digital

8/A MINICOMPUTER SERIES

8/A Module Sets
8/A Packaged Processors
8/A Minisystems

Features

THREE DIFFERENT VERSIONS
Module sets, packaged processors, and a fully integrated, stand-alone minisystem.

A COMPLETE RANGE OF MEMORIES
From 1 to 32K, including: CORE Read Only Memory (ROM), Random Access Memory (RAM), ROM/RAM combinations, and Reprogrammable ROM (PROM).

A COMPLETE SOFTWARE LIBRARY
Operating systems, language processors, and applications software.

A FULL LINE OF COMPATIBLE PERIPHERALS
Disk drives, magnetic tape drives, keyboard/display terminals, and many more.

PLUS TOTAL SERVICE AND SUPPORT
Maintenance, documentation, training, and software development assistance.

THE 8/A MINICOMPUTER SERIES

It has a lot more to offer besides a low price

We know that you'd like to reach those customers with applications that need the full power of a minicomputer, but can't afford it. If they're attracted by the cost of the microprocessor, but it doesn't offer enough power, take a good look at our 8/A series of module sets and packaged processors. And for a total system capability, the 8A Minisystem is the logical next step to increase performance.

8/A Series Highlights

Speed

We're talking about the basic cycle times that determine data rates and logical manipulation speeds. The 8/A's cycle time is just about 1.5 microseconds. That's faster than many traditional minicomputers.

Reliability

The entire 8/A series is built from standard components whose durability is on the record books. As members of the PDP-8 family, the 8/A's have over 25,000 hardworking relatives all over the world.

Software

No token assemblers. Today's mainline minicomputers have high-level language operating systems, language processors, and applications software. And all versions of the 8/A series share the same software library as the PDP-8 family. That includes the powerful OS/8 Operating System and the RTS/8 real-time executive, a host of language compilers, assemblers, and utilities; plus more than 200 application programs.

Computing speed...proven reliability ...and a comprehensive software library. All at an unbeatable price. THE 8/A MINICOMPUTER SERIES. From DIGITAL, the company that treats the OEM's customer as if they were our own.

System Components That Can Be Tailored to the Workload

The 8/A family of miniprocessors allows you to tailor a system to fit your exact requirements. A choice of hardware configurations means that you can meet your design needs without buying more (or less) computing power than the application calls for. And you can do it without sacrificing expandability, flexibility, programmability, or your ability to pay for it.

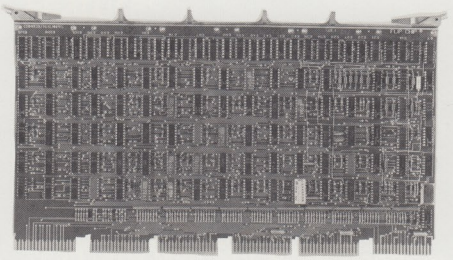
The 8/A Series can be configured with a complete range of memories from 1K to 32K, including CORE, Random Access Memory (RAM), RAM/ROM combinations, and Reprogrammable ROM (PROM). It's flexibility like this that enables DIGITAL to provide specific solutions to OEM requirements.

8/A SERIES CONFIGURATIONS

Module Sets

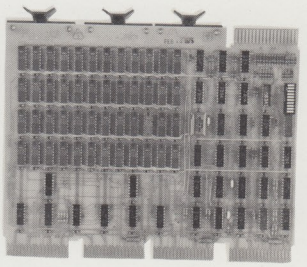
That include a central processor and a memory module

The 8/A module set consists of a CPU module and one or more memory modules. It's the version of the 8/A series that most closely resembles a microprocessor — at least in size and price. In performance, it's a full-sized minicomputer with memory expandable from 1k to 32K in various combinations of ROM, RAM, ROM/RAM, PROM, and CORE.



CPU Module

2 hardware registers
8 index registers



Memory Module

CORE	RAM	ROM	PROM
8K	1K	1K	1K
16K	2K	2K	
	4K	4K	
	8K		
	16K		

Packaged Processors

With the same modules packaged in a cabinet with power supply and a slotted backplane assembly

The 8/A-100... The ROM System

The 8/A-100, with its ROM/RAM memory combinations, provides a cost-effective, superior performance alternative to hardwired logic controllers. It offers complete program integrity for dedicated applications which require small memory configurations. A new hardware technique enables the user to program ROM/RAM combinations like CORE memory.

8/A-400... The Core System

The 8/A-400 provides the OEM user with all of the capabilities of proven CORE memory plus a wide range of peripherals at an extemely low price. It utilizes both 8K and 16K stacks and is designed to be a cost-effective system with memory configurations ranging from 8K to 32K.

Complete Minisystems

That offer a wide range of capabilities all packaged in an attractive desk

MS800-A

An 8/A minicomputer with 8K of core memory
A KM8-AA Option Board
A DKC8-AA Option Board
An RX8-B Floppy Disk Drive
An Executive Desk
OS/8 Operating System

MS800-B

An 8/A Minicomputer with 16K of core memory
A KM8-AA Option Board
A DKC8-AA Option Board
An RX8-B Floppy Disk Drive
An Executive Desk
OS/8 Operating System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8a
01441 3625
BUS
MD
STATE
SR
STATUS
MQ
AC
THIS
NEXT
STATE
MD
LXA
THIS
BUS
STATUS
IR
INT
NEXT
AC
MQ
HLT/SS
RUN
FLIP CHIP

8/A SERIES CENTRAL PROCESSOR UNIT

A Fast and Reliable CPU

We've never sacrificed performance for low price. And we don't start with our 8/A. The central processor cycle time is 1.5μs, with many instructions executing completely in a single cycle (those that directly reference data in memory execute completely in two cycles). This kind of speed means that the 8/A can handle operations that slower microprocessors can't. It can handle more input lines; it can sample data more frequently and, therefore, more accurately. And it can perform extra processing on input data, providing instant error detection and correction.

Proven Reliability

The circuitry that makes the 8/A fast also makes it reliable. The entire CPU is constructed of proven, reliable, currently-available TTL MSI logic chips. That's important, because no purchase is wise if it entails a struggle with the availability or maintenance of a yet-to-be-proven technology. It all fits neatly on one easy-to-replace module.

Proven Capability

Will the 8/A do the job... how much memory will it require... what sort of software investment is involved... what kind of an interfacing investment is required? When planning for the use of a computer, these are the kinds of questions that must be answered. The 8/A not only has straightforward answers, but also offers some unique advantages.

Proven Performance

The 8/A minicomputer is completely compatible with the more than 25,000 PDP-8 family computers already at work in locations around the world. Thousands of PDP-8 programs have been written. Thousands of PDP-8 interfaces have been implemented. And thousands of talented people have extended experience with PDP-8's. So when you start with the new 8/A, you're not starting with an unknown.

Extended Processor Features

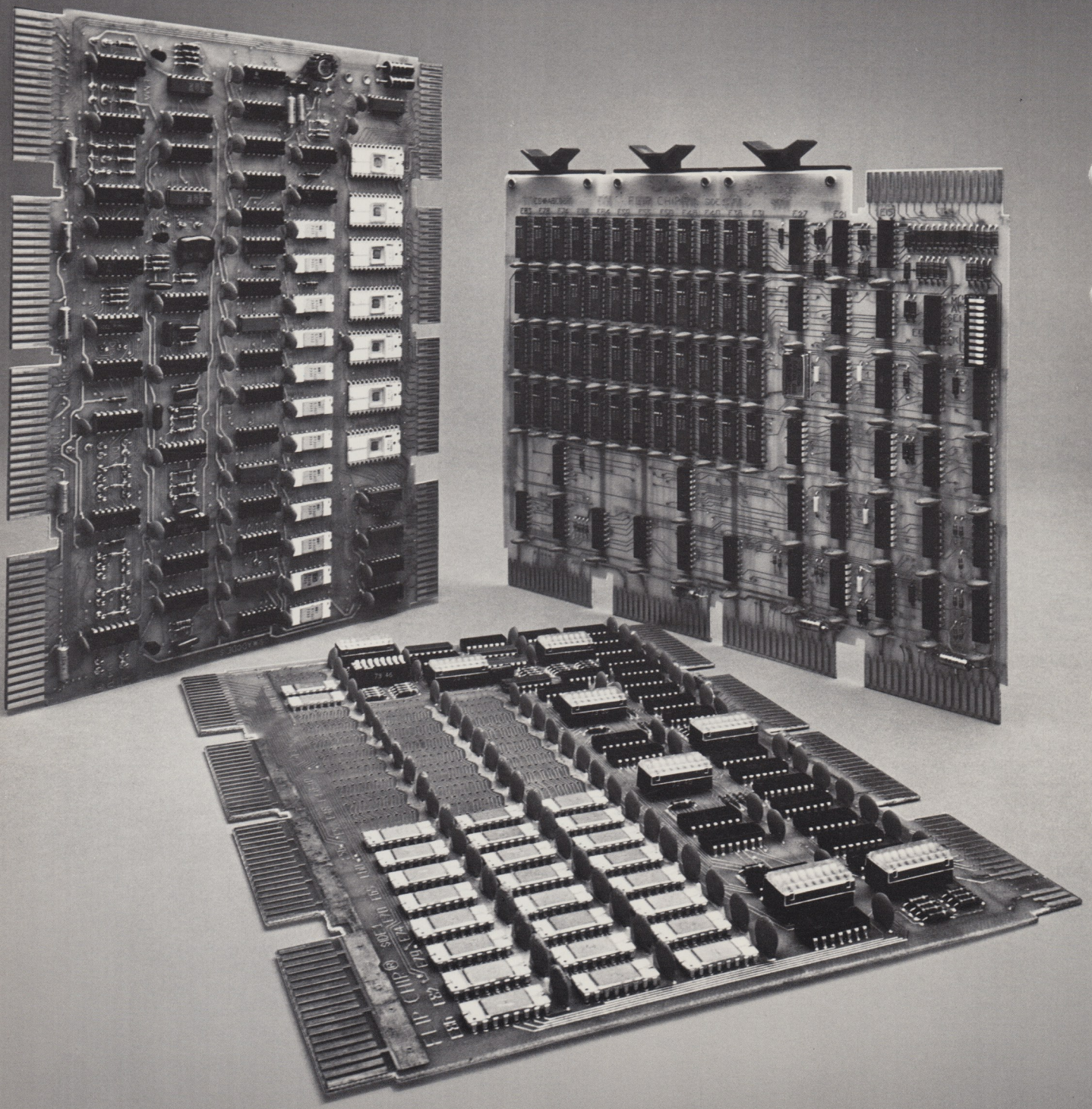
Simple plug-in option modules supply the 8/A with additional capabilities beyond the built-in features of the central processor. The input/output option board (DKC8-AA) provides a serial line interface, a 12-bit parallel interface, a 100 Hz real-time clock, and control logic for the optional programmer's front panel. The serial interface is switch-selectable to any of 8 Baud rates, from 110 to 9600 Baud. The parallel interface includes signalling and interrupt lines to permit control of transfers in either direction.

The extended option board (KM8-A) provides power fail, auto restart, memory extension, and a 128-word ROM bootstrap program to facilitate system restarts. The power failure control interrupts the CPU on an AC power-low condition and again on a battery-empty condition. In emergency situations, these two flags signal both a change-over to battery power and return to regular power.

The memory extension logic permits addressing of memory beyond 4K words. With the memory extension logic, the 8/A can address up to 32K words of memory. The ROM bootstrap program permits reloading and re-starting of paper tape and mass storage devices such as DECtape and cassette.

Chassis Configurations

In the packaged versions (8/A-100 and -400) the CPU and memory modules are mounted in a 10½" x 19" x 10" (26.67cm x 48.26cm x 25.4cm) chassis. The chassis includes a power supply and an OMNIBUS (10 slot in the 8/A-100, 12 slot for the -400) for mounting additional options. The power supply for the 8/A-100 (semiconductor memory) includes an integral battery backup. The 8/A-100 battery provides the backup operation of the CPU and memory from one to seven minutes (depending on the configuration) allowing the system to ride out the transients and cycle dropouts that comprise 95% of all power failures. If the failure is prolonged, the backup operation provides the time for a systematic shut-down. The front of the chassis contains: the power on/off and restart switches; panel lock switch; indicators for run, power on and battery charging states; plus mounting space for the optional programmer's console with its input keypad and LED octal readouts.



8/A SERIES MEMORY MODULES

The 8/A minicomputer expands to a large complement of memory to handle demanding applications. Logic within the basic processor is responsible for all addressing of memory up to 4096 words. The memory extension option module adds an additional 28K of memory addressing for a total of 32K words. Any one of the three following kinds of memory may be mixed on the same 8/A system.

Random Access Memory (RAM)

MOS random access memory is the primary memory for PDP-8/A systems. It is available in units of 1K, 2K and 4K words, each of which is implemented on a single module. RAM memory is programmed like core.

Read Only Memory (ROM)

Blastable read only memory provides high-speed, non-destructive memory in applications where the contents of memory do not change. It operates at a cycle time of 1.5 microseconds and, like RAM, is available in units of 1K, 2K, or 4K words on a single module.

Mixing RAM and ROM

A unique memory cross-addressing capability allows the 8/A to mix RAM and ROM memory in order to benefit from both. In a mixed memory system, all program instructions, which do not change, are permanently stored in ROM. All data, which does change, is allocated space in RAM.

RAM can be used as scratch pad memory using an indirect addressing scheme associated with ROM. The indirect addressing is specified by a 13th bit technique. Each location in ROM has 13 bits instead of the usual 12 bits, and the extra bit acts as a flag to the ROM hardware. Each time the 13th bit is an "0," data is accessed from ROM in the usual manner. However, when the 13th bit is a "1," the ROM hardware treats the 12 bit contents as an address in RAM rather than as data. The 12 bit address is sent to RAM via a top connector and it is at this address that data will be accessed or deposited.

The 13th bit is inaccessible to the programmer and its use is transparent. The ROM Blaster/Loader performs the necessary hardware function of setting the 13th bit as required. Combined configurations of ROM/RAM offer the advantages of both memory types. The main program can be stored in non-destructive ROM while the RAM can be used as scratch pad for write instructions and data storage.

Programmable Read Only Memory (PROM)

An alternate method of obtaining the combined advantages of ROM and RAM is to use programmable read only memory. Each PROM includes 1024 words of memory. Up to 256 of these can be written into by the executing program. The remainder is protected read only memory, but it can be erased and reblasted when program changes are necessary. DIGITAL's PROM blaster is available for users who wish to do their own PROM programming.

Core Memory

CORE is available in either 8K or 16K stacks. It is the recommended cost-effective choice for large systems. The 8/A-400 design is optimized for 8K to 32K core memory, configurations. The 8/A's high density core stacks offer low power consumption.


decscope

8/A SERIES PERIPHERALS

Peripherals are the tools that a computer uses to communicate with the "outside" world. Whether it uses a single serial interface or high-speed A/D's backed by bulk storage devices, every computer must have some sort of I/O device if it is to perform useful work. And it must have an exceptional scheme of interfacing I/O devices if it is to do its work easily.

The 8/A OMNIBUS

The 8/A takes full advantage of the powerful OMNIBUS interfacing technique in handling a wide range of I/O interfaces.

ALL I/O interfaces and peripheral controls plug right into the OMNIBUS slots. The result is a simple, compact and powerful method of I/O interfacing.

Multiple Option Boards

There are two option boards which contain the major interfaces and options that most users will need. The first of these, the DKC8-AA I/O Option Board includes: real-time clock, programmers console control, input/output interface, 12-bit parallel I/O and an asynchronous serial line unit. The KM8-AA, Extended Option Board includes: memory extension and timeshare control, power fail with auto restart and a bootstrap loader.

Interfaces to Real-Time Devices

Although the 8/A's interfacing ease can be taken advantage of in developing special purpose interfaces, it is rarely necessary. A host of standard 8/A interfaces are ready to do the job. If it involves such tasks as controlling relays, solenoids, contact closures, limit switches, and counters, universal digital controllers are available. They are designed for high noise immunity and extremely easy hookup via screw terminal connectors. If the job concerns analog data, analog input sub-systems are available. Like the universal digital controllers, the analog input sub-system also provides high noise immunity and simple screw terminal connection.

Communications

When the 8/A must communicate with people, DIGITAL supplies both the interfacing and the terminals. Asynchronous interfaces have switch-selectable Baud rates for maximum flexibility. Terminals like the LA36 (hard copy) and VT50 (display with optional hard copy) provide interactive capability at a price as attractive as the 8/A itself.

In cases where the 8/A must communicate with other computers, DIGITAL supplies both asynchronous and synchronous interfaces for local or remote (via modem) communications. These communications capabilities make the 8/A the ideal tool for remote data gathering in support of a larger central computing facility.

Terminals
VT50 DECscope

The VT50 series of on-line interactive terminals gives you fast video interaction. Plus a variety of switch-selectable transmission rates and operating modes; compatibility with computers or timesharing networks operating in asynchronous, ASCII communications codes; low-density modules for high reliability; and simplified mechanics for low maintenance. When hard copy is needed, an electrolytic copier, on the side of the visual display unit, will provide a permanent record of displayed data.

LA36 DECwriter II

LA36 DECwriter II is one of the industry's lowest-priced, best performing impact teleprinters. It's fast—a true 30-cps machine; it's quiet—you'll almost forget it's there; and it's versatile—you can use 6-part forms and even standard 132-column lineprinter paper.

Mass Storage Devices

Mass storage devices are the 8/A's means of collecting, organizing and retrieving large volumes of data. DIGITAL manufactures small mass storage devices tailored to the 8/A customer's needs.

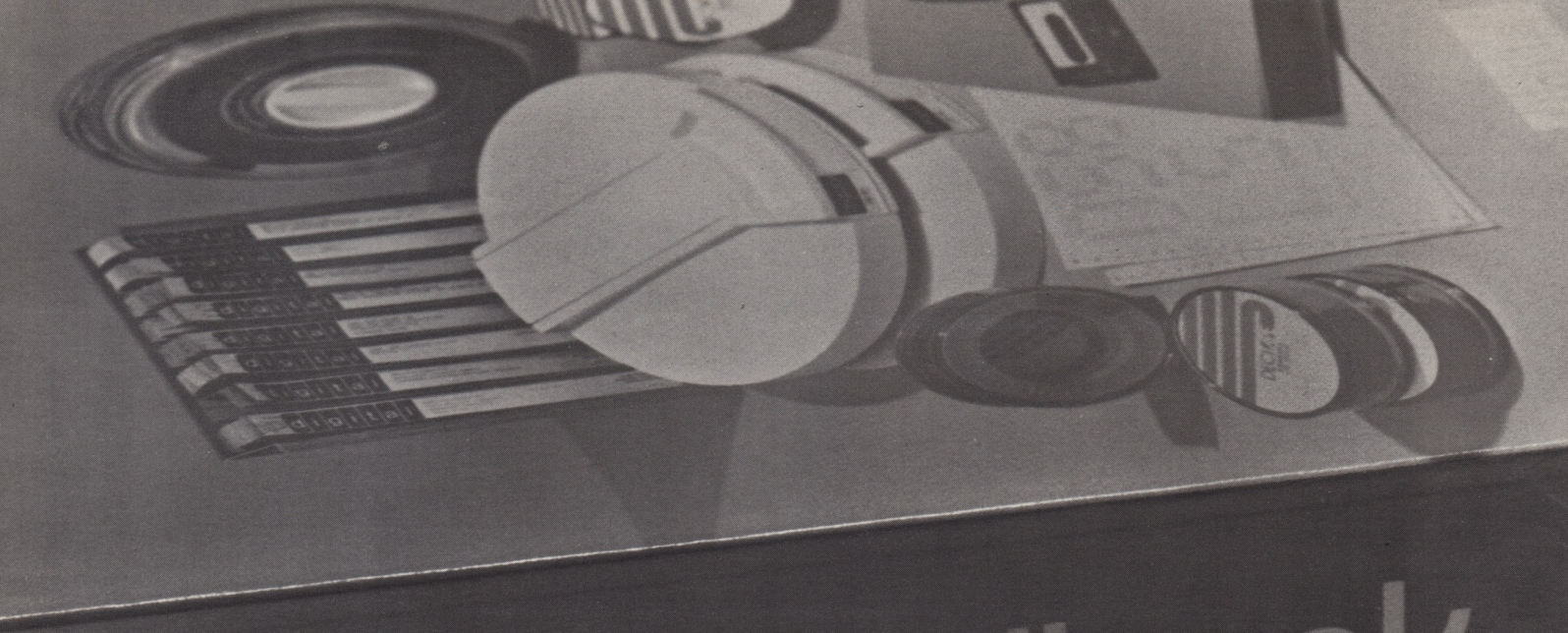
The TA8-A dual cassette magnetic tape drive provides a total of 180,000 characters of on-line storage, at extremely low cost. Where higher capacity and speed are required, the RX8-B dual floppy disk drive is the appropriate device. The RX8 uses diskettes for low-cost random access mass memory. Each disk is capable of storing up to 128K 12-bit words; or 256K 8-bit bytes in IBM compatible format. It consists of one or two drives, a single drive electronics module, a microprogrammed controller and a power supply, enclosed in a rack-mountable chassis.

For economical mass storage, the RK8-E disk cartridge system can provide 1.6 million words of high density memory per disk drive. Since each controller can support four disk drives, a fully expanded RK8-E system offers over 6 million words of storage. Each drive has a typical access time of 50 milliseconds (average random move) and can transfer a 12-bit word in 8.32 microseconds.

KL8A 4-Channel Asynchronous Interface

The KL8A is a new low-cost solution for interfacing up to four I/O devices on a single board...saving time and money on hardware, space, and power. Available now for any data com application ...from terminals to peripherals and modems or whatever else you've got hooked up. The KL8A features:

Three channels partial modem control
One channel full modem control
EIA or 20MA current loop
50 to 9600 baud transmission rate (switch selectable on each channel).



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8/A SERIES SOFTWARE

It's the software that distinguishes the 8/A from a microprocessor. Software that ties together the processor and peripheral capabilities of the 8/A. Specifically, the 8/A software is organized around two major operating systems: OS/8 for program development and RTS/8 for on-line real-time operation. These two systems are totally compatible, with the programs developed under OS/8 capable of being directly loaded for execution under RTS/8. And in larger configurations, OS/8 operates on-line as a background task under RTS/8, providing the full range of 8/A systems power on a single system.

RTS/8: The Real-Time System

RTS/8 makes the 8/A a full-fledged multi-task, real-time system capable of handling many ongoing processes concurrently. And by allowing separate programming of each distinct function, it makes overall software development simple and modular. RTS/8 is an event-driven operating system, designed to substantially reduce the cost of software development.

The key feature of RTS/8 is a compact memory-resident executive requiring, in its simplest form, less than 700 words of memory. This small size permits it to be used in cost-sensitive applications, such as controllers, which previously could not tolerate the overhead of other real-time software systems. A complete minimum configuration system, for example, could easily be contained within 4K of main memory. Yet, expansion capability has not been sacrificed. With expansion to only 12K words of memory a full foreground/background system can be supported. This allows users to control real-time events while concurrently having complete access to the OS/8 operating system for program development.

RTS/8 can control up to 63 tasks on a fixed priority basis. Tasks may reside in memory or on a mass storage device, to be swapped in only when required. Support tasks are provided for a wide variety of peripheral devices including analog to digital equipment, disk, magtape, printer and monitor console for system control.

RTS/8 has the performance characteristics of much larger competitive real-time systems.

Features such as dynamic task scheduling, concurrent I/O (multi-programming), multiple buffered I/O, inter-task communication, on-line operator control and foreground/background processing have all been implemented under RTS/8.

OS/8: The Program Development System

OS/8 is a full-scale operating system that places the power of large system software at the keyboard of a PDP-8. It provides all the facilities to make 8/A programming—both in FORTRAN and in assembly language—quick and efficient. All compilers, assemblers and utility programs are stored on mass storage devices and called out by simple keyboard commands. User-written programs are also stored on disk or tape to permit rapid editing, assembling and linking.

The advantage of OS/8 is that it permits program development resources to be concentrated on a single system. If a large amount of software is to be developed, a central 8/A-400 system with high-speed line printer and cartridge disk storage provides optimum efficiency. Smaller development efforts can make use of smaller configurations.

In either case, the central development OS/8 system can produce fully compatible, fully checked program modules for execution on even minimum size 8/A's.

DIGITAL EQUIPMENT CORPORATION

Anyone who knows computers, knows DIGITAL. Although we've been around for 18 years, the products we offer today are just as far-sighted and exciting as our very first memory module. So it won't be surprising to some that we can offer the 8/A minicomputer.

Besides small computers, we make the big hardware, too. Like our large scale timesharing DECsystem-10s. And just about everything in between small and large that you could possibly need.

We're responsible for over 40,000 computer installations—from deep beneath the sea, to the auto assembly line, to the small town regional high school, to the research laboratory, to the offices of a major bank. Approximately 18,000 people are responsible for this kind of production and service. 130 offices worldwide. 2,000 engineers all over the globe. 14 regional training centers.

And complacency isn't in our vocabulary. We think there are always ways to do things better, at lower cost for the customer. And if it's possible, we do it.

Resources

Sales specialists provide the expertise to match specific customer requirements with the appropriate computer system. Field service engineers install and maintain the computer hardware, providing continuing service on a contract or on-call basis. Software support specialists install and train customer personnel in the use of software systems. Additional training is provided by full-time hardware and software instructors who offer more than 100 different courses in 14 regional training centers. These centers train more than 20,000 satisfied customers every year.

Continuing support in the use of DIGITAL computers is available through DECUS, the Digital Equipment Computer Users Society. With a membership of more than 20,000 from some 40 countries, DECUS is the largest and most active society of its kind in the world.

OEM Referral Program

DIGITAL has a formalized OEM Referral Program to help sell your computerized system to end users. Our sales force of 1200 people helps you sell your systems with the information you provide us for the OEM catalog. The catalog categorizes OEM systems so that our sales people can match prospects' needs and refer them to the right OEM.

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