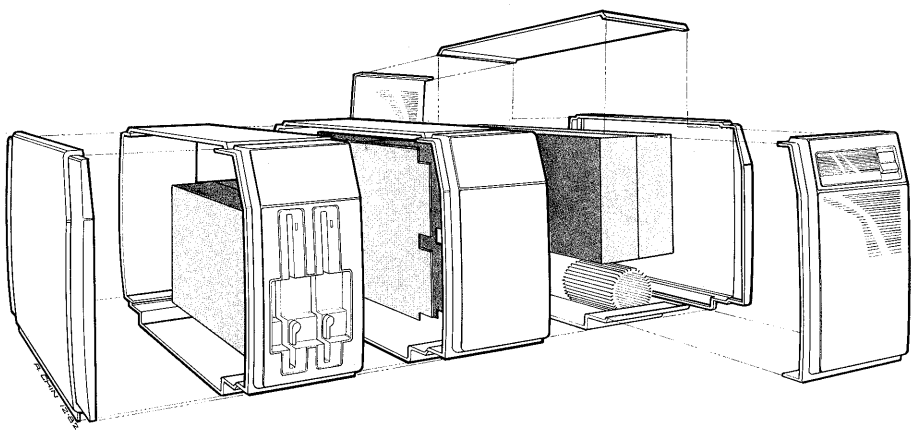
The add-on peripherals or plug-in cards and software available for the Desktop Generation computer systems enable you to

- Expand your on-line storage and system memory;
- Add input/output capabilities including printers, plotter, terminals, and interactive devices;
- Enhance your communications and graphics capabilities;
- Develop your own applications.

System Expansion

A wide range of system options means that you can gear your system to support the applications you want to use. As you decide to add new applications, your system hardware can expand to support them.

Even as you upgrade your hardware, your applications software and data remain unaffected. The same programs that you created and executed on your Model 10 or 10/SP system, running one of the Data General operating systems, also execute on Model 20 and Model 30 systems, regardless of the hardware configuration.



Card Expansion Module

A card expansion module increases the power of the CPU card module by providing slots for five additional I/O cards, such as communications cards.

Mass Storage

Additional mass storage for the Desktop Generation systems consists of on-line, readily-accessible storage and the means for backing up your on-line data. The on-line storage, in addition to the second diskette drive, may be one or two Winchester disk drive modules. The cartridge tape module provides tape backup for your on-line disk storage.

Winchester Disk Drive

An optional Winchester disk drive module is available for Desktop Generation systems. When your application requires extensive on-line data storage or quick access to many large programs, the Winchester disk drive provides 15 Mbytes of fast-access on-line storage. Adding a second Winchester disk drive increases on-line disk storage to 30 Mbytes.

Certain software requires a disk drive to function. Both AOS and CEO require at least one 15-Mbyte disk drive. Once you have transferred these software packages from diskette to disk, you no longer need to access the diskettes for everyday operation unless you want to for dynamic file storage. Many Desktop Generation models include a 15-Mbyte Winchester disk drive. A second disk drive can easily be added to any Desktop Generation configuration.

Drive Type	Formatted Storage Capacity
Winchester disk drive	
1 drive	15.0 Mbytes (maximum)
2 drives	30.0 Mbytes (maximum)
Diskette drive	
1 drive	368.6 Kbytes
2 drives	737.2 Kbytes

Tape Backup

When you have stored a substantial amount of data on fixed-disk devices, you will periodically want to back up your data onto magnetic tape. Regularly backing up your disk(s) onto magnetic tape saves valuable data in the event of a disk failure. For this purpose, Data General provides a 1/4-inch fast cartridge tape module.

The cartridge tape module contains a magnetic tape cartridge drive and a power supply. The magnetic tape cartridges, which you insert into the tape drive slot, offer substantial data capacity — up to 15.4 Mbytes. Since the tape's capacity exceeds the entire contents of a Winchester disk, even large files or programs can be stored, backed up, and transported. For optimal performance, when transferring consecutive records, the magnetic tape cartridge can operate with continuous tape motion in a *streaming mode.*

Add-on Display Terminals

Each Desktop Generation computer system requires a monitor and keyboard to serve as the system console. Each system also supports optional add-on display terminals which may be any combination of Data General's DASHER series terminals — D210, D211, G300, D410, and D460.

The display screen for each terminal measures 12 inches diagonally. Designed with operator comfort in mind, these terminals incorporate the following features.

- Tilt bases to permit you to raise and lower the terminals for optimum viewing;
- No-glare screen to eliminate overhead light reflection;
- Brightness control placed in front to allow easy access;
- High refresh rate to reduce screen flicker;
- Green phospor screen to reduce eyestrain;
- Blink, dim, underscore, and reverse video character attributes for highlighting or designing forms;
- Multilingual display for international and multinational applications;
- Detachable, standard typewriter-style keyboards.

The number of display terminals a Desktop Generation system supports depends on the operating system in use. Both RDOS and AOS support up to four add-on terminals in addition to the system console. Each add-on terminal uses one asynchronous line of a communications card. (See the "Communications" section ahead.)

Conventional Display Terminals

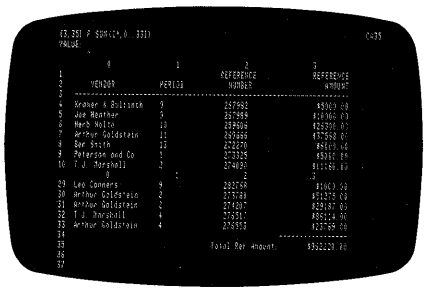
DASHER D210/D211 display terminals are appropriate for text and data entry. Both feature a 96-character set, support international character fonts, and incorporate a number of screen facilities to enhance the manipulation and presentation of visual display information. The control keys move the cursor up, down, forward, and backward. When the cursor moves off-screen, the terminal automatically scrolls the display forward or backward line-by-line to accommodate it. Both terminals contain an integral EIA RS-232-C communications interface. The D211 terminal additionally supports 20mA (current loop) and EIA RS-422 communications interfaces plus a serial printer port for local printing.

Office Automation Plus

The DASHER D410 and D460 display terminals include the major features of the DASHER D210/D211 terminals, plus

- 512-character set;
- Word processing symbols to speed text editing;
- Single- and double-thickness line drawing elements to create graphics for simple business presentations, such as bar charts and diagrams;
- Greek symbols, mathematical notation (integral, differential, summation, and square root), and Arabic numerals to enhance scientific and technical displays;
- Up to 24 user-defined display windows to facilitate applications in order inquiry, transaction processing, and text manipulation and presentation when entries or changes to a standard form are desired;
- Wide document support to enhance a variety of applications including text processing and business graphics;
- Reverse video (dark characters on a light background) to highlight information, display material being edited, show characters being inserted or deleted, or display messages to the operator.

The D460 terminal allows you to create and combine business graphs, diagrams, and other graphics with alphanumeric text. The screen format for the D460 terminal is 24 lines by either 80 columns (standard) or 135 columns (condensed). Its character-mapped commands and display abilities are cost-effective alternatives to more expensive bit-mapped hardware and software and serve a wide range of business, scientific, and industrial applications.



The spreadsheet software package combined with the capabilities of the DASHER D460 terminal allows you to divide your screen into multiple windows for simultaneous viewing of different sections of the worksheet.

	D210/211	D410/460	G300
Character size	7 x 9	7 x 11	5 x 8
Character cell	10 x 12		8 x 10
Screen format (lines x columns)	24 x 80	24 x 80/135	24 x 80
Monitor resolution (horizontal pixels x vertical pixels)	810 x 288		640 x 240
Character position	Character-mapped		Bit-mapped
Line type	RS-232-C RS-422[1] 20mA current loop[1]		

[1]*The D211, D410, and D460 support this line type; the D210 does not.*

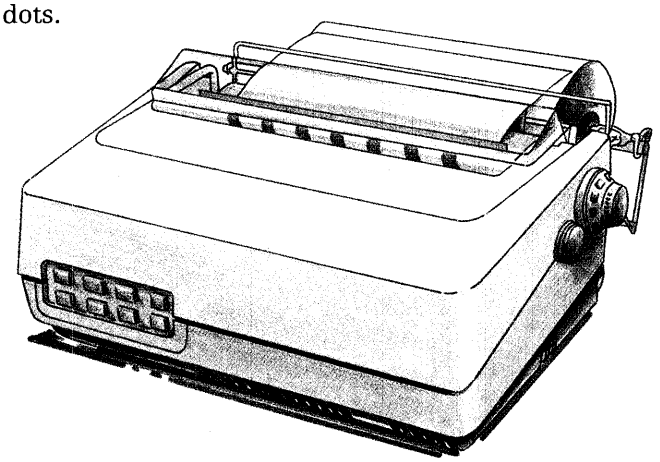
Hardcopy Devices

If your work includes the preparation of reports, mailing labels, and other formatted output, you often need to reproduce electronic text or graphics on paper or film. For this purpose, Desktop Generation computer systems offer a choice of three printers and a color plotter — all table-top units. These options offer a range of printing speeds, quality, and capabilities at various prices.

- The multifunction dot matrix printer is an economical medium-speed printer capable of printing up to 160 characters per second on forms up to 9 inches wide.
- The data processing dot matrix printer is a 15-inch printer with a serial interface. It is capable of printing 150-characters-per-second on 15-inch-wide forms.
- The letter-quality printer offers a selection of type fonts and delivers printed pages that appear to have been typewritten.
- The desktop color plotter transfers high-quality graphics to paper or film at low cost.

Multifunction Dot Matrix Printer

The multifunction dot matrix printer is an economical, compact, high-speed printer featuring bidirectional printing of up to 160 characters per second. The multifunction printer operates in one of three modes: graphics, correspondence, or boldface. In graphics mode, the printer reproduces illustrations, charts, and graphs, using patterns of dots.



In graphics mode, the multifunction dot matrix printer reproduces illustrations, charts, and graphs, using patterns of dots.

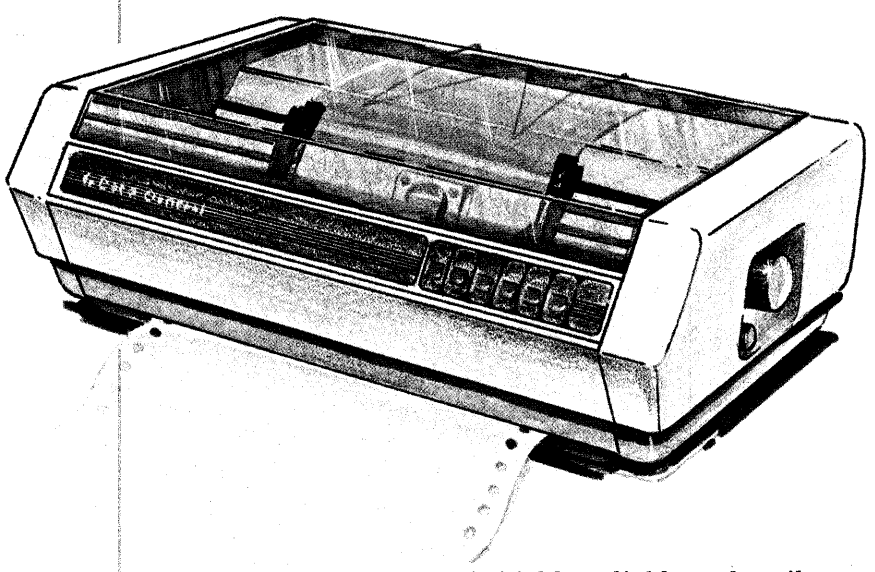
You can select some printing parameters from your system console or by pressing the switch pads on the printer's front control panel. The printer uses your office stationary, continuous roll or fanfold paper, or from one- to four-part forms in widths of four to nine inches. This multifunction printer also offers a convenient, long-lasting, snap-in cartridge for fast, simple, and smudge-free ribbon changing.

Data Processing Dot Matrix Printer

The data processing dot matrix printer is a table-top printer that prints 150 character per second, including uppercase and lowercase characters, symbols, and underscore. Using this flexible printer, you can control your document's format, selecting

- The number of characters and number of lines printed per inch;
- Four print fonts — normal, compressed, elongated, or compressed-elongated;
- Eight language fonts;
- Normal and double-width boldface characters appropriate for headlines.

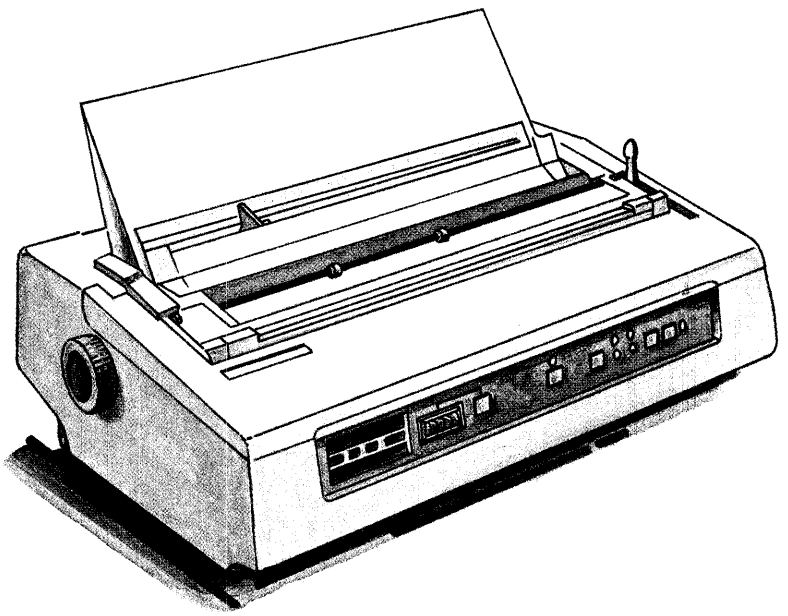
The data processing dot matrix printer accepts continuous roll paper, fanfold paper, or even six-part forms, in widths from 1.5 to 15 inches.



The printer is highly reliable and easily serviced. It has a limited number of mechanical and electrical parts, modular construction, and a self-test function to check most logic and mechanical components. In addition, a cartridge makes ribbon changing a fast, clean, and easy task.

Letter-quality Printer

The letter-quality printer is a table-top unit that delivers high-quality printed pages. A letter-quality printer is an excellent choice for word processing and office automation applications, such as reports to clients or sales letters.

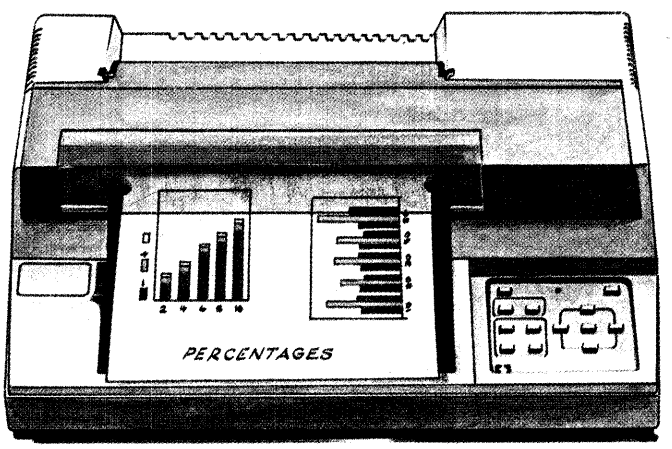


The letter-quality printer: an excellent choice for word processing and office automation applications.

The letter-quality printer offers a choice of printing fonts and the option of a bidirectional forms tractor or a single or dual sheet feeder. The forms tractor feeds continuous fan fold paper. Both sheet feeders store and feed single-cut sheet paper, eliminating the need for fan fold paper or forms and making it possible to print on your own letterhead stationery.

Desktop Color Plotter

If you need to reproduce colored copies of illustrations for reports and presentations, your system should include a plotter—peripheral equipment that uses colored pens to reproduce shapes transmitted from your computer.



The desktop color plotter employs advanced technology to quickly produce vivid designs on paper or transparent film in a spectrum of colors. The plotter holds two pens and moves the paper or film under one pen at a time to complete plots with fine resolution, up to 1000 dots per inch.

The desktop color plotter reproduces graphics in two or more colors on paper or transparent film.

Since the plotter selects the pens and controls their placement on the paper, two-color plotting is a one-step process. By mixing and changing pens, a rainbow of colors is available.

	Data Processing Dot Matrix Printer	**Multifunction Dot Matrix Printer**	**Letter- quality Printer**
Character structure	Dot matrix		Solid character
Performance			
Printing speed (char/second)	150	Data mode 160 Correspondence mode 40 Bold face mode 80	35
Characters per inch	5, 8.5, 10, 17.1	10, 12, 16.7, or 20	10, 12, or 15
Lines per inch (all selectable)	6 or 8		
Print columns	80 - 160	136 - 233	136 - 203
Maximum paper width	15 in.	9 in.	16 in.
International character set	Optional	Program or switch selectable	Optional
Communications			
Baud rates (bits per second)	110 to 19,200 (RS-232-C) 110 to 9600 (20mA loop)	150 to 9600	300 to 1200
Interface	EIA RS-232-C 20mA current loop	Serial	EIA RS-232-C
Parity	Odd, even, mark or none (selectable)		
Dimensions			
Weight	35.0 lbs. (15.9 kg)	17.0 lbs. (7.72 kg)	37.4 lbs (17.0 kg)
Height	7 in. (17.8 cm)	6.2 in. (15.75 cm)	8.2 in. (20.8 cm)
Width	24.0 in. (61 cm)	13.7 in. (34.8 cm)	24.0 in. (61.0 cm
Depth	14.0 in. (35.5 cm)	9.64 in. (24.5 cm)	15.6 in. (39.5 cm)
Accessories			
Paper	Fanfold	Office stationery rollpaper, fanfold	
Paper width			
maximum	15 in.	10 in.	16 in.
minimum	1.5 in.	3 in.	3 in.
Ribbon	Cartridge		

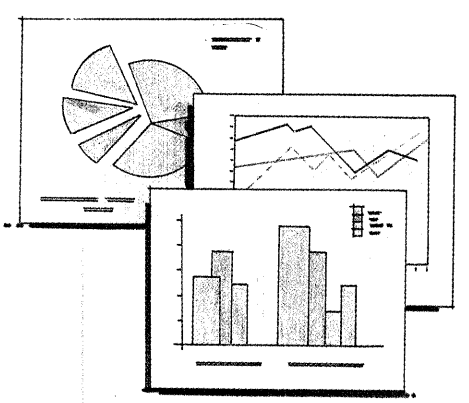
Desktop Color Plotter	
Performance	
Pen velocity, each axis, maximum	15 in./sec. (38.1 cm/sec.)
Communications	
Baud rates (bits per seconds)	9600
Interface	IEEE-488 RS-232-C/CCITT V.24
Parity (selectable)	Odd, even, mark or none
Number of pen stalls	2
Dimensions	
Weight	13.5 lbs. (6.1 kg)
Height	5.0 in. (12.7 cm)
Width	17.0 in. (43.2 cm)
Depth	13.5 in. (34.3 cm)
Accessories	
Paper type	Office stationery or film
Paper width	8.5 in. x 11 in.
Pen type	Fiber tip
Pen tip width	0.3 mm, 0.6 mm, 0.7 mm

Graphics Options

Graphic displays can simplify and enhance the presentation of even the most complex data and increase productivity through better understanding.

Graphics packages benefit both commercial and technical applications by depicting relationships and trends in the massive amounts of data processed and stored in computer systems. Complicated reports full of numeric data can be transformed into readily comprehensible charts and graphs.

In business environments, graphics can increase managers' productivity by formatting the information needed to speed and improve decision-making. Business applications include tracking market share, sales statistics, production quantity and quality, shipping schedules, financial data, and demographic information.



In technical environments, graphs have traditionally been used to represent the results of laboratory tests and the output of computerized models. Charts are indispensible in a wide variety of research, academic, and educational environments including the social sciences, economics, mathematics, and physics.

In computer-aided design (CAD), interactive graphics are used to design the components and systems of mechanical, electrical, electro-mechanical, and electronic devices. Sometimes, the purpose is only to produce precise drawings of components and (sub)assemblies, as in online drafting or architectural rendering. More frequently the purpose is to interact with a computer-based model of the component or system being designed to test, for example, its mechanical, electrical or thermal properties.

Graphics Subsystems

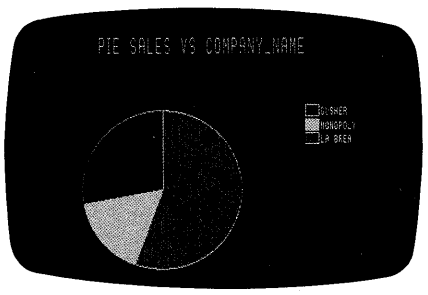
Desktop Generation products offer a range of graphics hardware for generating business or technical graphics.

The Model 10 and 10/SP CPU supports the graphics capabilities of the monochrome monitor. To use the color monitor, you must also use a graphics controller card. To use the DASHER graphics terminals — G300, D410, and D460 — you need one asynchronous line of a universal synchronous/asynchronous multiplexor card.

Graphics that the Model 10 and 10/SP computers provide are interactive: you can control the picture's content, format, size, or color on a display surface using such devices as a keyboard, mouse, or tablet.

The graphic display memory maintains information on the graphic display. In a process called *bit-mapping*, one bit of memory is reserved for each pixel. Model 10 or 10/SP computers with bit-mapped graphic monitors and direct memory access (DMA) provide very fast performance in the CAD environment.

The DASHER D410 and D460 for Model 20 and 30 computers are character-mapped graphic terminals. The smallest addressable unit in character-mapped graphics is a character.



You can generate business and technical graphics with any DASHER graphics terminal.

Graphics Monitors and Terminals

Data General produces graphics monitors and terminals for many purposes. Both the Model 10 and 10/SP monochrome system console and optional color monitor with the graphics interface card enable you to generate medium-resolution graphics. The optional DASHER G300, D410, and D460 terminals enable you to generate business and simple technical graphics.

	Monochrome Monitor	Color Monitor	G300 Terminal	D410/D460 Terminal
Screen size diagonal	12 in. (30.5 cm)	13 in. (33.0 cm)	12 in. (30.5 cm)	
Resolution in pixels (horizontal x vertical)	640 x 240			810 x 288
Screen format (lines x columns)	24 x 80			24 x 80/135
Character size (horizontal x vertical)	5 x 8			7 x 11
Character cell	8 x 10			10 x 12
Character position	Bit-mapped			Character-mapped

Graphics Input Devices

A variety of devices allow the CAD/CAE operator to communicate with the Desktop Generation computer. These devices allow the operator to pick a function from many presented, to enter text and numerical data into the system, to modify the picture shown on the screen, and finally to construct the desired picture.

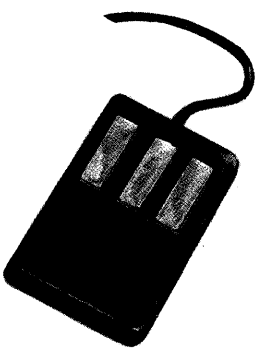
Most CAD/CAE systems have at least one operator input device; many systems have several, each for a different function, depending on the user's needs.

Data Tablet

A 12-inch by 12-inch graphics data tablet *digitizer* can be used to create or locate graphical data on a monitor screen for interactive graphics applications. Overlays, such as menus, charts, and maps, are placed on the surface of the data tablet for digitizing.

An adjustable tilt mechanism on the data tablet provides maximum operator convenience, positioning the tablet either horizontally or vertically. The slim, lightweight tablet provides a maximum of 6096 x 6096 points of resolution. The operator can select resolution quality of up to 500 lines per inch and/or up to 20 lines per millimeter, or the tablet can automatically scale output to match any monitor resolution. The data tablet connects to an RS-232 line interface and is fully supported by the GKS software packages.

Mouse. A three-button mouse is used for digitizing graphic information and allows you to direct the cursor on the screen. A crosshair in its transparent center helps you to easily view your tablet overlay. By pressing one of three buttons, you indicate a particular point — such as the desired starting point of a line — when the cursor appears at that location on the screen.



Graphics Output Devices

Desktop Generation computer systems support a printer and a color plotter that reproduce your electronic graphics. These graphics hardcopy devices include

- Multifunction dot matrix printer. Operating in graphics mode, uses patterns of dots to produce business graphics, simple illustrations, and charts.
- Desktop color plotter. Generates graphic visuals or provides hardcopy output for the CAD environment.

Graphics Software

The operating system and program development languages available with Desktop Generation products give you access to

- Standard MS-DOS and CP/M-86-based business and scientific, color and monochrome, color graphics application packages;
- GKS (graphics kernel software), which executes standard graphics routines under AOS for program development and technical applications, such as writing drivers for the graphic devices.

- CLRE (common language runtime environment), which executes subroutines under RDOS and AOS for the Data General program development languages FORTRAN 5, FORTRAN 77, and DG/L.
- Data General business graphics application software.

Non-Data General Graphics Applications

The two standard microcomputer operating systems supported by the Model 10 or 10/SP computers offer a range of graphics products.

A full complement of third-party graphics packages is available with the industry-standard operating systems, MS-DOS and CP/M-86.

MS-DOS graphics are supported by GW-BASIC, which is particularly suited to business graphics. GW-BASIC provides graphics support for both the monochrome and color Model 10 system consoles. Its drawing capabilities include statements for creating circles and lines, or painting the screen. Standard MS-DOS graphics packages for specialized applications, such as architectural CAD, are also available.

Under CP/M-86, graphics applications are implemented by the GSX-86 package, a standard graphics kernal subsystem extension. This package enables you to generate sophisticated business graphics and medium-resolution technical applications in color and in monochrome. In addition, a number of specialized graphics packages are available with standard third-party CP/M-86 application packages.

Graphics Kernal Software

The GSS-kernal provides a library of graphics subroutines for application programmers using Data General's commercial languages under AOS.

The GSS-KERNEL graphics package is a graphics subroutine library for program development with noninteractive high-level languages. The GSS-KERNEL package is a level 0 adaptation of the Graphics Kernel System (GKS) standard for two-dimensional graphics.

GSS-KERNEL is both host- and device-independent, providing maximum software portability between interactive devices. It accomplishes this by following GKS device-independent protocols.

GSS-KERNEL allows you to

- Program in program development languages, providing the basic graphics capabilities to incorporate graphics into existing applications without major software conversion;
- Customize a graphics application to your specific hardware requirements.

Language Runtime Support

CLRE graphics subroutines assist the application programmer using Data General's commercial languages under RDOS or AOS.

Data General's common language runtime environment (CLRE) graphics subroutines are available under both RDOS and AOS for FORTRAN 5 and DG/L, and under AOS for FORTRAN 77, PL/I, and COBOL.

Data General Business Graphics Software

Three Data General packages are available for business graphics: TRENDVIEW, PRESENT, and BusiPEN.

TRENDVIEW executes under AOS and allows you to easily create pie, bar, line, or more complex graphs. It permits automatic smooth curve fitting and linear-regression trend line plotting.

With the TRENDVIEW graphics package it's easy to create pie, bar, line, and more complex graphs.

You work interactively with TRENDVIEW, entering data at the keyboard with simple commands. An on-line help facility explains all the available commands. You can also use application programs, written in most languages to direct TRENDVIEW's activities.

TRENDVIEW's features include

- accepting data from stored files,
- computing all increments of coordinates automatically,
- displaying multiple charts simultaneously,
- storing charts for future reference.

PRESENT is closely associated with TRENDVIEW graphics displays. Its information presentation facility integrates an intelligent data selection capability with powerful data manipulation and output information formatting. PRESENT helps you to build reports by collecting and manipulating raw data into concise information.

Working in conjunction with TRENDVIEW, PRESENT also includes graphic displays (pie charts, bar graphs, and line plots). PRESENT runs as a stand-alone process or as an integrated element of Data General's Comprehensive Electronic Office (CEO) systems.

BusiPEN is Data General's graphics package for both AOS and RDOS Business BASIC. Existing Business BASIC programs can call BusiPEN as a subroutine. BusiPEN helps you to create pie, line, or bar charts; outputs to a file, a printer, or a DASHER G300 graphics display terminal; and also implements an on-line help facility.

Communications

Unless you plan to use your Desktop Generation computer as a stand-alone computing system, you need some form of communications interface to

Interconnectability: A Desktop Generation computer connects with a Data General host, with a Data General host through another Desktop Generation computer, with an IBM host or IBM-compatible host, and with public information data bases.

- Talk to other devices, such as printers, plotters, terminals, and scientific instrumentation,
- Receive information from outside your office or plant,
- Forward the results of your work elsewhere.

Equipped with the necessary hardware and software, your Desktop Generation computer can transmit information to and receive it from another Data General computer, another manufacturers' computers, and scientific instrumentation. As the first step in this process, communications cards establish the necessary physical interface between your Desktop Generation computer and synchronous or asynchronous communications lines.

Software is also available for gaining access to public information data bases. In addition, communications software enables Desktop Generation systems to emulate terminals for connection in the context of Data General's 32-bit system (running CEO office automation software, for example).

Communications Subsystems

Communications are supported by standard line interfaces and communications multiplexors.

Line Interfaces

The following industry-standard line interfaces are supported for communication lines to and from Desktop Generation systems.

- EIA RS-232-C for modem connections up to 50 feet.
- 20ma current loop for distances up to 300 feet.
- EIA RS-422 for distances up to 4900 feet.

Communications Multiplexor

Your choice of communications multiplexor depends on your applications. To attach most devices to your Desktop Generation system — for instance, an add-on terminal, a printer, or a modem — you need one line of a communications multiplexor. For every software communications package, such as XAP or DG/GATE, you also need one line of the card. If you have three add-on terminals, for example, along with the DG/GATE software package, you need every line of the four-line synchronous/asynchronous card.

The communications multiplexors available for Desktop Generation systems occupy any available slot in the CPU card module or the optional logic expansion module. The available options are

- One-line universal synchronous/asychronous multiplexor card (USAM-1)
- Four-line universal synchronous/asynchronous multiplexor card (USAM-4)

Line interfaces for the universal synchronous/asynchronous multiplexor cards are switch selectable. Depending on your line interface and the distance your communications must travel, you may need to use a *modem* — a peripheral that enables a computer to send signals over telephone lines. A modem cable is available with Desktop Generation computers.

IEEE-488 Bus Interface

The IEEE-488 digital instrument interface card is an easy-to-use hardware and software interface system that permits bidirectional, asynchronous communications among a wide variety of instruments and peripherals.

An IEEE-488 bus interface facilitates two-way asynchronous communications between digital instruments and peripherals.

The IEEE-488 bus interface provides an interface between the microI/O bus and the general-purpose interface bus (GPIB) as defined by the 1978 IEEE 488 standard, *Digital Interface for Programmable Instrumentation.* The IEEE-488 bus has many applications in testing and control, primarily in automatic test equipment, laboratory equipment, process control, and local communications.

Installing the IEEE-488 bus interface in multiple Desktop Generation computers provides a low-cost local area network (LAN) for computer-to-computer communications.

Communications Software

Desktop Generation communications hardware is supported by communications software packages. Compatible with a number of industry-standard networking and communications protocols, these packages control communications between your Desktop Generation computer and other computers and monitors. As the next table shows, the communications packages you choose depend on your operating system.

Communications Software	Operating System	Models 10	10/SP	20	30	Purpose
GPIB	RDOS,	X	X	X	X	Controls the IEEE-488 bus interface
	MP/AOS-SU		X	X	X	using a library of subroutines
XAP	RDOS,	X	X	X	X	Transfers files between Desktop
	AOS		X	X	X	Generation systems and/or Data General host minicomputers
DG/GATE	RDOS,	X	X	X	X	Accesses public data networks by
	AOS		X	X	X	emulating an IBM terminal
Terminal	RDOS,	X	X	X	X	Emulates D210/D211 or D410/D460
Emulation	AOS		X	X	X	terminals
RJE80	RDOS,	X	X	X	X	Transfers batch jobs to Data General
	AOS		X	X	X	or IBM 360/370-compatible host
MP/RJE80	MP/AOS-SU		X	X	X	computer system
X.25	AOS		X	X	X	Provides network protocols
Asynchronous XODIAC	AOS		X	X	X	Provides network management software

Office Automation (CEO) Networking

CEO office automation networking permits users on a Desktop Generation system to implement certain CEO features, for instance, electronic mail or calendars, running on a Data General 32-bit host system. The basis for this networking is communications using XODIAC network management software, developed according to CCITT-recommended, packet-switching protocol (X.25). The X.25 protocol allows 16-bit and 32-bit ECLIPSE computers to communicate with other ECLIPSE computers on public data networks.

Asynchronous XODIAC

Asynchronous XODIAC links your Desktop Generation system to any Data General MV/computer system without special hardware. This capability gives your Desktop Generation system access to the many resources available on the remote host, such as archiving the contents of your diskettes or disks to a magnetic tape on the host system. Asynchronous XODIAC also allows you to run the CEO control program for sending and receiving electronic mail to in-boxes located on the host. Asynchronous XODIAC executes under AOS and uses one asynchronous line of any communications card.

Transferring Files to a Data General Host

The XAP software package lets you transfer files between one Desktop Generation computer and another, between your Desktop Generation and any Data General host computer — including a 32-bit system.

The XAP file transfer program is a software package that transfers files between the Desktop Generation computer and either a Data General host minicomputer or another Desktop Generation computer. It creates a distributed data processing environment for transfering files to and from our 32-bit MV/family of computers. XAP supports the communications multiplexors, executing on the minimum configuration for the RDOS or AOS operating system. XAP provides the most inexpensive method of transferring files along an asynchronous line.

Transferring Files to a Non-Data General Host

The RJE80 software package sends batch jobs from your Desktop Generation computer to remote locations, where they are processed by a larger Data General computer or an IBM 360/370-compatible system.

The Remote Job Entry Control Program (RJE80) is a software package that sends entire files from a Desktop Generation computer to remote systems for storage or processing. The remote systems, also running RJE80 programs, may be another Desktop Generation computer, a Data General minicomputer, or an IBM 360/370-compatible computer system. This program uses synchronous lines only, and is highly reliable.

With RJE80, you can also receive files from a host and store or print them at your site. The RJE80 software executes under either RDOS, AOS, or MP/AOS-SU (using MP/RJE80).

Access to Public Information Databases

The DG/GATE software package lets you access Dow Jones reports, Dun & Bradstreet listings, and many other public databases.

The General Asynchronous Terminal Emulator (DG/GATE) is a software package for accessing public information networks such as Dow Jones reports, Dun & Bradstreet listings, and the Source™ for travel information, reservations, and business information programs. These public data bases allow you to scan the *New York Times* or access encyclopedias for information. You can even use your Desktop Generation computer to do your shopping or banking. Access to public databases is possible because with DG/GATE your Desktop Generation system appears to be an IBM terminal.

Emulation of Data General Terminals

The terminal emulation communications software also allows a Desktop Generation computer connected to a communications line to appear as a Data General terminal on the network. You can log onto a Data General host computer and perform data processing tasks just as you would with a standard terminal.

General-Purpose Interface Bus Software Package

The General-Purpose Interface Bus (GPIB) software package is a comprehensive library of subroutines for controlling the IEEE-488 bus interface. This product contains the subroutine libraries and a General-Purpose Interface Bus configuration utility program for adding the interfaces to the operating system.

GPIB software package: a library of subroutines that help you program the IEEE-488 bus interface.

The languages supported by the subroutines under each operating system are listed in the next table.

Programming Language	MP/AOS-SU	RDOS	AOS
Assembly	X	X	X
MP/BASIC	X		X
MP/Pascal	X		
SP/Pascal	X		X
MP/FORTRAN IV	X		
FORTRAN 5		X	X
DG/L		X	X

Sensor Input/Output

Sensor input/output (I/O) cards allow your Desktop Generation computer to interface directly with a wide range of data acquisition and control equipment. Using either a single interface or a combination of interfaces, a system can be tailored to any particular application. Since a Desktop Generation computer can contain single or multiple I/O interfaces, it is cost-effective for small jobs while offering extensive expansion capabilitites. Each card may occupy any slot in the CPU card module or optional logic expansion module.

Sensor I/O cards are available for:

- Interfacing directly with data acquisition and control instruments. The digital I/O card allows the computer to interface directly data acquisition and control instruments.
- Converting analog input signals to digital signals. The analog-to-digital card is a versatile real-time interface that allows you to connect analog input signals to systems in applications such as process control, laboratory experimentation, medical instrumentation, test equipment, and machine control.
- Converting digital signals to analog signals. The digital-to-analog card allows the computer to control external analog devices using two analog output channels in applications such as process control, laboratory experimentation, test equipment, and machine control. Scope control is standard on the digital to analog interface card.

Data General offers the Sensor Access Manager — a sensor I/O software package — to help you build and run process I/O programs for laboratory and industrial applications.

Sensor Access Manager

Data General's sensor access manager (SAM) software package helps you gather data from, and distribute it to, process I/O equipment in industrial and laboratory applications. The process I/O equipment can include measuring instruments and sensors, actuators, switches, electrical circuits and motors, guages, transistors — any equipment that generates or accepts an appropriate analog or digital signal.

The SAM package is a library of device handlers and subroutines that manage process I/O. SAM is a very generalized sensor I/O software system handling a wide range of requirements. SAM is modular — only those routines required to support a specific hardware requirement will be loaded into memory. For example, if you use only the analog I/O modules, only the routines pertaining to this module are loaded into memory. SAM runs under RDOS and AOS and allows application programs written in a combination of assembly language and a program development language to operate in the same environment.

Electronic Office

Data General's Comprehensive Electronic Office software is analogous with the traditional office environment. The integrated CEO system, which runs on AOS-based Desktop Generation systems, may contain

Based on a careful study of methods and needs in the office environment, Data General's Comprehensive Electronic Office System makes your transition to an automated office smooth and productive.

- CEO Word Processing,
- CEO Spelling,
- CEO Electronic Mail,
- CEO Administrative Support,
- CEO Decision Support.

CEO standalone software allows each workstation to execute different applications yet remain integrated with the total electronic office.

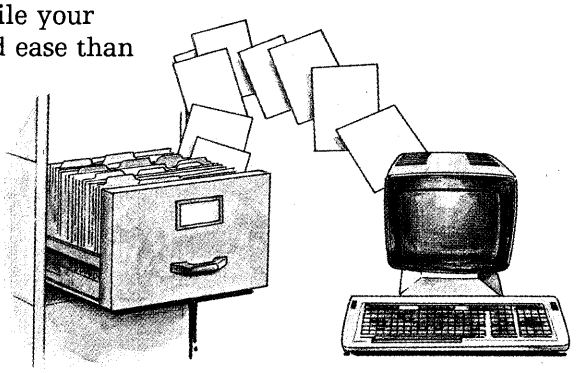
A CEO system allows your office to economize on paperwork, reduce paper storage space, and speed the exchange of information.

CEO stand-alone software can run on a single-station Desktop Generation system, a Desktop Generation workstation cluster, or an MV computer host with connecting Desktop Generation systems. Each work station may execute either the same or different applications. Thus, each technical or business workstation has independent capabilities but remains an integral part of the electronic office.

CEO Word Processing

CEO Word Processing makes all forms of written communication easier and is simple to learn and use. You use CEO Word Processing to create and edit documents, which you can then file in the CEO Word Processing electronic filing system. With CEO Word Processing, you can type documents and print any number of copies,

revise and combine several documents into one, and file your documents for future use — all with greater speed and ease than conventional methods allow.



CEO Word Processing lets you

- Move words, sentences, or paragraphs without retyping a single letter. Make corrections, updates, and extensive changes.
- Change margins and tab stops.
- Center, indent, or underline text, or print it in boldface letters.
- Save frequently needed information and reformat it as appropriate, without retyping.
- Do everything as you would on a typewriter, and much more, with such features as automatic carriage return, word wrapping, and decimal tabulation, form letters, and indexing capabilities.
- Enter additional printing instructions — a running head or foot on all or certain pages, or justified right margins and page numbering, to name a few.
- Get on-line help if you need information about any aspect of the word processor, by pressing the help function key.

CEO processes lists in conjunction with its word processing. When you have created a document you wish to personalize for a number of people, you may merge this document with a *list file* containing the unique information for each individual to receive the document. You create both the list file and the original document; CEO merges these elements and outputs customized documents.

CEO Spelling

CEO Spelling checks the spelling of a single word, a screenfull of words, or every word. It also allows you to look up the spelling of a word. CEO Spelling checks against two dictionaries: a standard on-line dictionary, plus an in-house dictionary that you can fill with entries such as proper names, jargon, and acronyms that you commonly use.

CEO Electronic Mail

CEO Electronic Mail lets you create, send, and receive electronic mail. It distributes electronic mail according to mailing lists which support both local and global mail networks. CEO Electronic Mail provides security, displays customized messages, and classifies mail as certified, confidential, and urgent. It also features blind carbon-copy capabilities and offers an electronic directory of users.

CEO Administrative Support

CEO Administrative Support helps you create a private electronic calendar that supports, for instance, resource scheduling, room and equipment reservation, and telephone message logging. You may allow others limited read or update access.

CEO Decision Support

CEO Decision Support uses the PRESENT information facility to assist you in sorting, computing, and listing data according to your specifications — without you writing a program. Using the interface between the TRENDVIEW graphics package and PRESENT, you can create graphic displays of your data.

Another decision-making tool is CEO's spreadsheet program accessible either from within CEO Word Processing or independently.

Information Management

A major function of computer systems is managing information through data entry, retrieval, and manipulation. The Desktop Generation systems support several software packages that assist you in

- Manipulating (sorting and/or merging) files and the records they contain,
- Generating reports interactively, or from a database,
- Organizing and managing files,
- Presenting information,
- Entering and retrieving data,
- Processing transactions.

Data General supports many software utilities that perform information management and decision support functions, among them, Sort/Merge, INFOS II, and PRESENT. The most significant use of these utilities, however, is that they form the basis of Data General's Comprehensive Electronic Office (CEO) software, which executes on AOS (and AOS/VS) systems.

Also available are DATAPREP and TPMS, tools for data entry and retrieval, and transaction processing, respectively.

Software Package	Operating System	Models				Purpose
		10	10/SP	20	30	
Sort/Merge	AOS		X	X	X	General-purpose utility
Sort/Merge with report writer	AOS				X	General-purpose utility with report generation capabilities
CSSORT	RDOS	X	X	X	X	General-purpose sort/merge utility
INFOS II	AOS		X	X	X	File management
PRESENT	AOS		X	X	X	Information presentation (graphics with TRENDVIEW)
DATAPREP	AOS				X	Data entry and retrieval
TPMS	AOS				X	Transaction processing

Sorting and Merging Files

Data General's Sort/Merge and CSSORT are general-purpose utilities that manipulate the order and content of records.

Sort/Merge executes on any AOS-based Desktop Generation system. CSSORT executes under RDOS on any Desktop Generation Model. Both Sort/Merge and CSSORT enable you to

- sort and copy records,
- merge multiple files into one file,
- edit record fields,
- delete duplicate output records from a sort or merge operation, according to conditions that you specify (or write these records to other files).

Using the optional report writing utility of Sort/Merge and interfacing with COBOL and INFOS II, you can neatly format output records into reports. Sort/Merge with the report writer executes on the Model 30 computer under AOS.

File Management

Data General's INFOS II is a powerful general-purpose software package for file organization and management.

INFOS II – a powerful file manager capable of organizing complex data and retrieving it in limitless combinations.

INFOS II, running under AOS, is both flexible and intricate. It can organize very complex data structures and retrieve limitless patterns of this data from its working files. In addition to conventional sequential and random access methods, INFOS II systems support indexed sequential access.

Information Presentation

Data General's PRESENT has several capabilities:

- displaying graphics — pie charts, bar graphs, and line plots — with the TRENDVIEW graphics package;
- querying on-line;
- extracting data from INFOS II and AOS files.

PRESENT uses two general-purpose data manipulation methods: arithmetic computation and special display formatting (using COBOL-like picture clauses).

Data Entry and Retrieval

Data General's DATAPREP software provides high-volume key-to-disk data entry under AOS on Model 30. This user-friendly, function-key-oriented software supports all standard data-entry functions — record entry, verification, deletion, and movement.

DATAPREP — friendly, function-key-oriented software for entering, verifying, deleting, and moving records.

DATAPREP features advanced automatic restart and recovery capabilities; these ensure absolutely minimum data loss in the event of system failure. Data-entry screen formats can be defined and modified quickly and easily online.

Transaction Processing

The Transaction Processing Management System (TPMS) is a sophisticated software system that gives your AOS-based Model 30 computer extensive transaction-oriented capabilities. TPMS provides automatic backup and recovery facilities in combination with INFOS II software. The system automatically validates data entry and has a restart and recovery capability.

TPMS allows concurrent transaction processing and program development, supporting AOS COBOL and PL/I with interactive screen-oriented extensions.

Program Development Options

Although Desktop Generation computers support an extremely wide selection of both Data General and non-Data General application software, you may want to develop your own software. This undertaking might involve creating special-purpose problem-solving tools that could, for example, simplify often-used operator commands by placing them in a single *macro* or command file, or personalizing your purchased software by creating a special program.

The operating systems for Desktop Generation computers support several of the most widely-used program development languages. Even without previous knowledge of programming languages, you can develop software with Data General's programming utilities.

Each operating system provides standard utilities for program development, such as debuggers, linkers, and library file editors. Data General supplies other aids to help you produce executable software quickly and easily:

program generators for various languages,

file tracking system,

interactive debugger,

macroassembler,

cross-development capabilities,

programming interfaces.

Program Development Utility	Operating System	Models 10	10/SP	20	30	Purpose
BusiGEN	AOS,		X	X	X	Business BASIC program
	RDOS	X	X	X	X	generator
PROXI	AOS				X	COBOL program generator
RPG II	AOS				X	Report generator
TCS	AOS,		X	X	X	File tracking system
	MP/AOS-SU		X	X	X	
SWAT	AOS		X	X	X	Interactive debugger (works with FORTRAN 77, PL/I, COBOL)
MASM	AOS		X	X	X	Macroassembler
MAC	RDOS	X	X	X	X	Macroassembler
Cross-development utilities	AOS,		X	X	X	Develop applications on one
	MP/AOS-SU		X	X	X	system for execution on another

Program Generators

The program generator BusiGEN is an interactive tool that creates programs in Business BASIC. Using BusiGEN, you can design, code, and document interactive Business BASIC programs for data entry, file maintenance, data inquiry, and report writing. Knowledge of Business BASIC is not needed to use the program generator, since all BusiGEN programs are based on your responses to a series of screen menu selections.

The PROXI program generator automatically creates code for complete, consistent COBOL application programs. These include code for file manipulation, inquiry handling, transaction entry, screen handling, and report generation. The PROXI generator creates standard COBOL program segments, stores them in a library, and combines them into complete source code programs. The library can be used to build additional programs, substantially increasing your daily output. The PROXI program generator executes on the Model 30 system.

Data General's AOS RPG II is an easy-to-use, program development language for report generation, file maintenance, and data preparation in data processing applications. RPG II includes an interactive editor and debugger, as well as a program analyzer to make program development and maintenance more productive. This language includes an interface to Data General's file management software, which supports a variety of data system applications. Designed with simplicity in mind, RPG II is an ideal programming tool for anyone unfamiliar with computers, operating systems, or compilers. RPG II executes on a Model 30 system.

File Tracking System

The Text Control System (TCS) tracks changes made to text files at various stages of development. TCS can recreate any previous revision from a single source and generate a final, executable program file for any revision. TCS executes under either AOS or MP/AOS-SU.

Program Debugging

An interactive, source-code-level debugger, SWAT works with AOS languages — FORTRAN 77, PL/I, and COBOL. In addition to standard debugging facilities, SWAT features conditional breakpoints referring to separately compiled source code and on-line help messages.

Macroassembler

Data General's macroassemblers, MASM (AOS) and MAC (RDOS), let you write assembly language routines once and reference them later with a single statement. These macroassemblers support macro nesting and locally defined symbols.

Cross-development Utilities

These utilities enable you to transport applications developed in a particular language from one operating system to another. With the AOS/VS-to-AOS Cross-Development utility, for example, you can execute applications developed on a Data General 32-bit system, such as the ECLIPSE MV/10000 computer, on a Desktop Generation system. Utilities are also available for cross-development from MP/AOS-SU to AOS.

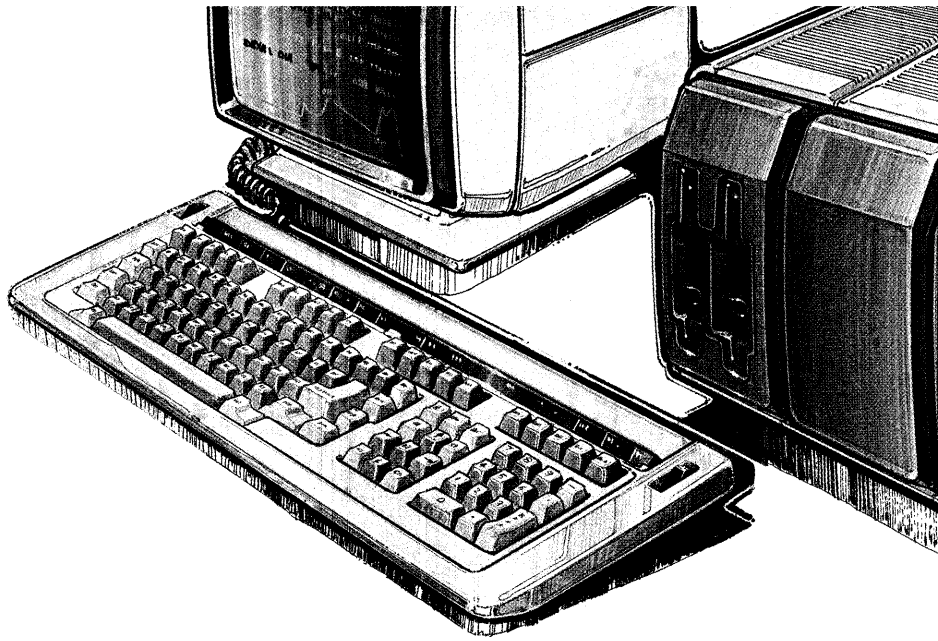
Application Packages

The Desktop Generation computer systems execute thousands of application packages developed for 16-bit ECLIPSE computers. These packages may be Data General proprietary applications, software developed by third parties for Data General 16-bit machines, or applications developed for MS-DOS or CP/M-86.

Data General proprietary software is both written and maintained by Data General Corporation. The wide range of applications includes the areas of program development, information management, office automation, and communications, among others — for all Desktop Generation operating systems, RDOS, AOS, and MP/AOS-SU.

Because of the number of 16-bit ECLIPSE computers running either RDOS or AOS, many thousands of highly-specialized applications have been developed by other companies for these systems. These companies, such as original equipment manufacturers (OEMs), software distributors, and independent software vendors (ISVs), create and maintain software covering many areas. Several ISV catalogs listing these software packages and their sources are available from your Data General sales representative or dealer.

A vast number of applications have been written for software supported by the Intel 8086 chip, and specifically for the MS-DOS and CP/M-86 operating systems. These packages provide a wide range of specialized software for many different applications. Please see the applications catalogs for more information.



5 Desktop Generation Model 10 Systems

Model 10 and Model 10/SP computer systems are equally at home as personal computers on your desk or as intelligent work stations connected to a larger Data General system. A Model 10 or 10/SP computer offers graphics capabilities and runs a selection of operating systems, including both Data General and the most popular non-Data General microcomputer operating systems, MS-DOS and CP/M-86.

For total solutions: Model 10 or 10/SP, a bridge between microcomputers and minicomputers

The minimum Model 10 or 10/SP system configuration is a complete package — a low-priced, entry-level system. This basic system is fully expandable through the addition of plug-in Desktop Generation modules, cards, and optional peripherals.

Adding software and hardware takes you from a desktop computer system, for personal and educational use, to a range of small business applications, to office automation and distributed data processing, to computer-aided design, engineering, and manufacturing.

Model 10 and 10/SP Packaged Systems

The Desktop Generation Model 10 and 10/SP computer systems are available in five packaged systems — three Model 10 systems and two model 10/SP systems. All systems operate under RDOS; Model 10/SP systems also run under AOS and MP/AOS-SU. Model 10 systems with 256 Kbytes of memory and all Model 10/SP systems support MS-DOS or CP/M-86 operating systems running concurrently with either RDOS or AOS.

The memory for each system ranges from 128 Kbytes to 768 Kbytes. Each system includes a monochrome monitor and keyboard as a system console, and at least one 368.6 Kbyte diskette drive. The Model 10/SP systems support the floating-point instruction set.

The next table summarizes the five systems.

Features	Model 10	10	10	10/SP	10/SP
CPU	micro ECLIPSE 8086				
Floating-point instruction set				Firmware	
Memory					
minimum (Kbytes)	128	256			
maximum (Kbytes)	768 Kbytes				
System console	Monochrome (or optional color) graphics monitor & keyboard				
Number of					
Diskettes (368.6 Kbytes)	1	2	1	2	1
15 Mbyte disks			1		1
power supplies	1		2	1	2
Operating system	RDOS			AOS[1] MP/AOS-SU	
	MS-DOS CP/M-86				

[1]*Requires 512 Kbytes of memory.*

Single-user Model 10 or Model 10/SP systems may be personal systems or workstations. Multiuser Model 10 and 10/SP systems support up to four additional terminals with either of the non-Data General microcomputer operating systems running concurrently on the system console.

A wide range of options for Model 10 and Model 10/SP computers means that you can gear your system to support the applications you want to use. As you decide to add new applications, your system hardware can expand to support them. Even as you upgrade your hardware, your applications software and data remain unaffected.

Basic Computer Unit

The basic Desktop Generation computer unit serves as the foundation for the Model 10 and Model 10/SP systems. In addition to the CPU card module, power supply module, and diskette module, each model has a standard system console.

CPU Card Module

The CPU card module contains five slots, two are reserved for central processor cards. The remaining three slots are available for additional memory cards or for optional memory expansion and I/O controller cards.

Central Processing Unit

The central processor is a two-card CPU, which contains dual 16-bit processors — a microECLIPSE chip, which implements the microECLIPSE processor; and an 8086 processor. This leaves three open slots within the CPU card module for either additional memory cards or I/O cards.

The microECLIPSE processor implements the 16-bit ECLIPSE character instruction set and supports Data General's RDOS, AOS, and MP/AOS-SU operating systems. The 8086 processor implements the standard 8086 microprocessor instruction set, which supports the standard 8086 microprocessor operating systems, MS-DOS and CP/M-86.

A diskette controller located on the CPU card manages the diskette drives. The CPU supports bit-mapped graphics for the Model 10 and 10/SP monochrome monitors and gives direct memory access (DMA) to graphics applications for rapid screen response.

A serial printer port connects a Model 10 or 10/SP computer to its optional printer or color plotter. The firmware floating-point instruction set (standard on the Model 10/SP and optional for Model 10 computers) supports the operating systems and programming languages which require this feature — AOS, MP/AOS-SU, FORTRAN 5, FORTRAN 77, DG/L, SP/Pascal, and MP/Pascal.

Memory

The CPU card contains the minimum memory for each computer. Minimum memory ranges from 128 or 256 Kbytes for Model 10 computers to 256 Kbytes for the Model 10/SP. Using the optional plug-in memory cards of 256 Kbytes or 512 Kbytes, any system's memory expands to a maximum of 768 Kbytes. All memory for the Model 10 and 10/SP computers (either on-card or add-on cards) have parity checking.

System Console

The standard display console for Model 10 and 10/SP systems is a 12-inch monochrome graphics monitor with keyboard. The monochrome monitor displays green characters on a dark background to reduce eyestrain. The system console controllers are located on the CPU card.

An optional 13-inch color monitor with keyboard produces 16 colors simultaneously from a palette of 4096. A graphics controller card is required with this option.

Basic System	Model 10	Model 10	Model 10	Model 10/SP	Model 10/SP
Computer unit					
CPU card module					
CPU	Dual 16-bit processors: micro ECLIPSE, 8086				
ECLIPSE instruction sets					
Character	Standard				
Firmware floating-point				Standard	
8086 instruction set	Standard				
Memory					
Minimum	128 Kbytes	256 Kbytes			
Maximum	768 Kybtes				
Expansion slots for user-installable option cards	3	3	3	3	3
Printer port	Serial, RS232				
Diskette module					
Diskette drives	1	2	1	2	1
Formatted removable storage (Data General format)	368.6 Kbytes	737.2 Kbytes	368.6 Kbytes	737.2 Kbytes	368.6 Kbytes
Winchester disk drives			1		1
On-line storage formatted			15 Mbytes		15 Mbytes
Power supply module					
Power supplies	1		2	1	2
a.c. power per supply	120V, 100V, or 220-240V at 50 and 60 Hz				
System console	Monochrome monitor and keyboard				
Diagnostics	Automatic power-up test				
	Diskette-resident test programs				
Operating systems					
	RDOS				
					AOS[1] MP/AOS-SU
	MS-DOS				
	CP/M-86				

[1]*Requires 512 Kbytes of memory.*

System Option	Model 10	Model 10	Model 10	Model 10/SP	Model 10/SP
Memory expansion	256 Kbyte or 512 Kbyte cards with parity to a maximum of 768 Kbytes				
Additional on-line storage					
Winchester disk drives	+2	+2	+1	+2	+1
Maximum on-line storage	30 Mbytes (formatted)				
Second diskette drive	+1		+1		+1
Maximum on-line storage	737.2 Kbytes (formatted)				
Magnetic tape module	15.4 Mbytes/cartridge				
System console	13 inch color monitor and keyboard[1]				
Terminals	DASHER D210				
	DASHER D211				
	DASHER G300				
	DASHER D410				
	DASHER D460				
Graphics enhancement	Graphics controller card with optional 13-inch color monitor.				
	Graphics tablet and mouse				
	DASHER G300 graphics terminal with optional printer and/or light pen				
Communications	4-line (USAM-4) or 1-line (USAM-1) universal synchronous/asynchronous multiplexor card with selectable RS-232, RS-422, and 20mA current loop line interfaces				
	IEEE-488 interface				
Sensor I/O	Digital I/O card				
	Analog to digital card				
	Digital to analog card				
Card expansion module					
Additional slots	5, for I/O option cards				
Printers	Letter quality				
	Multifunction dot matrix				
	Data processing dot matrix				
Plotter	Desktop color plotter				

[1]*Requires graphics controller card*

Operating Systems

The Model 10 and Model 10/SP microECLIPSE processor supports Data General's RDOS, AOS, and MP/AOS-SU operating systems. Its 8086 processor supports the standard microprocessor operating systems MS-DOS and CP/M-86. RDOS runs on any Model 10 or Model 10/SP computer system. AOS minimally requires a single-diskette system with 512 Kbytes of memory, the firmware floating-point instruction set, and the 15-Mbyte Winchester disk option. MP/AOS-SU runs on any Model 10 or Model 10/SP system equipped with firmware floating-point and a 15-Mbyte Winchester disk. You can run MS-DOS or CP/M-86 concurrently with RDOS or AOS on any Model 10/SP or Model 10 system with a minimum memory configuration of 256 Kbytes.

Program Development Languages

The next table indicates which Data General program development languages are supported on Model 10 and Model 10/SP systems by AOS, RDOS, and MP/AOS-SU. The table notes those RDOS languages that require the firmware floating-point instruction set. (AOS and MP/AOS-SU languages requiring floating-point are supported, since the operating systems themselves require the floating-point instruction set.)

Programming Language	Operating System					Model	
	AOS	RDOS	MP/AOS-SU	MS-DOS	CP/M-86	10	10/SP
General-Purpose							
Business BASIC	X	X				X	X
CBASIC					X		X
Extended BASIC	X	X					X
GW-BASIC				X			X
MP/BASIC	X		X				X
Commercial							
Interactive COBOL	X	X				X	X
Scientific							
DG/L	X	X[1]				X	X
FORTRAN IV	X	X				X	X
FORTRAN 5	X	X[1]				X	X
FORTRAN 77	X						X
MP/FORTRAN IV			X			X	X
MP/Pascal			X				X
SP/Pascal	X		X			X	X
PL/1	X						X

[1]*Requires firmware floating-point instruction set.*

Program Development Utilities

In addition to the programming languages, Data General supplies program development aids for generating and processing programs. These aids include

interactive Business BASIC program generator,
file-change tracking system,
macroassemblers,

text editors,

a general-purpose utility for manipulating record order and content,

cross-development packages enabling you to develop software applications on the Desktop Generation computers for use on Data General's entire range of computers.

Program Development Utility	Operating System	Model 10	Model 10/SP	Purpose
BusiGEN	AOS		X	Business BASIC program generator
	RDOS	X	X	
Cross-development utilities	AOS		X	Develop applications on one system for execution on another
	MP/AOS-SU		X	
CSSORT	RDOS	X	X	General-purpose sort/merge utility
MAC	RDOS	X	X	Macroassembler
MASM	AOS		X	Macroassembler
SED	AOS		X	Screen-oriented text editor
Sort/Merge	AOS		X	General-purpose utility
	MP/AOS-SU		X	
SPEED	RDOS	X	X	Line-oriented text editor
TCS	AOS		X	File tracking system
	MP/AOS-SU		X	

Multiuser Systems

A Model 10 or Model 10/SP system in a multiuser context supports up to four terminals in addition to the system console. Any combination of Data General DASHER series display terminals may be used — D210, D211, G300, D410, and D460. Each terminal uses one asynchronous line of a communications multiplexor.

	D210/211	D410/460	G300
Character size	7 x 9	7 x 11	5 x 8
Character cell	10 x 12		8 x 10
Screen format (lines x columns)	24 x 80	24 x 80/135	24 x 80
Monitor resolution (horizontal pixels x vertical)	810 x 288	810 x 288	640 x 220
Character position	Character-mapped		Bit-mapped
Line type	RS-232-C		
	RS-422 (D24) 20mA current loop (D211)	RS-422 20mA current loop	

Interconnection

A range of communications options are available for Model 10 and Model 10/SP computers which will enable file transfer, terminal emulation, connection to a Data General or non-Data General host, access to remote data bases, and connection with scientific instrumentation.

A Model 10 or Model 10/SP computer connects with a Data General host, a Data General host through another Desktop Generation computer, an IBM host, an IBM-compatible host, or a public information data base host.

Communications software is available for linking Model 10 and Model 10/SP systems to each other, to IBM-compatible systems, or to other Data General computer systems.

The universal communications multiplexors (USAM-1 and USAM-4) have switch-selectable line interfaces. Modem cables are also available with the Model 10 or Model 10/SP computer system.

A range of communications software packages supports the Model 10 or Model 10/SP computer system interconnectability. The next table lists the communications software available. Communications software for RDOS or AOS runs on the minimum configuration for each operating system.

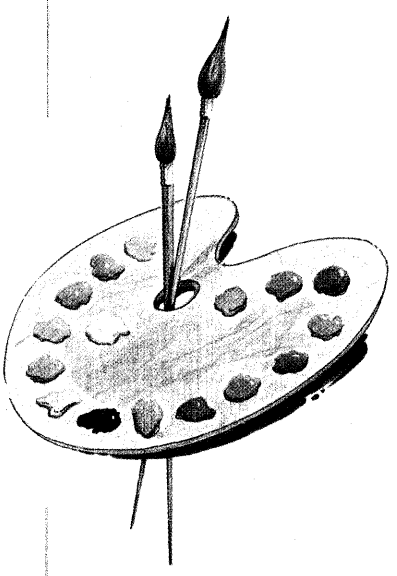
Communications Software	Operating System	Model 10	Model 10/SP	Purpose
Asynchronous XODIAC	AOS		X	Network management software
X.25	AOS		X	Network protocols
XAP	RDOS	X	X	File transfer between Desktop Generation systems and/or Data General host minicomputers
	AOS		X	
RJE80	RDOS	X	X	Batch job transfer to Data General or IBM 360/370-compatible host computer system
	AOS		X	
MP/RJE80	MP/AOS-SU		X	
DG/GATE	RDOS	X	X	Access to public data networks (emulates an IBM terminal)
Terminal Emulation	RDOS	X	X	Makes your Model 10 or Model 10/SP system appear as a terminal on a network.
	AOS		X	
GPIB software	RDOS	X	X	Library of subroutines for controlling the IEEE-488 bus interface
	MP/AOS-SU		X	

Model 10 and Model 10/SP Graphics

Model 10 and Model 10/SP computers provide all the components necessary for a full system solution to applications requiring graphics.

- Bit-mapped or character graphics,
- Monochrome or color monitor,
- Tablet or mouse interactive devices,
- Desktop color plotter,
- Multifunction dot matrix printer,
- Graphics software support under AOS, RDOS, MS/DOS, and CP/M-86 operating systems.

For very fast performance, Model 10 and Model 10/SP computers provide interactive graphics with bit-mapped graphic monitors and direct memory access (DMA). The monochrome monitor and keyboard are standard on Model 10 and 10/SP computers; the color monitor and keyboard are optional. The graphics controller card, needed to use the color monitor, provides 16 levels of colors at a time, chosen from a palette of 4096. A set of 16 different colors is available for text (alphanumerics) and another set is available for graphics. A mixture of alphanumerics and graphics is possible.



In addition to the bit-mapped monochrome or color monitor, any multiuser Model 10 or 10/SP system may include character-mapped graphics terminals such as the DASHER G300, D410 or D460 terminals.

The G300 graphics display terminal, in conjunction with the Graphics Command Interpreter software, can display virtually any line drawing that you can create with pencil and paper. The G300 also supports a graphics printer and a lightpen. The printer is a dot matrix type capable of reproducing the image displayed on the G300 screen. The lightpen is a versatile tool for marking points on the display screen, and may be used to replace some input functions of the keyboard in application programs.

A variety of input devices — mouse and data tablet — allow you to communicate with the Model 10 or 10/SP computer. Output devices include the multifunction dot-matrix printer which provides inexpensive printing and plotting and a desktop plotter which provides high-quality color output.

Graphic Monitors/Terminals	Graphic Input Devices	Graphic Output Devices
Standard monochrome monitor	Data tablet	Desktop color plotter
Optional color monitor	Mouse	Dot matrix printer
Add-on DASHER G300, D410 or D460 terminals		

The operating system and program development languages available with Model 10 or Model 10/SP computers give you access to

- standard MS-DOS and CP/M-86-based graphics applications packages which run business and scientific applications in color and monochrome.
- GKS (graphics kernel software) which executes standard graphics routines under AOS for program development and technical applications, such as writing drivers for the graphic devices. These routines are callable by the CLRE (common language runtime environment), a library of subroutines common to the Data General program development languages FORTRAN 5, FORTRAN 77, DG/L, and PL/1 under RDOS and AOS.
- Data General business graphics application software.

Package	Required Operating System	Model 10	Model 10/SP	Purpose
BusiPEN	AOS		X	Business BASIC graphics
	RDOS	X	X	
CLRE	RDOS	X	X	Common language runtime environment
	AOS		X	graphics subroutines for FORTRAN 5 DG/L
CLRE	AOS		X	Common language runtime environment graphics subroutines for FORTRAN 77 PL/I
GKX	CP/M-86	X	X	Graphics kernel subsystem
GSS-KERNEL	RDOS	X	X	Graphics subroutine library for
	AOS		X	Extended BASIC Business BASIC Interactive COBOL
GW-BASIC	MS-DOS	X	X	Business graphics
PRESENT	AOS		X	Information presentation with graphics (with TRENDVIEW)
TRENDVIEW	AOS		X	Business graphics

Model 10 and Model 10/SP Application Packages

Several categories of application software packages for Model 10 and Model 10/SP systems are available:

- Data General applications for Data General operating systems,
- Non-Data General applications for Data General operating systems,
- Non-Data General applications for MS-DOS and CP/M-86 operating systems.

Data General's applications for our own operating systems include software developed for RDOS, AOS, and MP/AOS-SU. These include CEO (Comprehensive Electronic Office) system — an integrated product designed for office support and offering electronic mail, electronic filing, administrative support, decision support, and word and list processing.

Non-Data General applications for Data General operating systems, AOS and RDOS, include spreadsheet analysis, word processing, calendaring, spelling and dictionary, graphics, electronic mail, and database management.

MS-DOS and CP/M-86 enhance personal productivity with accounting and management support packages. Categories of commercial and technical packages are listed below.

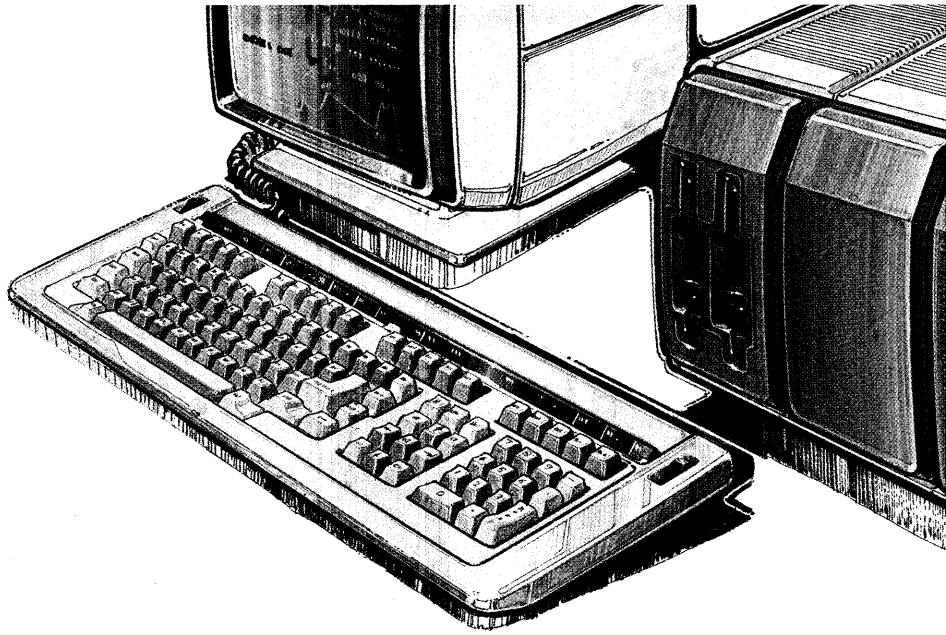
Commercial

associations and organizations
auto dealers/parts
banking/financial
building supplies
business services
dental
durable/nondurable goods
government
health
hotels
insurance
leasing/rentals
legal
maintenance
medical
metals
news media
oil and gas
print/publishing
public accounting
recreation
retail
transportation
utilities
warehousing
wholesale distribution

Technical

architectural engineering	
construction	mapping, layout and design, space modeling, structural analysis
electrical engineering	layout and design, simulation and analysis, electronics engineering tools
mechanical engineering	mechanical drawing and drafting, structural analysis, modeling and simulation
process control	automation management, facility management, material handling, machine control, process control and monitoring, production line control

Your service representative or dealer can provide more information on specific applications, including many software catalogs for Data General 16-bit computer systems.



6 Desktop Generation Model 20/30 Systems

Desktop Generation Model 20 and Model 30 computer systems support single-user and multiuser applications, with or without access to a host computer system. Any Model 20 or Model 30 system may also serve as an intelligent workstation within a larger Data General computer system. A Model 20 or Model 30 computer works well in commercial, business, and technical environments where large amounts of data and information are collected, processed, analyzed, and manipulated.

Desktop Generation Model 20 and Model 30 systems — desktop minicomputers ....

The Desktop Generation Model 20 and Model 30 computer systems are minicomputers in a desktop configuration. Since these systems are 16-bit ECLIPSE computers, they run all applications developed for Data General's 16-bit ECLIPSE computer line.

Model 20/30 Packaged Systems

Desktop Generation Model 20 and Model 30 computer systems are available in three packaged systems — two Model 20 systems and a Model 30 system. Each Model 20 system supports the RDOS and MP/AOS-SU operating systems, as well as AOS when configured with 512 Kbytes of memory. The Model 30 system supports multiuser AOS with COBOL applications. Each multiuser system supports up to five peripherals in any combination of terminals, printers, and communications equipment.

Memory for each system ranges from 256 Kbytes to 2 Mbytes. All systems contain one 15-Mbyte Winchester disk module and one 368.6-Kbyte diskette drive. Each system also supports the floating-point instruction set — both Model 20 systems use the floating-point firmware, while Model 30 has floating-point hardware and the commercial instruction set. This hardware combination gives the Model 30 system the capability for executing COBOL applications.

The next table summarizes the three systems.

Features	Model 20	Model 20	Model 30
CPU	micro ECLIPSE		
Floating-point instruction set	Firmware		Hardware with commercial instruction set
Memory			
Minimum	256 Kbytes	512 Kbytes	
Maximum	2 Mbytes		1.5 Mbytes
System console	Any DASHER terminal		
Add-on terminals	Any DASHER terminal		
Number of			
Diskette(s)	1 (368.6) Kbytes		
15 Mbyte disks	1	1	1
Power supplies	2	2	2
Operating system	RDOS		
	AOS		
	MP/AOS-SU		

Memories for the Model 20 and Model 30 systems are expandable to 2 Mbytes and to 1.5 Mbytes, respectively. Fully configured, these Desktop Generation models are indistinguishable from many minicomputer systems: they have

2 Mbytes of memory,

30+ Mbytes of on-line storage,

minicomputer operating systems,

a large selection of application programs,

a variety of peripheral devices including printers and additional terminals,

extended communications hardware and software,

performance accelerators.

Each system expands in the same manner as the Model 10 and 10/SP systems — by adding equipment as your requirements grow. Add-on peripherals or plug-in cards and the software available for the Model 20 and Model 30 systems enable you to expand your on-line storage and system memory; back up your on-line disk storage; add input/output capabilities including printers, terminals, interactive devices, and sensor I/O equipment; enhance your communications capabilities; execute a wide range of applications software; and develop your own applications.

Basic Computer Unit

The foundation for the Model 20 and Model 30 computers is the basic Desktop Generation computer unit — CPU card module, power supply module, and diskette module.

CPU Card Module

The CPU card module contains five slots; two are reserved for specific cards. One of the reserved slots accommodates the CPU (central processing unit) card, while the second reserved slot accepts a memory card. The remaining three slots are available for optional I/O controller cards or additional memory expansion cards. The Model 30 computer uses one of these slots for the floating-point hardware card.

Central Processing Unit

The Model 20 and Model 30 central processor is Data General's S/20 CPU — the microECLIPSE processor. The Model 20 central processor cards contain the firmware floating-point instruction set; the Model 30 uses the hardware floating-point card and commercial instruction set. The central processor card for all these computers also contains the communications interface for the system console, and the real-time clock and programmable interval timer as standard programming aids.

The Desktop Generation's processor is the S/20 processor used in larger Data General computer systems.

The microECLIPSE processor is Data General's S/20, the same processor used in our larger computer systems. Therefore, the microECLIPSE processor implements the 16-bit ECLIPSE character instruction set and supports Data General's RDOS, AOS, and MP/AOS-SU operating systems.

The floating-point instruction set supports single- and double-precision floating-point number manipulation. Using floating-point numbers provides greater accuracy when working with extremely large or small numbers. Certain operating systems and program development languages, such as AOS, MP/AOS-SU, FORTRAN 5, FORTRAN 77, DG/L, and PL/I all require the floating-point instruction set. Using the floating-point hardware unit, standard on Model 30 systems, can accelerate floating-point computations by 28 times.

FINAL AMOUNT = (1 + $\frac{\text{INTEREST RATE}(\%)}{100}$) NUMBER OF YEARS × INITIAL AMOUNT

```
DECLARE F, RATE, BEGIN REAL
DECLARE N INTEGER
-
-
F = ((1+RATE/100)**N)*BEGIN
-
-
```

Memory

Minimum memory configurations are 256 Kbytes or 512 Kbytes for the Model 20 systems and 512 Kbytes for the Model 30 system. Using the optional plug-in memory cards, memory expands to a maximum of 2 Mbytes for Model 20 systems or 1.5 Mbytes for Model 30 system. All memory cards contain either 256 Kbytes or 512 Kbytes, each with parity.

Basic System	Model 20	Model 20	Model 30
Computer unit			
CPU card module			
CPU	16-bit MicroECLIPSE processor		
ECLIPSE instruction sets			
Character	Standard		
Floating-point	Firmware		Hardware
Commercial	Optional		Standard
Memory			
Minimum	256 Kbytes	512 Kbytes	
Maximum	2 Mbytes		1.5 Mbytes
Expansion slots for user-installable option cards	2		1
Diskette module	368.6 Kbytes formatted removable storage (Data General format)		
Power supply module			
Power supplies	2		
a.c. power per supply	120V, 100V, or 220-240V at 50 and 60 Hz		
Winchester disk drives	1		
On-line storage (formatted)	15 Mbytes		
System console	DASHER D210, D211, D410, or D460 terminal		
Diagnostics	Automatic power-up test; diskette resident test programs		
Operating systems	RDOS		
	AOS		
	MP/AOS-SU		

System Console

The Desktop Generation Model 20 and Model 30 systems support up to five terminals.

Model 20 and Model 30 system consoles may be any of Data General's DASHER series terminals. The terminals — D210, D211, D410, D460 — use a detachable keyboard. The optional terminal emulation software package allows you to connect your Model 20 or Model 30 system to a host computer system so that it functions as a D460 terminal. All Model 20 and 30 systems accept up to four DASHER terminals in addition to the system console when configured for a multiuser environment.

System Options	Model 20	Model 20	Model 30
Additional on-line storage			
Winchester disk drives			
Maximum	2		
Maximum on-line storage	30 Mbytes (formatted)		
Second diskette drive	368.6 Kbytes (formatted)		
On-line disk backup	Magnetic tape module storage 15.4 Mbytes/cartridge		
Performance accelerators			
Floating-point accelerator card	Optional		Standard
Memory expansion	256-Kbyte or 512-Kbyte cards to a maximum of:		
	2 Mbytes		1.5 Mbytes
Terminals	DASHER D210 DASHER D211 DASHER G300 graphics with optional printer and light pen DASHER D410 character graphics DASHER D460 character graphics		
Communications	4-line (USAM-4) or 1-line (USAM-1) universal synchronous/asynchronous multiplexor card with selectable RS-232, RS-422 and 20mA current loop line interfaces 1-line asynchronous card (4207) with RS-232 or 20mA current loop		
	IEEE-488 interface		
Sensor I/O	Digital I/O card Analog to digital card Digital to analog card		
Card expansion module	5 additional slots for I/O option cards		
Printers	Letter quality Multifunction dot matrix Data processing dot matrix		
Plotter	Desktop color plotter		

Operating Systems

As mentioned earlier, the microECLIPSE processor supports Data General's RDOS, AOS, and MP/AOS-SU operating systems. All Model 20 and 30 computers run RDOS or MP/AOS-SU. For AOS the minimum equipment required is a single-diskette system with 512 Kbytes of memory and a 15-Mbyte Winchester disk. The Model 30 and the Model 20 with 512 Kbytes of memory both run AOS.

Program Development Languages

The next table indicates which Data General program development languages are supported on Model 20 and Model 30 systems by AOS, RDOS, and MP/AOS-SU.

Programming Language	Operating System			Model		
	AOS	RDOS	MP/AOS-SU	20	20	30
Scientific						
FORTRAN 4	X	X		X	X	X
MP/FORTRAN 4			X	X	X	X
FORTRAN 5	X	X		X	X	X
FORTRAN 77	X				X	X
SP/Pascal	X		X	X	X	X
MP/Pascal			X	X	X	X
DG/L	X	X		X	X	X
PL/I	X				X	X
General-Purpose						
Extended BASIC	X	X		X	X	X
MP/BASIC	X		X	X	X	X
Business BASIC	X	X		X	X	X
RPG II	X					X
Commercial						
Interactive COBOL	X	X		X	X	X
COBOL	X					X

Program Development Utilities

In addition to the programming languages, Data General supplies program development aids for generating and processing programs. These aids include

- program generators,
- source language debugger,
- file-change tracking system,
- macroassembler,
- screen-oriented text editor,
- general-purpose utility for manipulating record order and content,
- cross-development packages enabling users to develop software applications on Desktop Generation systems for use on Data General's entire range of computers.

Program generators for Business BASIC and COBOL increase your software output.

The program generators, BusiGEN and PROXI, simplify program development, substantially increasing your daily output. BusiGEN is an interactive, menu-driven tool that creates programs in Business BASIC. Using BusiGEN, you can design, code, and document programs for data entry, file maintenance, data inquiry, and report writing, with no previous knowledge of Business BASIC.

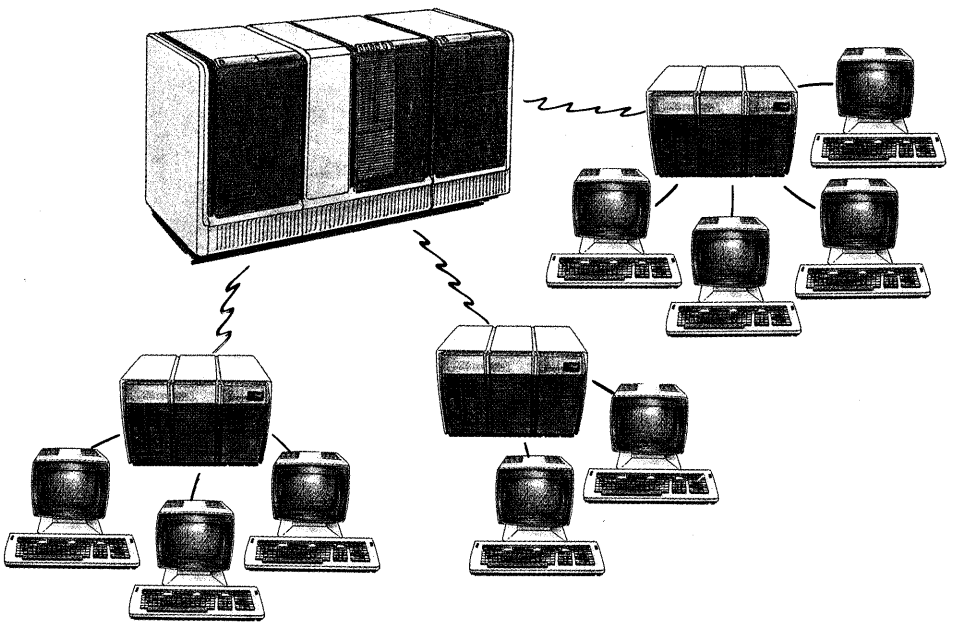
The PROXI program generator automatically creates code for complete, consistent COBOL application programs. The PROXI generator creates standard COBOL program segments, stores them in a library, and combines them into complete source code programs.

Program Development Utility	Operating System	Model 20	Model 20	Model 30	Purpose
BusiGEN	RDOS	X	X	X	Business BASIC program generator
	AOS		X	X	
PROXI	AOS			X	COBOL program generator
RPG II	AOS			X	Report generator
TCS	AOS		X	X	File tracking system
	MP/AOS-SU	X	X	X	
SWAT	AOS		X	X	Interactive debugger
MASM	AOS		X	X	Macroassembler
MAC	RDOS	X	X	X	Macroassembler
Cross-development utilities	AOS		X	X	Develop applications on one system for execution on another
	MP/AOS-SU	X	X	X	
SED	AOS		X	X	Screen-oriented text editor
SPEED	RDOS	X	X	X	Line-oriented text editor
Sort/Merge	AOS		X	X	General-purpose utility
	MP/AOS-SU	X	X	X	
CSSORT	RDOS	X	X	X	General-purpose sort/merge utility
Sort/Merge with report writer	AOS			X	General-purpose utility with report generation capabilities

Multiuser Systems

As multiuser systems, each Model 20 and Model 30 computer supports up to four terminals in addition to the system console. Any combination of Data General DASHER series terminals may be used — D210, D211, G300, D410, and D460. Each terminal uses one asynchronous line of any communications interface.

	D210/211	D410/460	G300
Character size	7 x 9	7 x 11	5 x 8
Character cell	10 x 12		8 x 10
Screen format (lines x columns)	24 x 80	24 x 80/135	24 x 80
Monitor resolution (horizontal pixels x vertical pixels)	810 x 288		640 x 240
Character position	Character-mapped		Bit-mapped
Line type	RS-232-C		
	RS-422 (D211)	RS-422	
	20mA current loop (D211)	20mA current loop	



A Model 20 or 30 interconnects with almost any host system.

Interconnection

In the context of Model 20 and Model 30 computers, interconnection includes enabling file transfer, terminal emulation, connection to a Data General or non-Data General host system, access to a remote data base, and communications with scientific instrumentation.

A Model 20 or 30 system may connect with a Data General host, a Data General host through another Desktop Generation computer, an IBM host, an IBM-compatible host, or a public information data base host.

The communications cards which supply the necessary physical connection may occupy any available slot in the CPU card module or the optional card expansion module.

The universal communications cards with switch-selectable line interfaces are USAM-1 and USAM-4. The single-line asynchronous card, model 4207, uses a jumper-selectable line interface. The IEEE-488 bus interface facilitates two-way asynchronous communications between digital instruments and peripherals. Cables are also available with the Model 20 and 30 computers for connection to a modem.

Communications software packages support the Model 20 and Model 30 computer system interconnection. The next table lists the communications software available for these models.

Communications Software	Operating System	Model 20	Model 20	Model 30	Purpose
Asynchronous XODIAC	AOS		X	X	Network management software
X.25	AOS		X	X	Network protocols
XAP	RDOS	X	X	X	File transfer between Desktop Generation systems and/or Data General host minicomputers
	AOS		X	X	
RJE80	RDOS	X	X	X	Batch job transfer to Data General or IBM 360/370-compatible host computer system
	AOS		X	X	
MP/RJE80	MP/AOS-SU	X	X	X	
DG/GATE	RDOS	X	X	X	Access to public data networks (emulates an IBM terminal)
Terminal Emulation	RDOS	X	X	X	Makes your Model 20 or Model 30 system appear as a terminal on a network.
	AOS		X	X	
GPIB software	RDOS	X	X	X	Library of subroutines for controlling the IEEE-488 bus interface
	MP/AOS-SU	X	X	X	

Performance Accelerators

The floating-point hardware makes the speed of execution of calculations 28 times faster.

The optional floating-point hardware card increases the computational power of your Model 20 computer system, the commercial instruction set adds to your repertoire of programming languages.

The floating-point instruction set is contained in firmware on the Model 20 CPU card. Using the floating-point hardware card, your calculations execute approximately 28 times faster than with the floating-point firmware.

The commercial instruction set provides instructions that perform extensive character movement, translation, and editing for efficient data handling. Certain programming languages, such as COBOL and RPG II, require the commercial instruction set.

Application Software

A generous range of application software packages is available for Model 20 and Model 30 systems. These include both Data General and non-Data General applications for Data General operating systems.

Data General's applications include software developed for RDOS, AOS, and MP/AOS-SU, among them, packages for electronic office, information management and presentation, data entry and retrieval, and transaction processing.

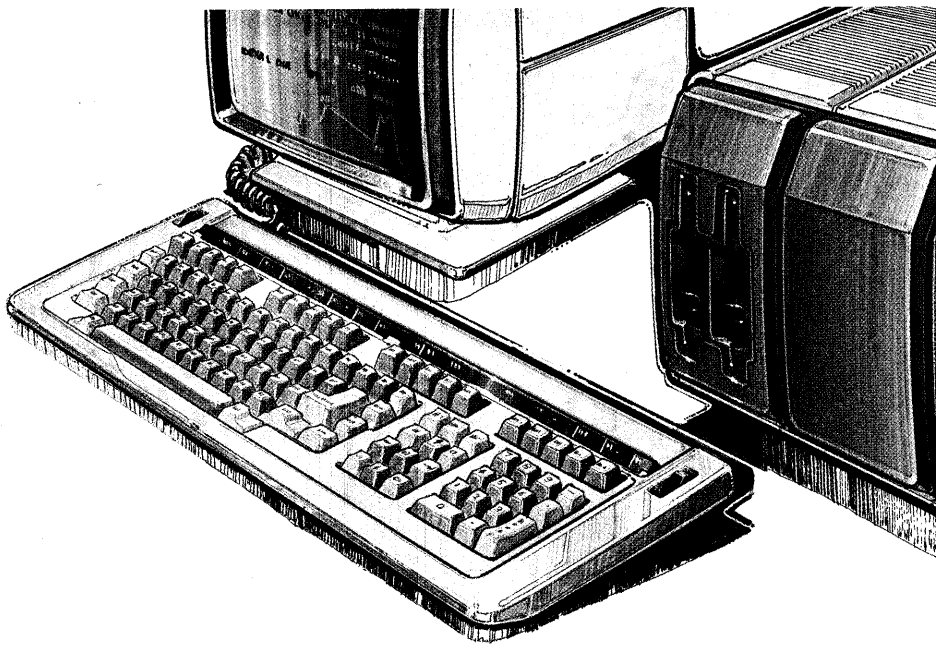
Data General's CEO™ (Comprehensive Electronic Office) system is an integrated product designed for office support. Its capabilities include electronic mail, filing, and spreadsheet; administrative and decision support, word and list processing.

CEO: the total solution for office automation.

The CEO system and its new office tools help communicate accurate and timely information when and where it is needed. CEO's integrated data processing capability means that an entire office's daily functions can be performed on one computer. CEO also

- Enables an office to manage and distribute information electronically, rather than on paper.
- Provides speedy simplified procedures for text creation, modification, storage, and retrieval.
- Offers the tools necessary to access databases and to generate reports and graphs.

Non-Data General applications for Data General operating systems present a wide range of software for both AOS and RDOS. Thousands of packages are available for personal productivity and for commercial and technical applications.



7 Desktop Generation Solutions

Data General's Desktop Generation computer systems are designed for commercial, business, and technical applications. These applications require certain basic Desktop Generation functions in common while demanding distinctly different configurations. Applying Desktop Generation capabilities to a sampling of application problems, we present some viable solutions.

Case 1

This case considers the situation of a first-time computer user, the owner of a very small business with annual revenues of approximately $100,000.

Overview

During the start-up of a very small business, when the annual volume is low, there is usually no need to automate any aspect of its accounting process. The sales volume and its associated clerical and administrative loads are easy to manage, usually with one employee.

When this business becomes more successful, however, its owner experiences the growing pains that go hand in hand with the maturation process.

In time, as annual volumes increase, the control exerted by a manual system slips by degrees. The small business owner soon finds that records cannot be maintained at current staffing levels and that management reporting, if it can be done at all, consumes an inordinate amount of time. As a result, the information needed to make decisions is unavailable. Yet many of these decisions have a tremendous impact on the overall success and prosperity of the business itself.

The most obvious response to the situation is to hire more employees, an extremely expensive proposition. Additional employees require a salary and the benefits generally associated with it. A total compensation package imposes additional burdens, for example, unemployment compensation. And in most cases new employees will not be fully utilized until growth dictates that even more help is required.

The Problem

Its accounts receivable functions are the life blood of any business, regardless of size. Consider the following accounts receivable example of a very small business, with $100,000 in annual revenue. This business has:

- One hundred customers that maintain accounts;
- An average number of 200 sales per week;
- An average of 300 transactions or entries per week, including sales, payments, and adjustments.

Each account is updated on a daily basis. Statements are sent monthly and usually on time; they consist of either a copy of the account ledger or separately typed statements. Management reporting in the form of aged trial balance is performed manually, and one individual is responsible for bookkeeping on a full-time basis.

A subsequent look at the same business, now beginning to prosper, shows the strains on its manual accounts receivable functions. The business now has:

- An annual volume approaching $200,000;
- One-hundred-and-fifty customers maintaining accounts;
- An average number of 300 sales per week;
- Approximately 450 transactions or entries per week, including sales, payments, and adjustments.

Accounts are still updated on a daily basis, but the individual who manually performs this function can no longer handle the volume. The business spends more money and time to stay viable than is truly necessary, and its owner must now decide on a course of action to remedy the situation.

Given that the small business must increase productivity to effectively manage itself, and given that the expense of additional employees is high, the only solution that addresses both problems simultaneously is a computer system designed specifically for the small business. Such a system ensures that the investment made is equal to, or less than, the proportional increase in productivity.

The Data General Desktop Generation family of computer systems provides the answer to the question: "What system should I choose?"

The Solution

The Desktop Generation Model 10 is ideally suited for the first-time business and professional user. Its wide range of system options allows the very small business to start with one configuration and add further capability as growth dictates.

The concept behind the Model 10 — and all other Desktop Generation systems — is modularity. You install the configuration you need at a price that matches your requirements and add to the system proportionately as your needs change. Unlike other systems on the market today, you buy only what you need when you need it, but you are not prevented from enlarging the system just because your original investment was small.

Because the Desktop Generation Model 10 can also be a multiterminal system, this small business can install a system with one terminal and later add terminals to accommodate future growth. It can also take advantage of the range of storage capacities available, starting with diskette storage to handle current applications and adding disks and diskettes as its applications evolve.

Model 10 software is available to satisfy a wide range of application requirements — from a simple spreadsheet to a complex order entry accounting system. The software is prewritten, installed, proven software, requiring no development time on the part of the business. Any expense associated with software is therefore minimal, and its installation and execution are quickly and easily accomplished.

The software available for Model 10 and other Desktop Generation systems is complete in that it performs all the tasks required for a particular application. A full selection of management reporting software speeds the generation of reports based on information entered into the system.

A configuration of Model 10 hardware and software addresses the functions of the small business just described. As a byproduct of entering debits, credits, and adjustments into its Model 10 system, this business can:

- Automatically produce statements on a timely basis
- Automatically produce management reports that help control cash flow and total interest expense
- Automatically track sales history by customer and determine customer profitability.

Because the Desktop Generation Model 10 has so much power, this business may choose to install a totally integrated system which encompasses order entry, accounts receivable, and inventory to control more of its operations. Spreadsheet analysis and word processing software are also available to handle some of the day-to-day tasks associated with the functions of a small business.

The System Configuration

The following table shows at a glance an appropriate configuration of the Desktop Generation Model 10 for very small businesses.

Desktop Generation model	10
Basic Hardware	
Main memory	256 Kbytes
Diskette drives capacity	2 737.2 Kbytes
System console	Monochrome graphics display monitor & keyboard
Operating systems	
Data General Microcomputer	RDOS MS-DOS or CP/M-86
Basic Applications	Accounting Accounts receivable Accounts payable Payroll Inventory Order entry General ledger Spread sheet analysis Word processing
Hardware Options	
Main memory maximum	256 Kbytes or 512 Kbytes 768 Kbytes
Communications	USAM-1
Disk drives capacity	up to 2 30 Mbytes
Output devices	Multifunction dot matrix printer Data processing dot matrix printer Letter-quality printer Desktop color plotter
Software Options	
Applications	Industry-specific applications that run under the RDOS, MS-DOS, or CP/M-86 operating systems

Case 2

This case analyzes the problems and needs of second-time computer users with very small businesses whose annual revenues have reached nearly $1,000,000.

Overview

Approximately 230,000 very small business owners in the United States alone have faced the decision to automate their businesses. All of them began with manual accounting systems and grew to the point where either automation or more staff was required. They chose automation.

Until recently, however, the choices available to these businesses were limited, lacking differentiation at the product level. It mattered little which business system they chose because all offered nearly the same functionality. The majority of these systems were single-terminal ones that supported MS-DOS or CP/M-86 operating systems, along with the many applications written for them. With few specific, vertical software packages to choose from, the applications purchased were to a great extent for personal productivity, word processing, and general accounting.

These businesses began with a computing environment in which one task at a time was performed. Their current growth now dictates that this mode of operation is no longer acceptable. Today they require simultaneous access to the system and the ability to overlap tasks so that all can be completed in a timely manner.

Thus, many business owners are now faced with a new set of circumstances, not totally unrelated to their pasts. They must decide what to do now that they have outgrown their personal computers — a problem that many had not expected to face after purchasing a computer that was to have kept pace with their growth.

The Problem

In this case, a single-terminal, personal computer was originally purchased to perform accounts receivable. Initially, these functions left plenty of time to use the system for spreadsheet analysis and word processing applications.

However, as the business grew closer to $1,000,000 in annual revenues, its personal computer reached 100 percent of its capacity for handling the original applications. The resulting problem was a two-sided one: first, the system was incapable of performing all the applications for which it was intended; and second, the growth of the business required that new, more complete industry-specific applications be installed to control all aspects of the operation — *in addition to accounts receivable.*

The question now facing this business owner is: should I purchase a second, or even a third, personal computer to perform these new functions, or should I consider a more powerful solution?

The addition of more stand-alone personal computers only solves the symptom of the problem, not the problem itself. That is, yes, you will be able to perform the necessary applications, if they are available, to control all aspects of the business. But will those applications be integrated with and tailored specifically to the kind of business you run?

The answer to this question is: probably not. Multiple personal computers would be a short-term solution to the problem.

The Solution

A Desktop Generation Model 10 multiuser system is a cost-effective solution for the small business that has outgrown its personal computer. (And the single-user configuration of Model 10 can prevent this problem from occuring in the first place.) Because the Model 10 includes two processors — one that supports standard Data General operating systems and one that supports the popular MS-DOS and CP/M-86 — it offers a more extensive choice of software than any small desktop system available today.

In many cases, the MS-DOS and CP/M-86 applications that run on single-user personal computers also run on the Model 10. In addition, however, these applications can execute simultaneously with an application that runs under a Data General operating system.

To businesses like the one described here, this means that you can continue to use your favorite programs while taking full advantage of an application that was written specifically for your industry. The best part of this is that both operating systems will run simultaneously on the Model 10. The application that runs under the Data General operating system will run with multiple terminals so that many people can access the the same program, or different programs, simultaneously.

All applications that run under Data General operating systems are compatible. If a business outgrows the capabilities of the Desktop Generation Model 10, it can transport all programs that run under its Data General operating system to a larger Data General computer running the same operating system — without the slightest modification to its software. Meanwhile, your original hardware investment remains intact because the Model 10 computer can function as a workstation on the larger Data General system.

The System Configuration

The following table shows at a glance one multiuser configuration of the Desktop Generation Model 10 system, appropriate for very small businesses.

Desktop Generation model	10
Basic Hardware	
Main memory	256 Kbytes
Diskette drives	1
capacity	368.6
Disk drives	1
capacity	15 Mbytes
System console	Monochrome graphics display monitor & keyboard
Operating systems	
Data General	RDOS
Microcomputer	MS-DOS or CP/M-86
Applications Software	Industry-specific, vertical packages Spread sheet analysis Word processing
Hardware Options	
Main memory	256 Kbytes or 512 Kbytes
maximum	768 Kbytes
Communications	USAM-4
Diskette drives	1
capacity	368.6 Kbytes
maximum capacity	737.2 Kbytes
Disk drives	1
capacity	15 Mbytes
maximum capacity	30 Mbytes
Additional terminals	4
Output devices	Multifunction dot matrix printer Data processing dot matrix printer Letter-quality printer Desktop color plotter
Software Options	
Applications	Additional Industry-specific applications that run under the RDOS, MS-DOS, or CP/M-86 operating systems

Case 3

Here an engineering group, currently sharing time and resources on a larger computer system, looks to engineering workstations for their CAD and CAE needs.

Overview

Engineers today increasingly use the services of computer systems for computer-aided design (CAD) and engineering (CAE). CAD refers to the engineering activities associated with the creation of parts and systems: geometric modeling, analysis, testing, and crafting. CAE integrates the functions of design, analysis, testing, model building and simulation, drafting, and documentation into one computer-aided process — providing the design engineer with sophisticated analytic programs. CAD and CAE help engineers move a product from concept to completion and plan the production process. They enable engineers to develop new products more within a computer system and less by building and testing costly prototypes.

The engineers involved may be responsible for generating preliminary designs and testing them to estimate project costs. Based on their estimate, they may then determine whether or not to bid on the job and then write the bid proposal. If the bid is won, these engineers will do the final designing, testing, and costing of the project.

The Problem

In this situation, the engineers involved need to increase their throughput so that their firm can take on more projects and win more bids. They need to improve and increase productivity, shorten product turnaround time, reduce costs and product liability, and improve their product's quality and yield.

The same engineers must do more than develop and analyze projects however. They must:

- Plan budgets,
- Keep calendars,
- Communicate with other members of their firm, and
- Document their work.

At present, they are supported by a mainframe computer system with a number of terminals distributed throughout several departments. Each engineering department has its share of terminals and access to the system's facilities. But each engineer must share computer time and resources within his or her department.

Ideally, this firm needs one computer terminal per engineer — complete with all the necessary resources for its particular applications — in order to reach its goals.

One answer is the purchase of a second mainframe to support more computing time, along with the additional terminals necessary. The expense involved with this venture is considerable, however. The gains in productivity do not justify the cost of a mainframe and each additional terminal, the price of communications hardware and software to tie the two systems together, and the expense of software to perform scheduling, budgetary, and documentation functions.

The Solution

A less-expensive but comparable solution to this problem is an array of Desktop Generation computer systems. The Desktop Generation Model 10 and Model 10/SP systems add versatile, individual workstations that actually lessen the processing burden on the mainframe system. Each Model 10 or Model 10/SP system, with its integral graphics, supports a relevant selection of application software, office automation software, communications, and a full line of peripherals. Technical professionals benefit from minicomputing power in a microcomputer package that can double as an engineering workstation and a personal business computer.

As individual workstations, Model 10 and 10/SP computers are key components of the entire system. They give each person a point of contact with the host system, allowing an engineer to *separately* process, enter, retrieve, and store data while using the host system to consolidate designs and perform more complex structural analyses, simulation, and testing.

Model 10 and Model 10/SP systems also have the interactive graphics capability necessary for design work, combined with large, readily accessible on-line storage and system memory for local processing, such as finite-element analysis programs.

Each professional in the firm described earlier can use the same Model 10 or 10/SP configuration, with slight variations. Some may have a letter-quality printer or color plotter; others, a tablet or mouse for input or a color graphics monitor rather than a monochrome one.

Each identical configuration serves as a mechanical, electrical, architectural, structural, or electronic engineer's workstation. The major difference between workstations is the applications software, tailored to the individual's task. The software available for Desktop Generation systems covers the entire range of technical and engineering disciplines. These packages can be obtained from Data General, an original equipment manufacturer, or a third-party vendor of software — for the AOS, RDOS, MP/AOS-SU, MS-DOS, or CP/M-86 operating systems.

Among the application packages available are those that simplify

modeling,
simulation,
materials handling,
facility management,
job costing,
project management,
structural analysis,
layout and design, and
symbol libraries.

As a personal business computer, the Desktop Generation system handles supporting functions such as document preparation, electronic mail, flow charts, calendars, and communications. It also runs all of the important decision support packages, including financial and statistical analysis and program management.

Business software that incorporates word processing, calendars, spreadsheets, and presentation tools, is available from Data General, in its CEO package, or from a third-party software vendor.

CEO provides the one-step solution to an engineer's documentation, scheduling, and communications needs. Briefly, CEO is integrated electronic office support — word processing, list processing, and electronic mail for documentation and distribution; electronic calendar for scheduling; electronic spreadsheet; and decision and administrative support. All of these functions come complete in one neat package.

Often engineers prefer to custom-design their tools to suit their environment. The modularity of Desktop Generation hardware and software makes customization not only possible, but simple. And the program development languages and utilities available under each operating system further support the creation of custom software tools.

The Desktop Generation brings a whole new level of computing power to the desktop of the technical professional. Each desktop workstation creates a complete work environment wherein engineering or business support functions are performed with equal ease, helping technical professionals reach their objectives in the fastest, most efficient way possible.

The System Configuration

The following table shows at a glance a configuration of the Model 10/SP system suitable for CAD and CAE environments.

Desktop Generation model	10/SP
Basic Hardware	
Main memory	256 Kbytes
memory option for AOS	512 Kbytes
Diskette drives	1 or 2
capacity	368.6 or 737.2 Kbytes
Disk drives	1
capacity	15 Mbytes
System console	Monochrome graphics display monitor & keyboard
Communications	USAM-1
Basic Software	
Operating systems	
Data General microcomputer	AOS or RDOS MS-DOS or CP/M-86
Applications	Function-specific applications that run under the RDOS, AOS, MP/AOS-SU, MS-DOS, or CP/M-86 operating systems
business/personnel	CEO electronic office software
productivity tools	Third-party packages
Hardware Options	
Main memory	Up to 768 Kbytes
Diskette drives	1
capacity	368.6 Kbytes
Disk drives	1
capacity	15 Mbytes
Output devices	Multifunction dot matrix printer Data processing dot matrix printer Letter-quality printer Desktop color plotter
Input devices	Data tablet Mouse

Case 4

This case considers the use of professional workstations in a company with several regional offices.

Overview

Office automation can be defined as the application of technology and human capability to manage and communicate information more effectively and efficiently.

Some of the benefits enjoyed by businesses and employees who have successfully implemented office automation technology are

- Personnel optimization, because human skills are enhanced, staff shortages are compensated for, and repetitive or time-consuming tasks are minimized;
- Increased productivity, because accuracy improves and jobs turn around faster;
- A competitive edge, gained by improved decision making and timeliness of information;
- Conservation of resources — both human and physical;
- Broader scope of control, because individuals and the organization gain flexibility and information is portable;
- Fewer expenses, due to a reduced capital investment in structures.

The properly automated electronic office can provide these solutions. A weak or ineffective implementation presents more problems than it answers, requiring months or even years of retraining and adjustment. The key to the successful electronic office is its transition from conventional methods, which should be as quick and comfortable as possible.

The Problem

The subject of this case is a company with five regional offices.

Each local office spends excessive time receiving information in a timely fashion so that its management can make decisions. All branches use the same filing system, created by supporting personnel at the main office. Thus, the branch offices depend on the presence of support personnel for access to corporate, departmental, or personal files, and have little recourse when support is unavailable.

The company's regional offices consume an innordinate amount of time scheduling a productive working day. Needless time is spent on the telephone canceling and making appointments, rearranging meetings, and tracking people down. In addition, correspondence must pass from dictation to longhand to typewriter — and generally from correction to typewriter again — and financial and statistical analyses are computed by calculator or even by hand.

How can this company extend productivity throughout the organization, enhance personal decision making, and protect its present investments?

By carefully supplanting traditional methods with electronic ones, each branch location and the central office can gain time, money, and resources.

The Solution

Data General's Desktop Generation family of computers is a compatible, comprehensive choice of desktop systems, capable of integrating the functions of small departments and branch offices. These computers build a bridge between professional computing and company productivity; as independent professional workstations, they give users significant personal processing power and storage in a compact package.

Desktop Generation Models 10/SP and 20 are independent professional workstations. Both offer powerful productivity tools, including integrated office automation capabilities; presentation display software; database and file query capabilities for nontechnical personnel at all levels; and application software designed to help managers in planning and decision making. Applications such as financial modeling and strategic planning support management with the tools to compete in today's complex economic environment.

Models 10/SP and 20 are particularly suited to configurations using CEO software. Model 10/SP systems can support a single-user environment and industry-standard operating systems, while Model 20 features a large memory capacity — up to 2 Mbytes — for running large applications.

Data General's Comprehensive Electronic Office (CEO) gives the office new tools that help communicate accurate and timely information whenever and wherever it is needed. It provides an integrated data processing capability so that an entire office's daily functions can be performed on one computer — allowing users to move easily between office tasks (electronic filing, phone messages, word processing) and traditional data processing procedures (software development).

CEO enables an office to manage and distribute information electronically rather than on paper. It introduces fast and simple methods for creating, modifying, storing, and retrieving text. It gives an office the tools necessary to access databases and generate reports and graphs. With Model 10/SP or 20 systems and CEO software, the company described earlier can increase its effectiveness and productivity. And, as a result, its branch offices will be more responsive to customers, employees, and the organization as a whole.

Desktop Generation systems bring ECLIPSE computing power to expandable, modular, and economical desktop systems. For this company, Models 10/SP and 20 represent an outstanding return on its investment because of the productivity they can contribute to its employees and departments.

The System Configuration

The following table shows at a glance how Model 10/SP and Model 20 AOS systems can be configured for office automation.

Desktop Generation model	10/SP	20
Basic Hardware		
Memory memory option for AOS	256 Kbytes add 256 kbytes	512 Kbytes
Diskette drives capacity	1 368.6 Kbytes	
Disk drive capacity	1 15 Mbytes	
System console	Monochrome graphics display & keyboard	Any DASHER terminal
Communications	USAM-1	USAM-4
Basic Software		
Operating systems Data General microcomputer	AOS MS-DOS or CP/M-86	
Communications	DG/GATE Asynchronous XODIAC	
Applications	CEO software Industry-specific applications	
Hardware Options		
Diskette drives capacity	1 up to 737.2 Kbytes	
Disk drives capacity	1 15 Mbytes	
Output devices	Multifunction dot matrix printer Data processing dot matrix printer Letter quality printer	
Software Options	Industry-specific applications that run under AOS, MS-DOS, or CP/M-86 operating systems	Industry-specific applications that run under AOS

Case 5

This case considers a large corporation's need for a system, or cluster, dedicated to distributed data processing.

Overview

The first interactive access to computers evolved with the concept of timesharing. The need to connect terminals to computers for interactive processing was the beginning of the requirement for communications. Timesharing allowed many people to use the same computer simultaneously and for totally different purposes, and it provided users with immediate interactive feedback. The original systems were built around large mainframe computers that required frequent upgrading as additional processing power was needed. Often these mainframes were not flexible enough to satisfy the set of applications requiring interactive use.

With the advent of minicomputers, computing power came closer to the work area. Users shared files and programs, storage and output devices; they also needed to exchange data across departments and over long distances as well. Computer-to-computer communications became a necessity.

Data General's Desktop Generation distributed minicomputers can be used to offload the central mainframe computer. When connected to each other in a network, the minicomputers can replace the central mainframe. By segmenting application problems in this way, minicomputer networks often handle distributed processing loads more economically.

Desktop Generation computers can be placed where the work is performed, with each processor assigned to a specific job. The processors communicate via the network. Any network can be expanded or reconfigured to meet growing and changing needs.

The Problem

In this situation, each local office of a major company has access to the central office's mainframe computer for batch processing. An extensive amount of information is duplicated at the home and regional offices. Data is reviewed and verified many times. Redundant functions are performed. Data entry and retrieval time is taking longer; in fact, the use of special delivery or express mail to communicate information between offices is increasing. The present mainframe with its numerous users, suffers from several inadequacies, among them:

- System inavailability,
- Poor system response and performance,
- Insufficient control and coordination of system operations,
- Belated data.

Many industry-specific applications exist, most of them are written in COBOL. The mainframe has no problem running these applications, but each remote site also needs the power to run the same applications. Given the current inefficiency of communications and insufficiency of computing power, should this corporation purchase another mainframe?

The Solution

The Desktop Generation Models 20 and 30 offer a more economical solution to this problem. Well-suited for the distributed data processing cluster, these systems are designed to provide independent operations in geographically remote sites. Users benefit from the economies and efficiencies made possible by accessing and sharing valuable distributed resources, equipment, databases, and specialized software.

DASHER display terminals, connected to the Model 20 or 30, are located in user departments at the regional and home offices for on-line data entry or updates and inquiries of client files. Both models further complement Data General host installations with communications connections for electronic mail, file transfers and calendar functions for scheduling activities. In addition, both models support IBM communication protocols.

Floating-point hardware and a commercial instruction set give Model 30 the ability to execute COBOL applications. COBOL, the most widely used data processing language in business, is designed to manipulate large volumes of character and numeric data, such as names, addresses, and part numbers.

This Desktop Generation system integrates the needs of small departments and branch offices. It provides the software benefits of Data General's Comprehensive Electronic Office (CEO) at the local or distributed level. The word processing feature, with list processing, allows selected users to peruse the database and select records for inserting data into custom-developed form letters. An automated spreadsheet capability allows users to model different financial and operational scenarios by varying the critical parameters.

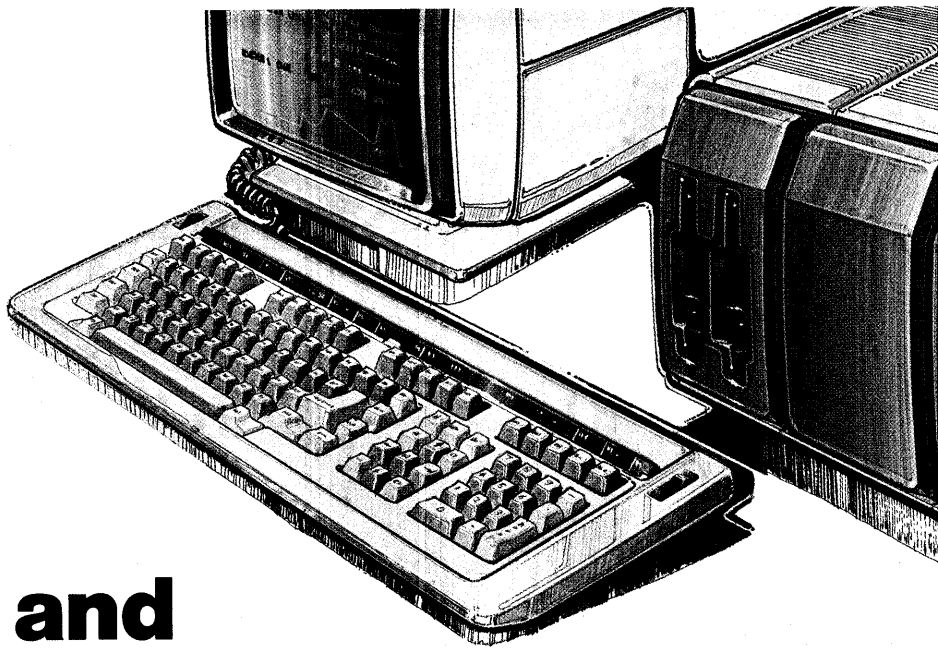
As the number of regional offices increases, multiple clusters can be linked to one of Data General's 32-bit computers — an MV/4000, for example — which in turn can be linked to an ECLIPSE MV/10000 for optimum networking.

The System Configuration

The following table shows at a glance how Desktop Generation Models 20 and 30 can be configured in distributed data processing clusters.

Desktop Generation models	20 and 30[1]
Basic Hardware	
Memory	512 Kbytes
Diskette drives capacity	1 368.6 Kbytes
Disk drives capacity	1 15 Mbytes
Terminals	DASHER D211 DASHER D410 DASHER D460
Communications	USAM-4
Basic Software	
Operating system	AOS
Communications	DG/GATE Asynchronous XODIAC 3270
Hardware Options	
Memory	up to 1.5 Mbytes (Model 30) up to 2.0 Mbytes (Model 20)
Diskette drives capacity maximum	2 368.6 Kbytes each 737.2 Kbytes
Disk drives capacity maximum	2 15 Mbytes each 30 Mbytes
Output devices	Multifunction dot matrix printer Data processing dot matrix printer Letter-quality printer
Software Options	Industry-specific applications that run under AOS.

[1]*Model 30 also includes the hardware floating-point card and commercial instruction set.*



8 Service and Support

Desktop Generation computer systems are backed by your choice of standard and extended warranties, modular mail, on-call four- and 24-hour service, on-call multidevice and per-call service, and fixed rate service, as well as several software support options. This comprehensive range of options — the best in the industry — ensures that you receive the depth of coverage that's right for you.

The Data General Service Organization

Desktop Generation systems are serviced by 2200 professional engineers in over 200 locations worldwide.

The Data General Service Organization consists of over 4000 people, 2200 of them professional engineers directly engaged in servicing computer systems in the field. This organization operates from a network of more than 200 locations worldwide, providing service for Data General customers on six continents.

Because our service organization is responsible for your satisfaction with our equipment, Data General regularly participates with most other reputable computer manufacturers in research studies of customer satisfaction. These studies indicate that Data General continually sets the standard in customer satisfaction for the minicomputer industry.

One way in which Data General maintains this reputation is by involving its service personnel in the design and manufacturing process. Their input helps us ensure that reliability and ease of diagnosis and repair are designed into the product. In addition, Data General service engineers keep abreast of current methodologies and each new Data General product, averaging 33 days of training each year throughout their careers.

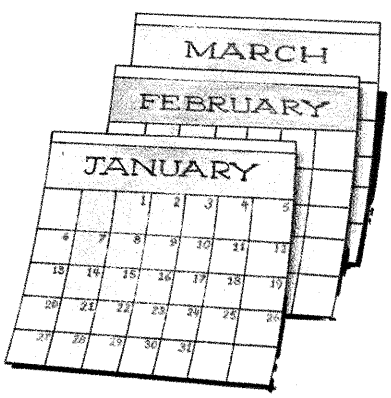
Backing up our service engineers in the field is a network of Software Support and Technical Assistance centers. These centers, staffed by the best systems engineers, are so well-equipped that the staff can duplicate a problem and give you the solution by telephone.

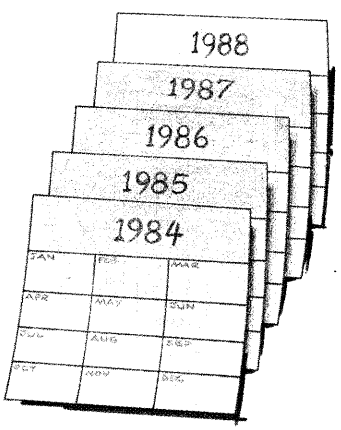
To guarantee customer satisfaction in the future, Data General is pursuing the latest in telecommunications and artificial intelligence technologies. These tools will benefit customers with rapid, effective remote diagnosis and problem tracking.

Service for The Desktop Generation

Since the Desktop Generation offers an enormous range of computing capabilities — from advanced personal computer, to business workstation, to technical workstation, to clusters of workstations in large networks — Data General is offering the most extensive range of service options available from any computer manufacturer.

The standard warranty for Desktop Generation computers gives you free replacement of any failing parts for 90 days. Replacement parts come with a 30-day warranty. In addition, a renewable 12-month warranty is also available.





Depending on your preference and needs, you can choose from two kinds of maintenance programs: customer self-maintenance, backed up by free telephone assistance, or maintenance provided by a field engineer.

The eight service options for Desktop Generation computers assure you of a support system that suits your business, your computer, and your budget. Each option is briefly described here and can be discussed at length with your Data General sales representative or distributor. Toll-free numbers are listed at the end of this chapter.

Standard Warranty

The standard warranty covers you for 90 days. If at any time during the warranty period a problem occurs, the customer can call a toll-free number for assistance. A staff member will help the customer isolate the faulty part(s) by phone and send replacements by overnight carrier. The replacement parts are customer-installable, and the faulty parts can be returned in the prepaid package accompanying the new components.

Extended Warranty

The extended warranty offers the same service as the standard warranty, but extends that service for 12 months and is renewable annually. There is a flat fee for each 12-month warranty period.

Modular Mail

The modular mail option is similar to an Extended Warranty, with the following exceptions:

- Instead of paying an annual flat fee, you pay only for service as needed. That is, each time you use the modular mail service you pay for the parts and materials involved. This option lets you take advantage of up to 50 percent discounts on parts.
- Data General sends you replacement parts within 72 hours. For an additional payment, overnight shipment is available.

On-Call Service

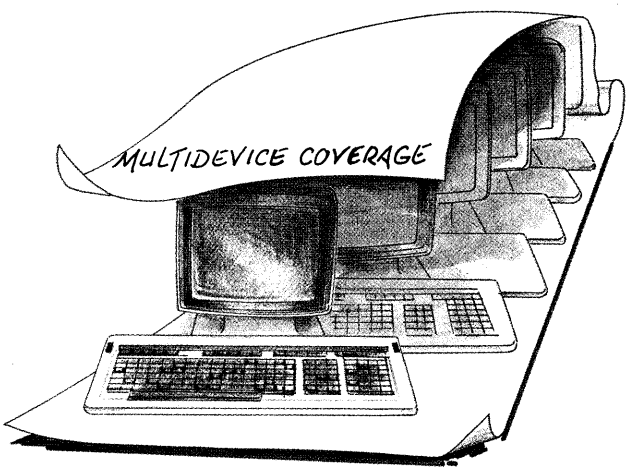
With the on-call service option, a Data General service engineer will attend to your maintenance needs on your premises. For a fixed amount, payable monthly, you receive service covering all parts, labor, and materials. Periodic check-ups and preventive maintenance are also included. If you have a problem, call the toll-free service hotline. If a quick solution cannot be found, a service engineer will visit your site within four hours.

On-Call 24-Hour Service

This option provides the same coverage as on-call service, except that a service engineer will arrive at your premises within 24 hours instead of four, and there is a proportionate discount.

On-Call Multidevice Service

With this option you can save 20 to 30 percent over the on-call service options. To use it, you should have 20 or more Desktop Generation workstations and you must delay your service request until three or more of them require attention. A service engineer will then fix all of them at once. However, you continue to receive service every month, regardless of whether or not the minimum number of failing units has been reached.



Per-Call Service

There is no monthly fee associated with this option. If you make a service call, a field engineer will arrive at your premises within eight working hours. You pay only for labor and materials used, and you can take advantage of a discount of up to 50 percent on replacement parts.

Fixed Rate Service

This option gives you the same coverage as per-call service, with an added feature: when you call the toll-free hotline, you receive a solid quote indicating what the bill will be.

Software Support

In addition to the maintenance options for Desktop Generation computers, a number of software support services are available.

On-Line Information Service

This electronic newsletter is available exclusively from Data General. To read it you need a modem link for your Desktop Generation workstation and the special information phone number, which you receive when you select this service.

The electronic newsletter provides information about software revisions, problems found together with their solutions, product information, and a mailbox. The newsletter is available 24 hours per day, seven days per week, for a low annual subscription fee.

Software Subscription Service

This is Data General's comprehensive mail service, available for an annual subscription fee. With it you automatically receive updates of software and documentation, along with improvements in the product for which you subscribe.

The modular design of Desktop Generation computers makes it easy to upgrade them with additional memory, increased disk storage, enhanced graphics, and much more. You can elect to perform upgrades yourself, with the simplest of tools, or have a service engineer do it for you.

Full Service

Full service provides the customer with immediate telephone assistance from expert software systems engineers. It also includes the software subscription and on-line information services. This option gives you unlimited service for a flat annual fee, payable in monthly installments. For an additional fee, you can also have access to the application software helpline.

Full Service Plus

This option gives you the benefits of full service plus the services of a systems engineer on your premises if needed.

Spares, Upgrades, Supplies, Accessories

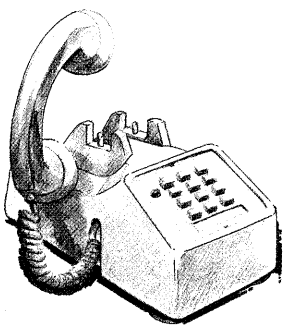
Data General spare parts are tested to the same specifications as the original equipment, and all of them come with a 30-day warranty.

The modular design of Desktop Generation computers makes it easy to upgrade them with additional memory, increased disk storage, enhanced graphics, and much more. You can elect to perform upgrades yourself, with the simplest of tools, or have a service engineer do it for you.

Supplies and accessories are items such as diskettes, ribbon cartridges, and computer stationery. The supplies and accessories available from Data General are produced to the exact tolerances required by the equipment, are fully waranteed, and are available from the Data General Service Organization.

For More Information

For information and answers, current and prospective customers of Data General can contact the corporation directly, toll-free, by calling the Service Operations Center (SOC) in their area. Through these centers you can connect with Data General staff members representing all sectors of the corporation. Lines are open from 8:30 a.m. to 8:30 p.m. The addresses and telephone numbers of Data General Service Operation Centers are listed below.



Area I
2400 Computer Drive
Westboro, Massachusetts 01580
1-800-322-1173 (in state)
1-800-343-2335 (outside MA)

Area II
1639 Tully Circle
Atlanta, Georgia 30329
404-633-6300 (local)
1-800-282-3066 (in state)
1-800-241-3647 (outside GA)

Area III
1500 Rosecrans Avenue
Manhattan Beach, California 90366
213-536-0440 (local)
1-800-343-2051 (in state)
1-800-343-1296 (outside CA)

Area IV
703 W. Algonquin Road
Arlington Heights, Illinois 60005
1-800-942-9106 (in state)
1-800-343-0806 (outside IL)

A Data General operator can provide the names and addresses of Data General sales offices, dealers, distributors, and other sales channels. Staff members are also available through the Service Operation Centers' toll-free numbers to answer questions on the following subjects:

system operation,
software assistance and ordering,
hardware assistance and ordering,
training,
documentation,
account information.

System Operation

Data General's customer support representatives answer operational questions such as, "Which way should the diskette label face when I insert a diskette into the Model 10?" or "Where does my printer cable plug into a Model 20 system?"

Software Assistance and Ordering

Software assistance is the specialty of Data General's systems engineering staff, who diagnose software problems, inform you of particular applications software packages, and take your orders. Systems engineers also help you locate non-Data General software packages and provide the names, addresses, and telephone numbers of their suppliers.

Hardware Assistance and Ordering

Data General's field engineering representatives help you identify and resolve hardware problems. Field engineering staff also take your orders for spare parts and supplies, such as additional modules, optional hardware, and replaceable units.

Training

Educational service representatives can describe, register you for, or place your order for, Data General self-study, training center, or on-site courses.

Documentation

The customer support staff helps you locate and order the Data General publications you need. Some publications are free; others can be purchased by check or credit card.

Account Information

If you do not have a Data General sales representative, the administrative services staff can inform you of the status of your order or contract, your account balance, your warranty and service agreements, or tell you how to register for these agreements.

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