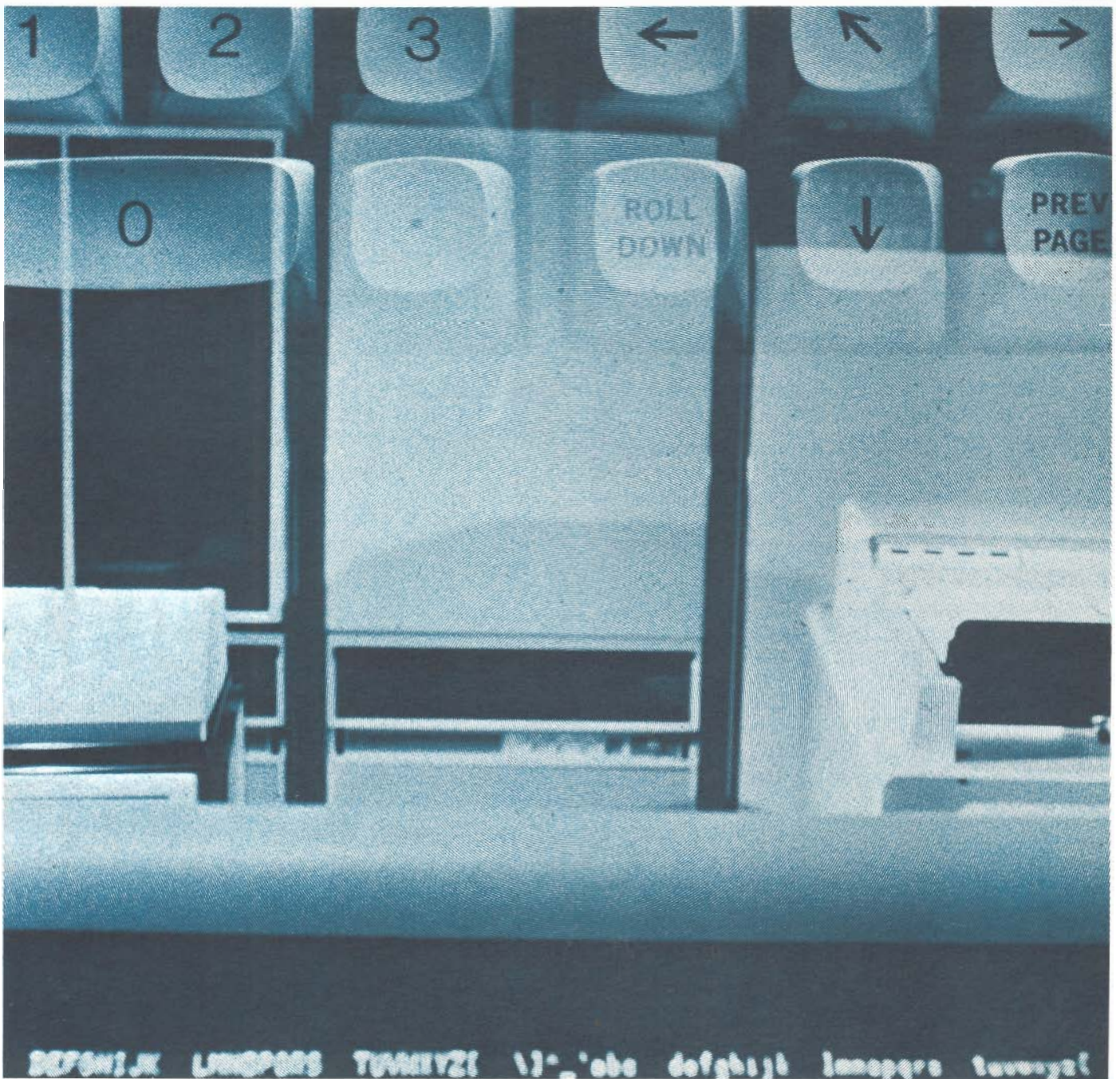


## HP 3000CX Mini DataCenters



# The Mini DataCenter Idea

Whatever your preconceptions about minicomputer systems, think again. Hewlett-Packard did. And developed a simple, new architecture and operating system that eliminates the redundancy and wasted memory inherent in traditional minis that echo big-computer design philosophy.

### **NO OTHER MINI CAN OFFER THE PERFORMANCE OF A MINI DATACENTER**

Code and data are handled in separate modules. By dividing program elements into those that will change and those that do not, programs can be shared among all users while each maintains his own unique data space. As a result, no memory is wasted in pointless repetition of common code.

Virtual memory is provided by a user-determined form of code segmentation. This approach permits a program to be larger than the main memory while avoiding wasteful thrashing between disc and memory that often results when segmentation is totally machine determined. As a further aid to efficiency, our 3000CX Mini DataCenters monitor the frequency of use of code segments, automatically eliminating swap out of segments that are in frequent use.

A hardware-implemented variable stack design sharply reduces the amount of memory required to execute the 3000CX Mini DataCenter programs. Since the data stack expands and contracts to meet the need of the program in use, no data area is wasted by unused subroutines. The data stack also provides variable-sized arrays, re-entrant code, recursive programming, and an extremely efficient method of parameter passing to subroutines.

### **PERFORMANCE IS ENHANCED BY A STRONG RELATION BETWEEN ARCHITECTURE AND OTHER SYSTEM FEATURES**

A 32 bit LSI ROM forms the basis of the microprocessor at the heart of our 3000CX Mini DataCenters. This

microprocessor implements 182 instructions, has a cycle time of 176 nanoseconds, utilizing overlapped microinstructions to provide both extreme speed and power — as many as 5.27 million operations per second.

Add to this interleaved memory modules for faster access, CPU and I/O processor designed for greater throughput and bus-oriented architecture for modularity, and the potential of 3000CX Mini DataCenters for your application begins to be evident.

Additionally, program size is kept small because of the very efficient code generation resulting from the system's strong instruction set, specifically designed to implement high-level languages. The subroutine call process is unusually fast because the microcode — not the user — shoulders the burden of determining whether code segments are in disc or memory. Program design is simplified because many features of the instruction set are reflected in the syntax of the programming languages.

### **A 3000CX MINI DATACENTER THAT PROVIDES A RANGE OF OPERATING FEATURES ON A PAR WITH LARGE-SCALE DATA SYSTEMS**

At a fraction of the cost, it extends the capabilities of a major data system outward to users who want the features and convenience of a large system, but whose problems don't require the full brute force capabilities of a costly major system. In the corporate environment, it permits EDP management to shift time-consuming, lower-priority management demands out of the central system's work flow with measurable savings in time and cost. Able to communicate with all other HP computers and with major IBM systems, while performing other batch and interactive tasks, a 3000CX Mini DataCenter can form the basis of powerful distributed systems that enhance the reach, versatility and value of the corporate-level effort.



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## 3000CX Series Mini DataCenters

### Introduction

The HP 3000CX Series Mini DataCenters are designed to meet the needs of distributed computer network users as well as those with single-unit dedicated computer requirements. Any Mini DataCenter within the HP 3000CX Series can be selected to fit individual hardware and software needs without altering the CPU operating system.

An HP 3000CX Mini DataCenter may be easily integrated into networks of interconnected Mini DataCenters and large central computing systems.

### SYSTEM FEATURES

Designated Models 50, 100, 200, and 300, these interactive Mini DataCenters have a common multiprogrammed operating system (MPE/C) that features spooling, virtual memory and a communications subsystem to link CX Series systems to each other and to larger computers as well. The operating system also offers data base management software and supports access to multiple interactive terminals and batch devices concurrently.

Other features of 3000CX Mini DataCenters are the ability to expand the CPU microprocessor to include decimal arithmetic instruction for business applications and extended precision floating point instructions for scientific use. Software includes six language subsystems, COBOL, Report Program Generator (RPG), FORTRAN, System Programming Language (SPL), BASIC Interpreter, and the first full BASIC language compiler. Also available is a complete line of peripheral equipment.

### ARCHITECTURE

- Hardware implementation of stack provides efficient memory utilization and a highly effective multi-programming environment
- Separation of code and data for multi-user code sharing
- Concurrent CPU and I/O processing for maximum systems utilization
- Modular organization built around a high speed (175-ns) data bus for high system throughput

- CPU utilizes 32-bit LSI bipolar ROM-based microprocessor to form the basis of 182 instructions. The comprehensive instruction set reflects compiler, execution and operating systems requirements
- 16-port terminal controller with autospeed detect and type 103 modem capability for effective communications with terminals
- 16-channel SIO multiplexer with 880,000 byte/second transfer rate for rapid data transfers

### MULTIPROGRAMMED EXECUTIVE OPERATING SYSTEM

- Virtual memory in the form of code segmentation provides cost-effective use of main memory and the capability to handle large programs
- Dynamic memory manager for maximum memory utilization
- Advanced file system for extensive data handling
- Automatic input and output spooling for efficient peripheral usage
- Accounting and logging to aid system management
- Comprehensive file security for protection of sensitive data
- Simple file and program backup on magnetic tape for data integrity
- Power-fail with auto-restart for continuous system operation
- On-line peripheral access and resource sharing for flexible I/O use

### MINI DATACENTER CONFIGURATION

The four different hardware configurations use a common multi-user operating system built on a full hardware implementation of stack architecture. These Mini DataCenters with their specific hardware, sets of peripherals and selected software, represent the various levels of throughput and capability to handle a specific number of functions.

HEWLETT  PACKARD

## Model 50 Mini DataCenter



The Model 50 Mini DataCenter is the smallest of the HP 3000CX Series. It consists of 96 Kbyte processor, 5-megabyte disc, 800-bpi magnetic tape unit, system console and a 16-port asynchronous terminal controller. It is a starter system—the basic building block from which larger, more powerful systems may be formed.

### HARDWARE SUPPLIED

HP 3000CX fundamental hardware, including:

- central processing unit (CPU)
  - 96 Kbytes of core memory
  - memory controller
  - system clock
  - 16-port asynchronous terminal controller
  - 16-channel SIO multiplexer
  - Hard copy system console
  - cabinet bays, card cages and power supplies
- 30110A: 4.9 million-byte moving-head cartridge-disc unit
- 30115A: 800-bpi magnetic tape unit

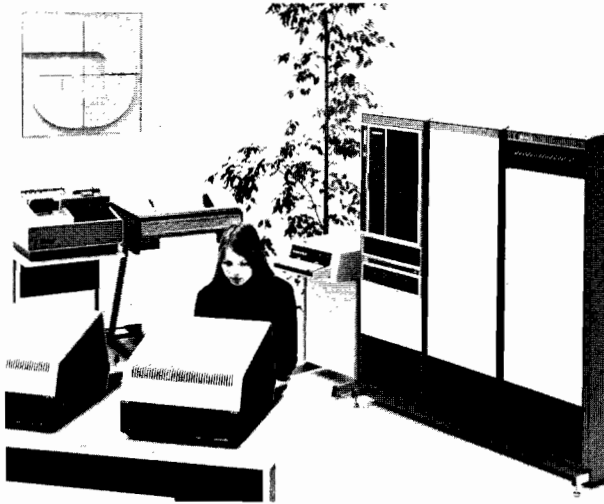
### FUNDAMENTAL OPERATING SOFTWARE

- multiprogramming executive operating system (MPE/C)
- systems programming language (SPL)
- text editor (EDIT)
- program debugging aids (DEBUG and TRACE)
- file-copying utilities (FCOPY)
- sort and merge subsystems (SORT)

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**For research and education purposes only.**

## Model 100 Mini DataCenter



The Model 100 Mini DataCenter provides increased interactive terminal and batch processing capabilities. A wide range of software makes the Model 100 ideal for scientific, commercial and timesharing applications requiring terminal oriented processing. Depending on the specific application, the system can support four to eight terminals. With optional core expansion it can support as many as 16 terminals.

### TIMESHARING OPTION

A timesharing option, including a full BASIC compiler, and a BASIC interpreter is available. The interpreter provides an effective program development medium, while the full compiler provides efficient execution of frequently run programs.

### SCIENTIFIC AND BUSINESS OPTIONS

A versatile on-line interactive editor, ANSI standard FORTRAN compiler, scientific library and statistical analysis software package, provide a powerful scientific processing capability. For business oriented applications, the Model 100 offers RPG II with hardware decimal instruction.

### MINI DATACENTER FEATURES

On-line disc storage of 14.75 million bytes is provided by a fast-access moving-head disc operating through a special high-speed channel. The disc, with 5-ms maximum track-

to-track positioning and data transfer rate of 937.5 Kbytes/sec are the basis of the system's terminal responsiveness. An 800-bpi, 9-track (NRZI), IBM-compatible tape unit provides an efficient data-file backup mechanism.

### HARDWARE SUPPLIED

HP 3000CX fundamental hardware, including:

- central processing unit (CPU)
- 96 Kbytes of core memory
- memory controller
- system clock
- 16-port asynchronous terminal controller
- 16-channel SIO multiplexer
- selector channel
- hard-copy system console
- cabinet bays, card cages and power supplies

30106A 600-cpm card reader

30129A 15 million-byte cartridge disc unit

30115A 800-bpi magnetic tape unit

30118A 200-lpm line printer

### FUNDAMENTAL OPERATING SOFTWARE

- multiprogramming executive operating system (MPE/C)
- systems programming language (SPL)
- text editor (EDIT)
- program debugging aids (DEBUG and TRACE)
- file-copying utilities (FCOPY)
- sort and merge package (SORT)

### SOFTWARE OPTIONS

Timesharing Option

- BASIC interpreter (32101A)
- BASIC compiler (32103A)

Scientific Option

- FORTRAN compiler (32102A)
- scientific library (32205A)
- statistical analysis package (32204A)
- expanded instruction set – extended precision floating point (30011A)

Business Option

- RPG II compiler (32104A)
- expanded instruction set – decimal (30011A-001)

# Model 200 Mini DataCenter



The Model 200 Mini DataCenter is ideal for the terminal-oriented user. Enhancing the operating system are 128 Kbytes of core memory and a system swapping disc. This combination extends the number of terminal users allowing an additional 16-port terminal controller.

### **TIMESHARING OPTION**

A BASIC interpreter and BASIC compiler comprise the timesharing option. File independence and virtual memory are features that allow the user to broaden the scope of an application and maintain the benefits of on-line processing.

### **SCIENTIFIC OPTION**

An ANSI FORTRAN IV compiler, scientific library, statistical analysis package and floating-point hardware are available through the scientific option. The performance enhancements of the system bring more resources to a greater number of engineering users.

### **BUSINESS OPTION**

A full capability terminal, the HP 3000 system's technological contribution to the commercial user, is augmented by the Model 200, which adds another dimension allowing even more terminal users. This capability is complemented by 47 million bytes of mass storage, a 600-cpm card reader and a 200-lpm line

printer. The commercial hardware and software options include an ANSI COBOL compiler, RPG II compiler and decimal arithmetic hardware.

### **HARDWARE SUPPLIED**

HP 3000CX fundamental hardware, including:

- central processing unit (CPU)
- 128 Kbytes of core memory
- memory controller
- system clock
- 16-port asynchronous terminal controller
- 16-channel SIO multiplexer
- selector channel
- hard-copy system console
- cabinet bays, card cages and power supplies
- 30102A 47-million-byte moving-head disc
- 30129A 4.4-million-byte system disc
- 30106A 600-cpm card reader
- 30115A 800-bpi magnetic tape unit
- 30118A 200-lpm line printer

### **FUNDAMENTAL OPERATING SOFTWARE**

- multiprogramming executive operating system (MPE/C)
- systems programming language (SPL)
- text editor (EDIT)
- program debugging aids (DEBUG and TRACE)
- file-copying utilities (FCOPY)
- sort and merge package (SORT)

### **SOFTWARE OPTIONS**

Timesharing Option

- BASIC Interpreter (32101A)
- BASIC compiler (32103A)

Scientific Option

- FORTRAN compiler (32102A)
- scientific library (32205A)
- statistical analysis package (32204A)
- expanded instruction set — extended precision floating point (30011A)

Business Option

- ANSI COBOL compiler (32213B)
- RPG II compiler (32104A)
- expanded instruction set — decimal (30011A-001)



The Model 300 Mini DataCenter is designed for the maximum processing needs of today's computer user. The Model 300 Mini DataCenter can handle six to 32 users in both batch and terminal-oriented environments. It features a hardware-implemented stack, code sharing, microcoded instruction set and virtual memory. These features enable users to implement applications with minimal impact on overall system resources.

### **TIMESHARING OPTION**

Timesharing users are provided an option which includes a BASIC interpreter and a full BASIC compiler. Efficient software, a fixed-head disc and a powerful CPU offer concurrent terminal users more capability than any other minicomputer.

### **SCIENTIFIC OPTION**

A FORTRAN compiler, scientific library, statistical analysis package and floating-point instruction hardware are featured in the scientific option. Versatile on-line capabilities and powerful batch features give users the needed tools and performance.

## **Model 300 Mini DataCenter**

### **BUSINESS OPTION**

This option provides a Data Base Management package (IMAGE/3000) and a Data Base Inquiry facility (QUERY/3000). Also included are RPG II, ANSI COBOL, and decimal arithmetic hardware. These features added to HP's MPE/C operating system, text editor, sort and merge package, file copier, program debug intrinsics, a card reader/punch, 47 Mbyte storage device and 1250-lpm line printer, give the production-oriented user full system capabilities in a multi-user environment.

### **HARDWARE SUPPLIED**

HP 3000CX fundamental hardware, including:

- central processing unit
- 128 Kbytes of core memory
- memory controller
- system clock
- 16-port asynchronous terminal controller
- 16-channel SIO multiplexer
- selector channel
- hard-copy system console
- cabinet bays, card cages and power supplies
- 30102A 47 Mbyte moving-head disc
- 30129A 4.4 Mbyte system disc
- 30115A 800-bpi magnetic tape unit
- 30119A card reader punch, includes:
  - 200-cpm card reader
  - up to 75-cpm card punch
- 30128A 1250-lpm line printer

### **FUNDAMENTAL OPERATING SOFTWARE**

- multiprogramming executive operating system (MPE/C)
- systems programming language (SPL)
- text editor (EDIT)
- program debugging aids (DEBUG and TRACE)
- file-copying utilities (FCOPY)
- sort and merge package (SORT)



## SOFTWARE OPTIONS

### Timesharing Option

- BASIC interpreter (32101A)
- BASIC compiler (32103A)

### Scientific Option

- FORTRAN compiler (32102A)
- scientific library (32205A)
- statistical analysis package (32204A)

- expanded instruction set – extended precision floating point (30011A)

### Business Option

- ANSI COBOL compiler (32213B)
- RPG II compiler (32104A)
- IMAGE/3000 data base management package (32215A)
- QUERY/3000 data base inquiry facility
- expanded instruction set – decimal (30011A-001)



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# HP 3000CX Mini DataCenters ... There Are No Equals

You'll find few systems that offer a single operating system for concurrent execution of batch, real-time and time-share with a common file system for all. And in the price range of an HP 3000CX Mini DataCenter, there is only Hewlett-Packard.

**The only minicomputer system** that lets you work simultaneously in any mode from multiple interactive terminals concurrently. Or lets you do it in RPG, COBOL, FORTRAN, BASIC and SPL at the same time; even mixing languages in the same program. Or permits terminal accessed input-output pooling.

**The only minicomputer system** that implements virtual memory and code-sharing programming in hardware to free you from the memory consuming inefficiencies of afterthought software implementation.

**The only minicomputer system** that offers decimal arithmetic and extended precision floating point as time saving microprocessor features. Or come with a built-in debug and trace to cut program check-out time in half.

**The only minicomputer system** that offers you as extensive an array of batch and terminal access capabilities.

**The only minicomputer system** that offers a BASIC interpreter plus a full BASIC compiler with execution as much as 10 times faster than those attainable with incremental compilers.

And, of course, Hewlett-Packard offers you the world-wide delivery and maintenance network, the HP guarantee and HP's tradition of quality.

Write or phone your nearby HP sales engineer.



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